



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA



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

MONITORING PLAN

IN SUPPORT OF THE INTEGRATED WATER USE LICENSE APPLICATION



Draft

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1 PROJECT OVERVIEW

1.1 Project Background and Motivation

The Western Cape Water Supply System (WCWSS) serves the City of Cape Town (CCT), surrounding urban centres and irrigators. It consists of infrastructure components owned and operated by both the CCT and the DWS (Department of Water Affairs, 2012). In 2007, the Western Cape Reconciliation Strategy Study (WCRSS) was commissioned by the Department of Water and Sanitation (DWS) (then the Department of Water Affairs and Forestry – DWAF) to facilitate the reconciliation of predicted future water requirement scenarios for a 25 year planning horizon.

According to the WCRSS undertaken in 2007, the WCWSS’s total present water use was estimated at about 465 million m³/a with the existing sources yielding only about 475 million m³/a (DWAF, 2007). The study also noted that whilst the Berg Water Project (Berg River Dam and its supplement scheme) would increase the yield to 582 million m³/a from 2007, the estimated water requirement (even with water conservation and demand management) by 2019 could exceed this. The implication is that the system supply would then be fully utilised and thus additional interventions would thus be required to come online by that time (**Figure 1**) (DWAF, 2007).

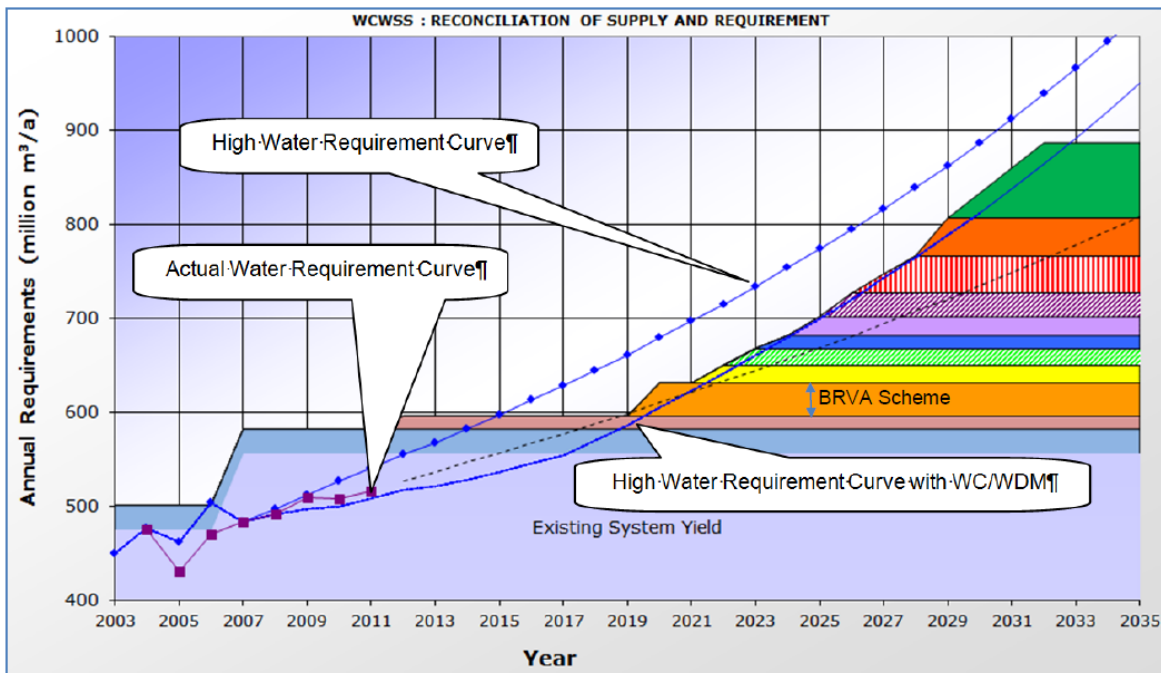


Figure 1: WCWSS Reconciliation of Supply and Requirements (DWA, 2012a)

