



TRANS-CALEDON TUNNEL AUTHORITY

**CONSULTING SERVICES FOR THE MOKOLO CROCODILE
WATER AUGMENTATION PROJECT PHASE 2
(MCWAP-2)**

CONTRACT № TCTA 20-041

**DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED
UPGRADING & CONSTRUCTION OF NEW FLOW GAUGING
STRUCTURES FOR THE RIVER MANAGEMENT SYSTEM AS
PART OF THE MCWAP2**

June 2024

GBN JOINT VENTURE

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MOKOLO CROCODILE WATER AUGMENTATION PROJECT PHASE 2
(MCWAP-2)

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MOKOLO CROCODILE WATER AUGMENTATION PROJECT PHASE2

CONTRACT № TCTA 20-041

DRAFT BASIC ASSESSMENT REPORT

EXECUTIVE SUMMARY

The Mokolo Crocodile River (West) Water Augmentation Project Phase 2A (MCWAP-2A) is a Strategic Integrated Project 1 (SIP 1) (refer to letter in Annexure A). The overall Mokolo Crocodile River (West) Water Augmentation Project Phase 2A consists of the following components:

- Water Transfer Infrastructure (WTI), which entail an Abstraction Weir at Vlieëpoort on the Crocodile River (West); Desilting Works, Raw Water Pipeline, Balancing Reservoirs and Pump Stations in order to abstract and transfer of water from Crocodile River (West) to Lephalele.
- A River Management System (RMS) to manage abstractions from, and the river flow in, the Crocodile River (West) between Hartbeespoort Dam and Vlieëpoort Weir, the Moretele River from Klipvoor Dam up to the confluence with the Crocodile River (West), the reach of the Elands River from Vaalkop Dam up to the confluence with the Crocodile River (West), and also the required flow over (past) the Vlieëpoort Weir. Including the construction of three new weirs.

The MCWAP 2A received the first issue of its Environmental Authorisation (EA) (reference number 14/12/16/3/3/2/1100), from the Department of Forestry, Fisheries and the Environment (DFFE) on 18 March 2019, for which a Scoping and Environmental Impact Assessment (EIA) process conducted for the WTI and RMS (refer to Annexure B1). Subsequently, the second EA was issued on 13 October 2022 for the required deviations of various project components and telecommunication structures identified during the preliminary design phase (from the first EA issue) (refer to Annexure B2).

MCWAP 2A is also associated with 30 material sources i.e. borrow pits that was applied for at Department of Mineral Resources and Energy (DMRE). Twenty-three (23) of these borrow pits were initially subjected to an EIA process and received Environmental Authorisation (DMRE Reference: LP30/5/1/1/3/2/1 (00257) EM) on 6 January 2022 (refer to Annexure B3). Seven (7) additional borrow pits have further been identified and been subjected to individual Basic Assessment Processes for which Environmental Authorisation (DMRE Reference: LP30/5/1/1/3/2/1 (00311,312,313, 314,315,316 &317 BP) EM) was received on 5 September 2022 (refer to Annexure B4).

The GIBB-Bigen-Nyeleti Joint Venture (GBN-JV) on behalf of the Applicant, Department of Water and Sanitation (DWS), is applying for EA, in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the 2014 EIA Regulations (as amended), subject to a Basic Assessment process. The Basic Assessment application is for the updated River Management System (RMS) component where the existing Atlanta and Beestekraal gauging weirs are being rehabilitated and two flow measuring alternatives considered namely a new crump weir to be constructed just downstream of the existing Paul Hugo weir or alternatively, a gantry to measure river flow. The approximate coordinates of the site locations of the flow gauging weirs are listed below.

- a) A2H019 (Roodekopjes Dam / Beestekraal Weir) on the Crocodile River (West); S 25.403640°, E 27.574750°

- b) A2H059 (Atlanta Weir) on the Crocodile River (West); S 25.206310°, E 27.557940°
- c) Approximately 50 – 100m downstream of A2H116/A2H132 (Paul Hugo Weir) on the Crocodile River (West); S 24.69508°, E 27.40900°
- d) The Gantry alternative, approximately 10 to 20 meters above A2H116/A2H132 (Paul Hugo Weir) on the Crocodile River (West); S 24.6951389°, E 27.4088361°

Note that the numbers, e.g. A2H083, are the DWS numbers for the various existing flow gauging stations/weirs.