The WCRSS identified the need for augmentation of the WCWSS by 2019. Based on this, the DWS appointed the Western Cape Water Consultants Joint Venture (WCWC JV) to undertake pre-feasibility level (Phase 1) investigations into six potential surface water development options. These options included the following:

- Michell’s Pass Diversion Scheme;
- First Phase Augmentation of Voëlvlei Dam;
- Further Phases of Voëlvlei Dam Augmentation;
- Molenaars River Diversion;
- Upper Wit River Diversion; and
- Further Phases of the Palmiet Transfer Scheme.

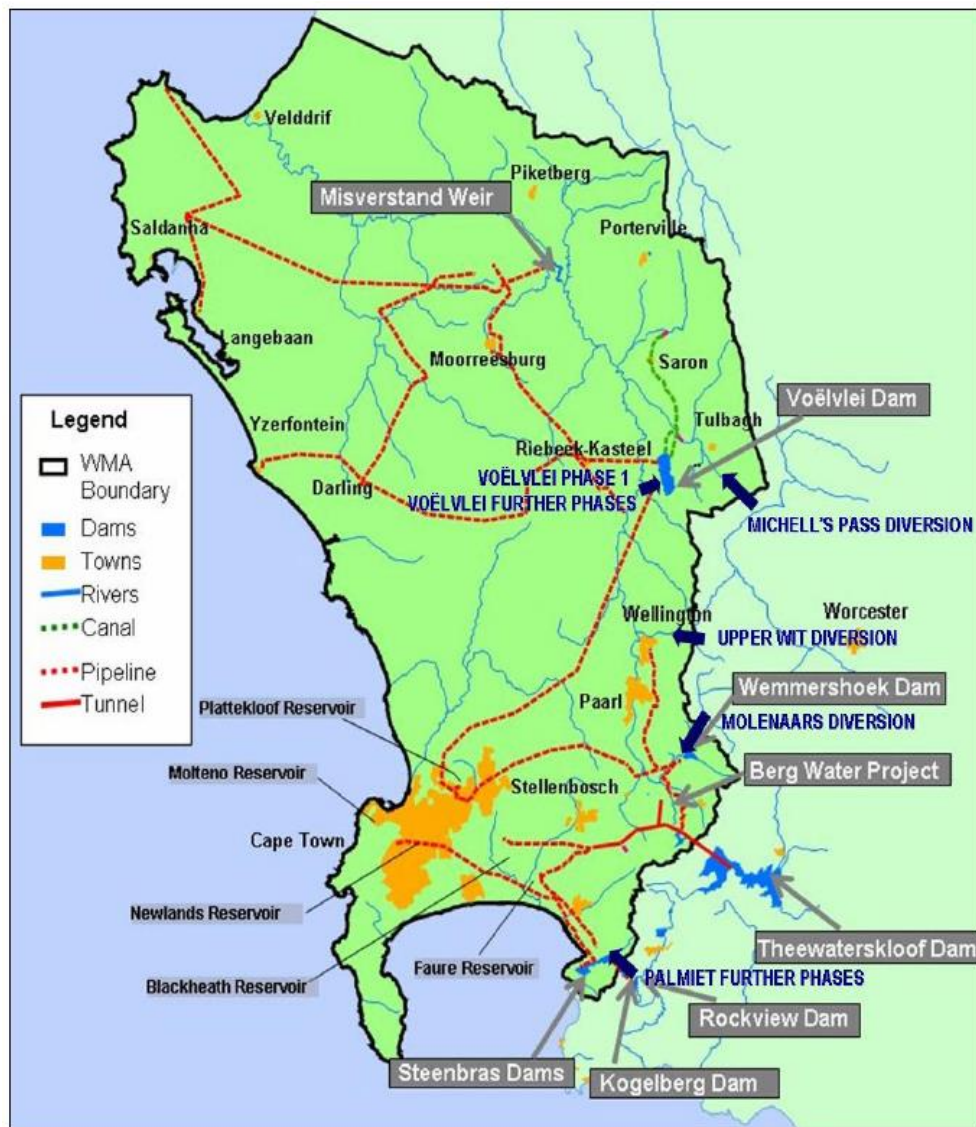


Figure 2: The WCWSS and the Location of the Options Investigated (DWA, 2010)

Based on the findings of the pre-feasibility study, the six possible options investigated were then prioritised to identify the two most viable options for further investigation at a Feasibility Study level in Phase 2. The Phase 1 outcome indicated the following two priority schemes.

- Berg River-Voëlvlei Augmentation Scheme (BRVAS) (also known as the First Phase Augmentation of Voëlvlei Dam); and
- Breede-Berg Transfer Scheme (BBTS) (also known as the Michell's Pass Diversion Scheme).

It was then found that the BRVAS option was the more favourable surface water intervention option of the two, primarily due to lower environmental impacts.

1.2 Project Location and Catchment Context

The project area is situated in Western Cape in the Drakenstein Local Municipality of the Cape Winelands District Municipality as well as the Swartland Local Municipality of the West Coast District Municipality (**Figure 3**).

The proposed development falls within the Berg River Catchment of the Berg–Olifants Water Management Area (WMA). The Berg River Catchment covers an area of almost 9 000 km² in the Western Cape Province, and is subdivided into 12 quaternary catchments ranging in size from 125 km² near the headwaters to 2000 km² in the drier western parts of the catchment (**Figure 4**) (C.A.P.E., 2008). Both Voëlvlei Dam and the proposed Berg River abstraction site are located in quaternary catchment, G10F of the Berg River Catchment.