PUBLIC PARTICIPATION PROCESS

The Public Participation Process (PPP) for this Draft Basic Assessment Report (BAR) will be conducted according to Regulation 39 to 44 of the NEMA EIA Regulations 2014 (as amended 2017). A preapplication meeting was held on 11 April 2023 with the Department of Forestry, Fisheries and the Environment (DFFE) (refer to Annexure C1 for the minutes and presentation of the pre-application meeting), whereby the GBN-JV presented the PPP for the Basic Assessment process.

The 30 calendar days comment period, as per the regulations for Interested and Affected Parties (I&APs) to review and comment on this Draft BAR is from 12 July 2024 to 26 August 2024. The availability of this Draft BAR has been announced to the registered MCWAP 2A I&APs, landowners (directly and adjacent) of the proposed three (3) gauging weirs and alternative site, non-governmental organisations (NGOs) and the government stakeholders (refer to Annexure C2 for the database), by means of email notifications, advertisements in two (2) local newspapers, Platinum Bushveld and Kormorant and one (1) national newspaper (The Star), and through the placement of site notices. The advertisements and site notices were placed in English, Afrikaans and Sepedi (refer to Annexure C3).

This Draft BAR is available through the following vehicles:

- Download an electronic copy from the Bigen website (link for downloading: <https://bigengroup.com/who-we-are/downloads/>); and
- A hard copy has been placed at the Public Libraries of the Thabazimbi and Madibeng Municipalities.

SPECIALIST STUDIES

The GBN-JV has integrated the following specialist studies for this Draft BAR:

- Aquatic Biodiversity and Sedimentation Report prepared by M2 Environmental Connections (Pty) Ltd (2023) (refer to Annexure D1);
- Heritage and Palaeontological Impact Assessment by CES - Environmental and Social Advisory Services (2023) (Annexure D2);
- Environmental Ambient Noise Assessment prepared by Rayten Engineering Solutions (Pty) Ltd (2023) (refer to Annexure D3);
- Terrestrial Biodiversity Assessment prepared by M2 Environmental Connections (2023) (refer to Annexure D4);
- Agricultural Impact Assessment prepared by Nsovo Environmental Consulting cc (2023) (refer to Annexure D5);
- Surface Water by Environmental Assurance (Pty) Ltd (2023) (Annexure D6);
- Air Quality by Environmental Assurance (Pty) Ltd (2023) (Annexure D7);

- Civil Aviation Compliance Statement by Delta Built Environment Consultants (2023) (Annexure D8); and
- Defence Compliance Statement by MDTE (2023) (Annexure D9)

Refer to the table below for a summary of the findings of the site-specific specialist studies.

Site specific Specialist Findings

Specialist Study	Specialist Finding	Reference to applicable section of report
Aquatic Biodiversity and Sedimentation Report prepared by M2 Environmental Connections	<p>The outcome of the study for Aquatic Biodiversity and Sedimentation Impact Assessment was that:</p> <ol style="list-style-type: none"> 1. Based on the FRAI study conducted at Paul Hugo Weir a fish ladder may be considered but will not be feasible as it will only have a negligible positive impact due to the upstream Paul Hugo Dam being a considerable barrier. 2. The incorporation of a 32m riparian buffer should be maintained as far as possible during construction phases of the weirs. The riparian areas within the aquatic impact area is not included as it falls within the direct construction area. It is recommended that the wetland specialist assessment be closely analysed alongside the aquatic specialist assessment in order to establish the definitive sensitivity buffer for the wetland and related aquatic systems. Construction activities not related to the direct construction within the Crocodile River such as the site laydown camp area should be established outside the riparian buffer zone. 	Section 5.2.3
Heritage and Palaeontological Impact Assessment by CES	<p>The outcome of the study for Heritage Impact Assessment was that: no archaeological sites were located during the site assessment and no apparent impact on the archaeological landscape is foreseen during the preconstruction, construction and operation phases of the project. The Palaeontology Impact Assessment outcome is that the geological structures suggest that the rocks are either the wrong kind or much too old to contain fossils. Furthermore, the material to be excavated for foundations is soil or bedrock and these do not preserve fossils. Since there is an extremely small chance that trace fossils such as stromatolites from the Chuniespoort Subgroup may be disturbed (Site Atlanta A2H059 only) a Fossil Chance Find Protocol has been added to the report.</p>	Section 5.2.6
Environmental Ambient Noise Assessment prepared by Rayten Engineering Solutions	<p>The outcome of the study for Noise Impact Assessment was that the construction works can have an impact on the surrounding environment. During the construction of the three (3) gauging weirs, it is crucial to anticipate and address the potential noise generated throughout the various phases of the project. Construction activities often involve heavy machinery, drilling, blasting, and earthmoving, all of which can contribute to elevated noise levels. The operation of excavation equipment, such as bulldozers, excavators, crushers, and dump trucks, can produce continuous low-frequency noise. Given the magnitude and intensity of these activities, it is essential to implement effective noise control measures where possible, such as the use of well-maintained construction equipment and engaging with nearby</p>	Section 5.2.8