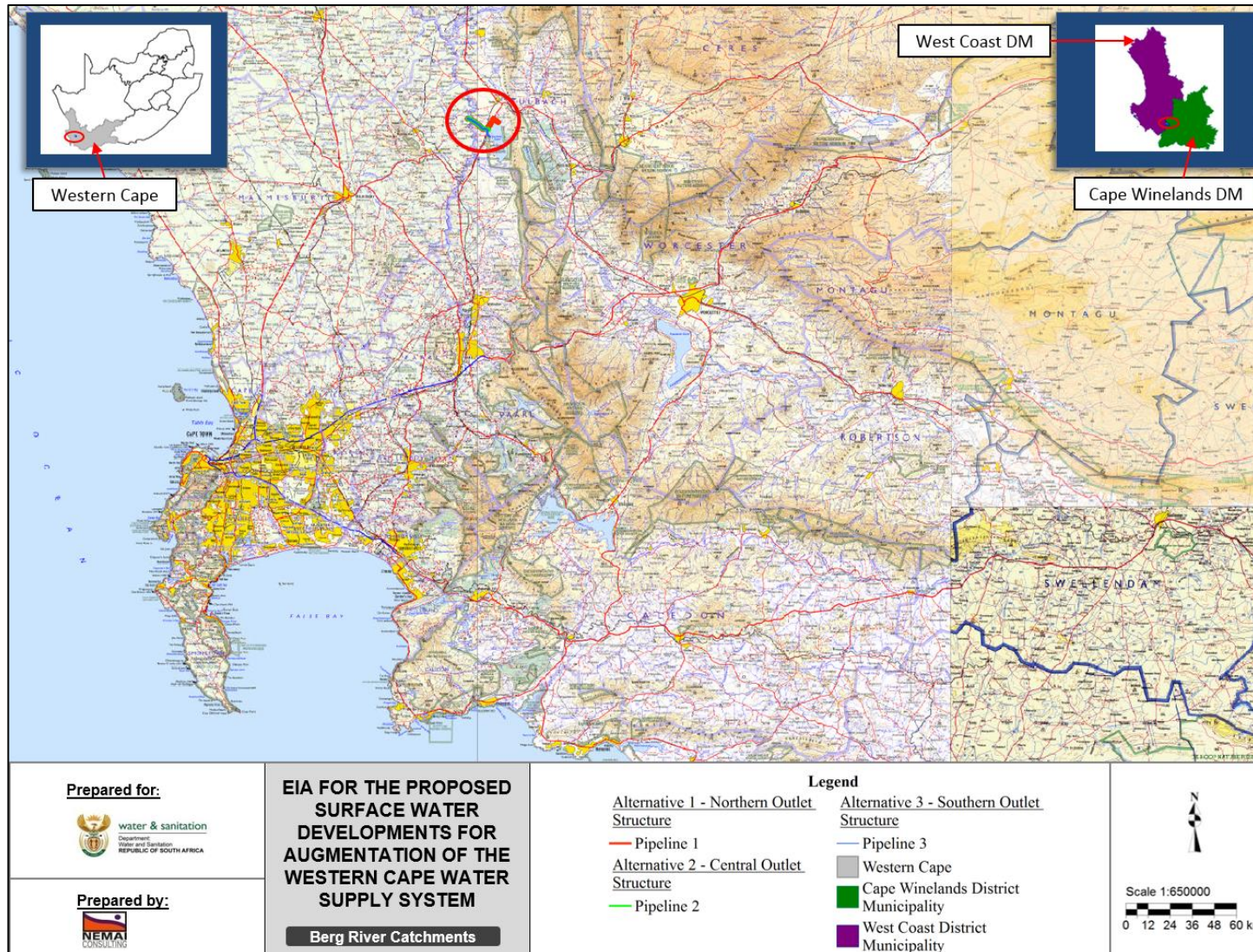


Figure 3: Locality Map

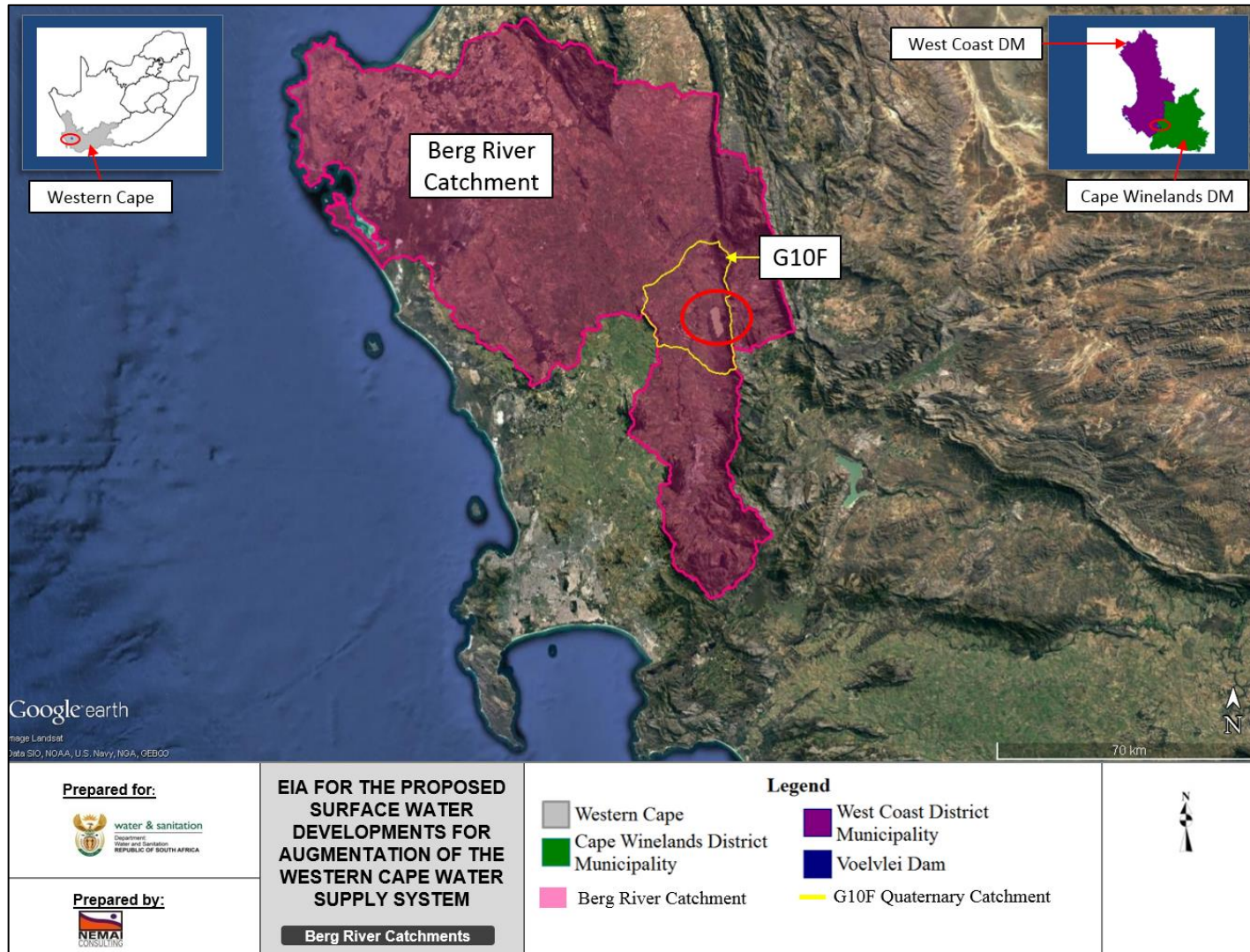


Figure 4: Berg WMA and Berg River Catchment

1.3 Project Components

The project components are illustrated in **Figure 5** below and include the following:

- A low level weir, abstraction works and 4m³/s raw water pump station on the Berg River;
- A rising main pipeline from the Berg River to Voëlvlei Dam; and
- A potential new summer release connection at the existing Swartland WTW to facilitate summer releases into the Berg River for environmental requirements thus eliminating the need to utilize the existing canal from which water losses occur.

The following associated infrastructure was identified:

- Abstraction works;
- Rising main pipeline and pump station;
- Diversion weir;
- Access roads during construction;
- Access roads during operation; and
- Construction camp (footprint).

Three alternative pipeline routes are considered as part of the BRVAS scheme (**Figure 5**). These routes are related to three potential discharge options into the dam from the diversion weir site. These alternative routes are as follows:

- Option 1: Pipeline route to Northern Discharge Point = 8 115 m;
- Option 2: Pipeline route to Central Discharge Point = 5 000 m; and
- Option 3: Pipeline route to Southern Discharge Point = 6 300 m.

1.4 Water Use

The proposed surface water developments for augmentation of the WCWSS requires authorisation from the DWS. In terms of Section 40 of the NWA, each party proposing a water use, as defined in Section 21 of the Act, must seek authorisation before such water use can commence. The water uses as set out in Section 21 of the Act apply to the proposed developments and therefore require authorisation are listed in **Table 1**:

Table 1: Water uses associated with the project

Water Use Type		Project Activities
Section 21(a)	Taking water from a water resource	<ul style="list-style-type: none"> Water abstraction from the Berg River into Voëlvlei Dam.
Section 21(c)	Impeding or diverting the flow of water in a watercourse	<ul style="list-style-type: none"> Traversing of delineated wetlands and riparian zone.
Section 21(i)	Altering the bed, banks, course or characteristics of a watercourse	<ul style="list-style-type: none"> Developments within 500m of wetlands (regulated area): the rising main pipeline, access roads, weir, and pump station. The encroachment of the 1:100 floodlines by the rising main pipeline, access roads, weir, and pump station. Discharge of water from the Berg River into Voëlvlei Dam.

2 MONITORING PLAN

Monitoring is required to ensure that the receiving environment at proposed surface water developments for augmentation of the WCWSS is suitably safeguarded against the identified potential impacts, and to ensure that the environmental management requirements are adequately implemented and adhered to during the execution of the project. This monitoring plan only focuses on water resources and provision is made in the Environmental Management Programmes compiled as part of the Environmental Impact Assessment for all other features of the receiving environment.

2.1 Baseline Monitoring

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

The environmental parameters to be included in the baseline monitoring are shown in **Table 2**.

Table 2: Baseline Monitoring Requirements

Environmental Parameter	Monitoring Locations	Requirements
Water Quality	<ul style="list-style-type: none"> All major watercourses to be affected by the project, including the affected Berg River. Sites to be located at suitable locations up- and downstream of the construction sites and in-stream works, to be determined in consultation with the ECO. <i>In situ</i> water quality monitoring to be conducted. 	<ul style="list-style-type: none"> Comply with relevant standards – SANS 5667.
Air Quality	<ul style="list-style-type: none"> Dust fallout units to be located taking into consideration significant sources of air pollution, sensitive receptors, and dominant wind direction. Particulate matter (PM₁₀) – strategic monitoring point(s) to be selected. 	<ul style="list-style-type: none"> Dust fallout – comply with ASTM D1739; SANS 1929, SANS 69. Particulate matter (PM₁₀) – comply with the National Ambient Air Quality Standards.
Noise	<ul style="list-style-type: none"> Noise monitoring sampling sites to be located taking into consideration significant sources of noise, sensitive receptors, and dominant wind direction. Sites to coincide with dust fallout sites (where relevant). 	<ul style="list-style-type: none"> Comply with SANS 10103:2008.

2.2 Environmental Monitoring

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

The environmental parameters to be included as part of the environmental monitoring programme, which is to be undertaken by the Contractor, includes the following:

1. Water quality;
2. Air Quality
 - a. Dust fallout;
 - b. Particulate matter (PM₁₀); and
3. Noise.

The following requirements need to be incorporated into the programme:

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

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

In addition, as recommended by the Aquatic and Wetland Specialist, an aquatic ecologist with fishway experience should monitor the construction phase of the project, in order to assess compliance and to also provide guidance for riparian and fishway related matters that arise.

2.3 Compliance Monitoring and Auditing

Compliance monitoring will commence in the pre-construction phase, where those conditions in the Environmental Authorisation 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 weekly inspections of the site and at least 6 monthly full compliance auditing against the EMPr and Environmental Authorisation. The aforementioned reports will be submitted to the Project Manager, EMC and DEA for their records.

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

1. The holder of an Environmental Authorisation must, for the period during which the Environmental Authorisation, and EMPr, remain valid -
 - a. Ensure that the compliance with the conditions of the Environmental Authorisation, and EMPr is audited; and
 - b. Submit an environmental audit report to DEA.
2. The environmental audit report must-
 - a. Be prepared by an independent person with the relevant environmental auditing expertise;
 - b. Provide verifiable findings, in a structured and systematic manner, on-
 - i. The level of performance against and compliance of an organization or project with the provisions of the requisite Environmental Authorisation or EMPr; and
 - ii. 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;
 - c. Contain the information set out in Appendix 7 of GN No. R 982 (4 December 2014); and
 - d. Be conducted and submitted to DEA at intervals as indicated in the Environmental Authorisation.
3. The environmental audit report must determine-
 - a. 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
 - b. The level of compliance with the provisions of Environmental Authorisation, and EMPr.

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

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

2.4 Implementation Programme

The implementation programme for environmental monitoring is provided in **Table 3**.