Specialist Study	Specialist Finding	Reference to applicable section of report
	residence and farmers to inform them when drilling and blasting may occur.	
Terrestrial Biodiversity Assessment prepared by M2 Environmental Connections	<p>The outcome of the study for Biodiversity Impact Assessment was that:</p> <ol style="list-style-type: none"> 1. Beestekraal Weir was classified as having “high sensitivity”. The habitat at the Beestekraal weir consisted of a tall dense riparian zone comprising of <i>Combretum</i>, <i>Vachellia</i>, <i>Senegalia</i>, <i>Ziziphus</i>, <i>Searsia</i>, <i>Olea species</i> and an undergrowth of predominantly <i>Carissa bispinosa</i>, <i>Diospyros lycoides</i> and <i>Megathyrsus maximus</i>, punctuated in places by <i>Scadoxus puniceus</i>, <i>Sansevieria aethiopica</i> and <i>Aloe davyana</i>. Well-developed reed beds (<i>Phragmites australis</i> and <i>Cyperus eragrostis</i>) facilitate significant terrestrial biodiversity by providing foraging and breeding habitat for birds, mammals, reptiles and amphibians with several faunal Species of Conservation Concern (SCCs) expected to utilise the habitat. No floral SCCs or protected species were identified on site. 2. Atlanta Weir was classified as having “low/moderate sensitivity”. The entire riparian area defined by NFEPA as floodplain wetland, inflating the sensitivity of the site. Significant stands of dense reeds house protected reptile species as confirmed on site (African Rock Python) but impacts to this habitat is expected to be low. No floral SCCs or protected species were identified in the area of influence but evidence of otter presence was found. 3. Paul Hugo Weir and the gantry area were also classified as having “low/moderate sensitivity”. The entire riparian area defined by NFEPA as floodplain wetland inflating the sensitivity of the site. No floral SCCs or protected species were identified. 	Section 5.2.4
Agricultural Impact Assessment prepared by Nsovo Environmental Consulting	The outcome of the study for Agriculture Impact Assessment Reports was that the proposed project will have a minimal impact on agriculture since the footprint of infrastructure disturbance, which impedes agriculture, constitutes only a negligible percentage of available land surface area, allowing agricultural activities to continue unhindered. This is because the access roads are located along the existing road and the surface infrastructure is located in areas which are not currently cultivated.	Section 5.2.11
Surface Water by Environmental Assurance	The outcome of the study for the Water Quality Impact Assessment Report was that construction phase and to a lesser extent the operational phase of the weir rehabilitation and re-construction will have an effect on water quality, flow regime, sediment concentration, nutrient levels, aquatic habitats and species as well as on the vegetation in the proposed reconstruction area, although off-site impacts are not expected, and the impact is anticipated to be largely concentrated within the construction area. In order to ensure and prevent this possible outcome, mitigation measures were provided to enable the proposed development to minimise the impact.	Section 5.2.3

Specialist Study	Specialist Finding	Reference to applicable section of report
Air Quality by Environmental Assurance	The outcome of the study for the Air Quality Impact Assessment Report was that the proposed construction phase and to a lesser extent the operational phase of the weir rehabilitation and reconstruction will contribute to the total suspended load in the atmosphere, although off-site impacts are not expected, the impact is anticipated to be largely localised within the construction area. Mitigation measures were provided to enable the proposed development to minimise the impact.	Section 5.2.7
Civil Aviation Compliance Statement by Delta Built Environment Consultants	The assessment found the proposed construction of weirs will have no impact on the civil aviation infrastructure. The proposed structures are situated a significant distance away from the aerodromes and have a height ranging from 1 to 3.5 m above ground level, which is below the elevation of the runways and their associated obstacle-free zones.	Section 5.2.9
Defence Compliance Statement by MDTE	The assessment found the proposed developments are located more than 6 km from the nearest private airfield, and is not within close proximity of any defence installations of concern and is out of the line of sight of any private airfields. The proposed development does not comprise structures of excessive height or having other characteristics that may affect radar systems. The three proposed weirs are unlikely to impact on any military radar installations.	Section 5.2.10

IMPACT ASSESSMENT

The majority of the impacts associated with the proposed three (3) gauging weirs and alternative site would be of a short-term duration and of a local extent. As a result, the majority of the impacts associated with the proposed three (3) gauging weirs and alternative site is considered of an **INSIGNIFICANT TO VERY LOW** significance, after mitigation.

Based on the assessment, which considered specialist studies, it is the Environmental Assessment Practitioner's (EAP) opinion that the **River Management System (RMS) component where the existing Atlanta and Beestekraal gauging weirs are being rehabilitated and two flow measuring alternatives considered namely a new crump weir to be constructed just downstream of the existing Paul Hugo weir or alternatively, a gantry to measure river flow can be authorised with the gantry as the preferred alternative**, with the recommended mitigation measures (refer to Annexure E for the Construction Environmental Management Programme (CEMP_r)) for implementation. This will ensure that all impacts are monitored efficiently, and the significance of impacts limited as far as possible.

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ABBREVIATIONS

BA	Basic Assessment
DBAR	Draft Basic Assessment Report
DFFE	Department of Forestry, Fisheries, and the Environment
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
HIA	Heritage Impact Assessment
IAPs	Interested and Affected Parties
LEDET	Limpopo Economic Development, Environment and Tourism
LEMA	Limpopo Environmental Management Act, No. 7 of 2
MCWAP 2A	Mokolo Crocodile Water Augmentation Project Phase 2A
NEMA	National Environmental Management Act (No. 107 of 1998)
NEM:BA	National Environmental Management Biodiversity Act (Act No. 10 of 2004)
NHRA	National Heritage Resources Act (Act No. 25 of 1999)
NWA	The National Water Act (Act No. 36 of 1998)
OHS	Occupational Health and Safety
PHRA	Provincial Heritage Resources Authority
PPP	Public Participation Process
RSA	Republic of South Africa (where is this mentioned)
SAHRA	South African Heritage Resources Agency
TCTA	Trans-Caledon Tunnel Authority
WTW	Water Treatment Works
WULA	Water Use Licenses Application

1 INTRODUCTION

The GIBB-Bigen-Nyeleti Joint Venture (GBN-JV) on behalf of the Applicant, Department of Water and Sanitation (DWS), is applying for Environmental Authorisation (EA) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) and the 2014 EIA Regulations (as amended), subject to a Basic Assessment process. The Basic Assessment application is, for the River Management System (RMS) component where the Atlanta and Beestekraal gauging weirs will be rehabilitated and the construction of a new flow gauging weir or alternatively a gantry to measure river flow downstream and upstream, respectively (**hereafter referred to as “Project”**).

The project will entail the upgrade and height increases and the construction of three flow gauging weirs: the Beestekraal, Atlanta and Paul Hugo Weir or the construction of a gantry to monitor flow in the river. The project area falls under the jurisdiction of the Madibeng as well as the Thabazimbi Municipalities which is located within the Limpopo (Paul Hugo Weir) and Northwest Provinces (Beestekraal and Atlanta Weirs) (refer to **Figure 1** for the regional Map of the Project Area). The weirs are located on various properties and land use in the area is predominantly agriculture in the form of vegetable, maize, cotton, wheat, and pasture cultivation.