Table 3: Monitoring Implementation Programme

No.	Monitoring Aspect	Objectives	Parameters to monitor	Monitoring/Sampling Frequency	Responsible Party	Performance indicators	Resource Requirement	Actions	Methodology
1.	Surface water	<p>Instream monitoring</p> <p>Detect any change in the quality of surface water which may be caused by the construction of the project infrastructure.</p>	<ul style="list-style-type: none"> Chemical oxygen demand Total ammonia Copper Iron Lead Nitrite/Nitrate Orthophosphate Zinc Faecal coliform bacteria Sodium (Na) Soap, oil and grease Manganese Fluoride 	<ul style="list-style-type: none"> <i>In situ</i> – daily. Laboratory - fortnightly. Additional monitoring may also be required in cases of incidents (e.g. spillages into or adjacent to the watercourse), storm events, intensive instream works, complaints from downstream community, visible signs of pollution or at the discretion of the Engineer's Environmental Officer. 	Contractor & ECO.	<ul style="list-style-type: none"> SANS 5667. Compare water quality results with baseline values. South African Water Quality Guidelines (SAWQG): <ul style="list-style-type: none"> Volume 4 - Agricultural use: Irrigation; Volume 5 - Agricultural use: Livestock; and Volume 7 - Aquatic Ecosystems. 	<ul style="list-style-type: none"> Hand-held testing equipment. Sampling bottle. 	<ul style="list-style-type: none"> Water quality monitoring will be conducted as per WUL Condition. Sample collection and transportation must comply with the relevant standards. Off-site analysis must be performed by an accredited laboratory. 	Measurements of the quality of the water resource at specific intervals.
		<p>Point Source Discharges monitoring</p> <p>Monitor compliance of discharged water with standards to detect pollution.</p>	<p>General limits contained in the General Authorisation (GA) (Government Gazette No. 36206, Notice No. 169 of 2013).</p>	<ul style="list-style-type: none"> <i>In situ</i> – daily. Laboratory - fortnightly. Additional monitoring may also be required in cases of incidents (e.g. spillages into or adjacent to the watercourse), storm events, intensive instream works, complaints from downstream community, visible signs of pollution or at the discretion of the Engineer's Environmental Officer. 	Contractor & ECO.	<ul style="list-style-type: none"> Conditions of the GA. SAWQG: <ul style="list-style-type: none"> Volume 4, Agricultural use: Irrigation; Volume 5, Agricultural use: Livestock; and Volume 7, Aquatic Ecosystems. 	<ul style="list-style-type: none"> Hand-held testing equipment. Sampling bottle. 	<ul style="list-style-type: none"> The Contractor will be required to identify the precise locations of the discharge monitoring points in terms of accessibility and to record the coordinates of these points to ensure consistency during monitoring. It is the 	Measurements of the quality of the discharged water at specific intervals.

No.	Monitoring Aspect	Objectives	Parameters to monitor	Monitoring/Sampling Frequency	Responsible Party	Performance indicators	Resource Requirement	Actions	Methodology
								<p>contractor's duty to test the point source discharge points after the installed treatment equipment, or just before discharge into the environment. Measures should be in place need to be in place to stop discharge immediately if water quality standards are not met.</p> <ul style="list-style-type: none"> Sample collection and transportation must comply with the relevant standards. Off-site analysis must be performed by an accredited laboratory. 	
2.	Reinstatement & Rehabilitation	<p>Reinstate and rehabilitate the disturbed areas as closely to their original state as possible, or to pre-determined</p>	<ul style="list-style-type: none"> Construction EMPr provisions. Verify the whether the site has been de-established. Verify whether all structures, equipment, 	All rehabilitation and reinstatement efforts shall be implemented immediately after completion of construction activities.	Contractor	All rehabilitation measures carried out as per specifications of Rehabilitation Plan, Construction EMPr and Closure Plan.	Ecologist / specialist (as required).	<ul style="list-style-type: none"> Adequate reinstatement and rehabilitation of construction areas. Conduct 	Visual observation, site monitoring, photographic records.

No.	Monitoring Aspect	Objectives	Parameters to monitor	Monitoring/Sampling Frequency	Responsible Party	Performance indicators	Resource Requirement	Actions	Methodology
		conditions.	<ul style="list-style-type: none"> materials, waste, rubble are removed from site. Vegetation establishment. Check pre-construction survey photographs. 					concurrent or progressive rehabilitation of areas affected by construction activities that are situated outside of the construction footprint.	
3.	Environmental Awareness Training & Water Conservation training	Ensure that all employees onsite are aware of and understand the conditions of the WUL, Environmental Authorisation and EMPr.	<ul style="list-style-type: none"> Compliance with conditions in WUL and Environmental Authorisation. Implementation of mitigation measures included in the EMPr. 	Daily	Contractor & ECO	<ul style="list-style-type: none"> Proof of the Environmental Awareness & Water Conservation Training. Copy of WUL, Environmental Authorisation and EMPr must be kept on site. 	Attendance Registers and an outline of the content of the training session.	Weekly toolbox / awareness talks, including register.	Weekly toolbox / awareness talks, including register.
4.	Stormwater Management	Prevent sediment laden stormwater runoff from entering watercourses.	<ul style="list-style-type: none"> Measured sediment loads. Indicators of erosion. 	Weekly	Contractor & ECO	Effectiveness of stormwater management measures.	Hay bales, sediment pond, sediment fences & sand bags.	Disperse runoff and prevent concentration of stormwater flow.	Implementation of specifications included in stormwater management plan.
5.	Waste Management	Prevent pollution and/or disposal of any material or waste into the watercourse.	Implementation of waste management measures in EMPr.	Daily	Contractor	Safe disposal certificates & Waste Disposal Slips	Skips and/or bins.	<ul style="list-style-type: none"> Site clean-up Oils and pollutants and other pollutants must be disposed of in appropriate licensed site. 	Refuse (i.e. all construction waste such as rubble, cement bags, waste cement, timber, can, other containers, wire and nails) shall be collected and stored in demarcated, fenced areas in skips and/or bins.

No.	Monitoring Aspect	Objectives	Parameters to monitor	Monitoring/Sampling Frequency	Responsible Party	Performance indicators	Resource Requirement	Actions	Methodology
6.	Construction Footprint	Confine all construction to demarcated construction footprint.	Visual observations verifying whether all construction activities shall be restricted to working areas designated on the drawings and/or demarcated.	Daily	ECO Contractor	& Observations	Fence, shade cloth.	Demarcate and fence off construction area.	<ul style="list-style-type: none"> No members of the construction team/s will be permitted to loiter away from the construction campsite. All construction activities restricted to demarcated area.
7.	Erosion Control	Erosion control measures to be implemented and maintained.	Erosion Control Measures.	Weekly	ECO Contractor	& Observations	Hay bales, sand bags or silt fences.	Implement & Inspect Erosion Control Measures	<ul style="list-style-type: none"> Implement permanent or temporary erosion control measures. Temporary measures would include placement of hay bales, sand bags; silt fences; intercept silt-laden runoff from construction site camp and storage area. A further measure is the diversion of surface runoff away from construction areas by the use of berms. Effectiveness of erosion control measures to be measured against the

No.	Monitoring Aspect	Objectives	Parameters to monitor	Monitoring/Sampling Frequency	Responsible Party	Performance indicators	Resource Requirement	Actions	Methodology
									EMPr and the final storm water management plan to be submitted by the contractor. • Monitoring checklist.
8.	General Compliance Monitoring	Check for adherence to the WUL, Environmental Authorisation and EMPr.	Specific conditions of the WUL, Environmental Authorisation and EMPr.	Daily / as required	ECO Contractor	Conditions are satisfied / complied with. Proof to be kept on file.	ECO Monitoring Reports	<ul style="list-style-type: none"> • ECO site appraisal • ECO to check – <ul style="list-style-type: none"> ○ Files and records ○ Public complaints register ○ Record of environmental incidents • ECO Report – submission to project team and authorities (as required) 	