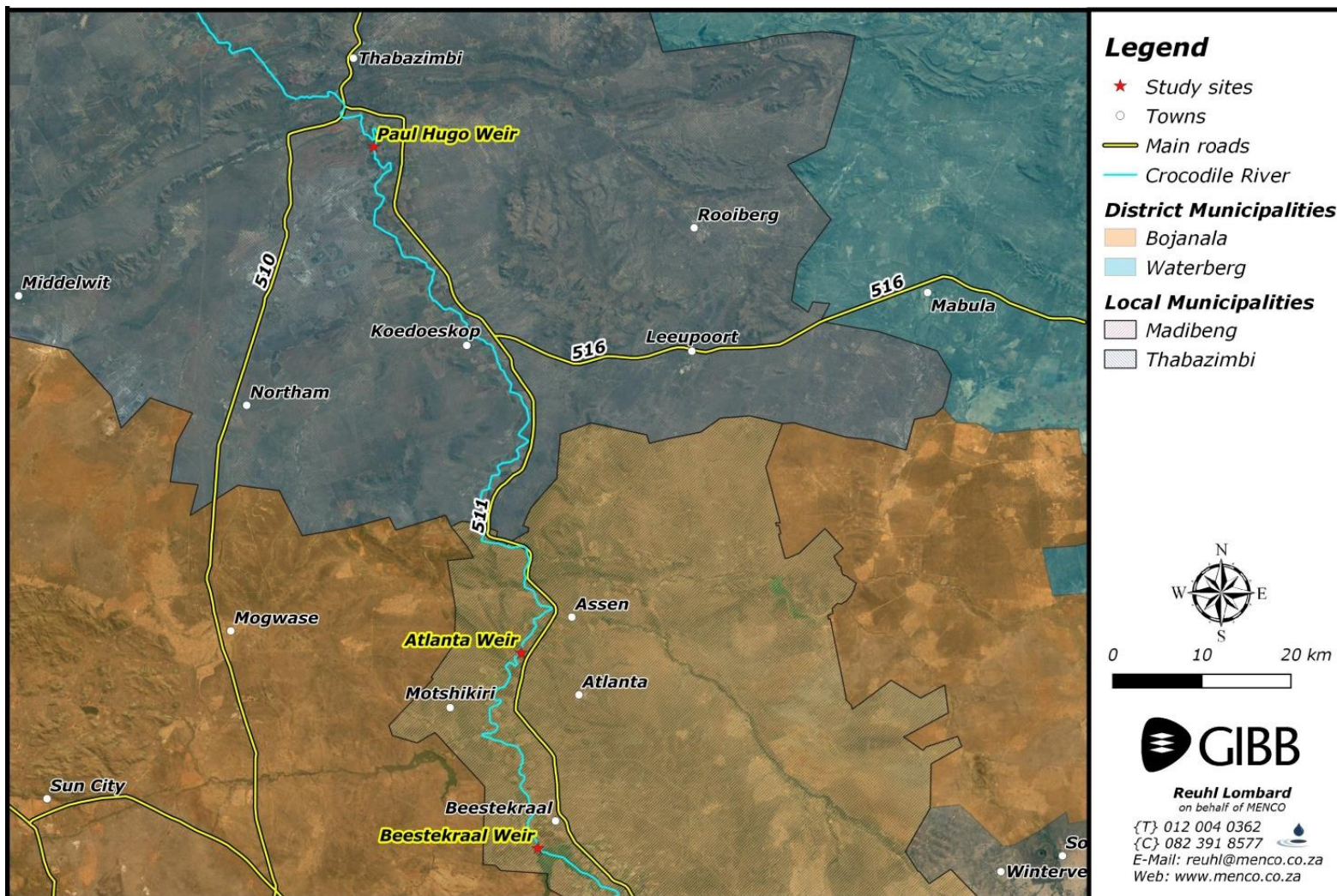


Figure 1: Regional Map of the Project Area

1.1 Background to the MCWAP2A

Mokolo Crocodile Water Augmentation Project Phase 2 (MCWAP-2A) was resuscitated for the following reasons:

- Government identified and approved 18 Strategic Integrated Projects (SIPs) across the RSA to support economic development and address service delivery in the poorest provinces. SIP 1 entails the unlocking of the Northern Mineral Belt with Waterberg as the catalyst. Investment in rail, water and transmission infrastructure and energy generation will catalyse unlocking rich mineral resources in Limpopo resulting in thousands of direct jobs across the areas covered. The MCWAP includes the water infrastructure needed for SIP 1. Due to the priority accorded by Government to such SIP projects, it was prudent to give priority to the future water needs of the Lephalale area in support of the national development imperatives;
- MCWAP-1 augments the supply from Mokolo Dam and is already operational since June 2015. It serves as an interim measure to supply in the growing water requirements of Lephalale, Eskom and Exxaro. This solution will over the long term optimally utilise the full yield from Mokolo Dam. The sustainable yield of Mokolo Dam is however not sufficient to meet the increased needs of the users, including the pollution abatement measures (FGD) which is an environmental and funding condition;
- A suitably sized transfer pipeline from the Crocodile River (West) can be implemented timeously to meet the increased requirements to support the RSA's economy. MCWAP-1 will be operated as a system together with proposed MCWAP-2A when the latter is completed. MCWAP-2A will also serve to provide the necessary assurance of water supply to the strategic end users from independent sources; and
- The water requirements have been finalised to the degree that is adequate to make informed economic decisions with respect to the transfer capacity of MCWAP-2A.

The overall MCWAP-2A consists of the following components:

- Water Transfer Infrastructure, which entail an Abstraction Weir at Vlieëpoort on the Crocodile River (West); Desilting Works, Raw Water Pipeline, Balancing Reservoirs and Pump Stations in order to abstract and transfer of water from Crocodile River (West) to Lephalale;
- Borrow Pits for the sourcing of construction material and supply of bedding material; and
- A River Management System to manage abstractions from, and the river flow in, the Crocodile River (West) between Hartbeespoort Dam and Vlieëpoort Weir, the Moretele River from Klipvoor Dam up to the confluence with the Crocodile River (West), the reach of the Elands River from Vaalkop Dam up to the confluence with the Crocodile River (West), and also the required flow over (past) the Vlieëpoort Weir.

1.2 MCWAP 2A Environmental Authorisation

In 2018, Nema Consulting CC (Nema) was appointed by the TCTA to conduct the Environmental Impact Assessment (EIA) process for the MCWAP 2A. The Department of Forestry, Fisheries and the Environment (DFFE) issued the EA (Reference No. 14/12/16/3/3/2/1100) on 18 March 2019. Subsequent to the issuing of the EA, appeals were lodged by a number of parties, and the outcome of the appeal process was issued on 13 October 2020 by the Minister of DFFE. The conditions within the EA stipulated specialist studies that must be conducted to input into the design of the MCWAP 2A. After reviewing the EIA (2018) recommendations and the conditions of the EA (2019), the GBN-JV appointed specialists to undertake various environmental studies as listed below:

- a) Aquatic Baseline Study;

- b) Wetland Baseline Study;
- c) Flora Baseline Study;
- d) Vertebrate Baseline Study;
- e) Groundwater Baseline Study;
- f) Heritage Study;
- g) Sediment Study;
- h) Fishway Study;
- i) Bat Cave Study;
- j) Invertebrate Baseline Study;
- k) Palaeontology Baseline Study;
- l) Avi-Fauna Baseline Study;
- m) Noise Baseline Study;
- n) Air Quality Baseline Study;
- o) Visual Assessment;
- p) Traffic and Roads Baseline Study;
- q) Climate Change Assessment;
- r) Assets and Infrastructure Baseline Survey; and
- s) Socio-Economic Baseline Study.

With a view to inform the design of the pipeline and associated infrastructure, the engineering design was based on the approved alignment and within the assessed 40m wide corridor, and considered the other conditions and requirements (specialist studies) as indicated in the EA.

The GBN-JV identified challenges in placing the pipeline alignment and associated infrastructure within the assessed 100 m wide corridor, due to various external alternatives, and therefore required to be placed outside of the 100 m corridor. These areas that fall outside the 100 m corridor were considered as "Project Deviations". In 2022, the GBN-JV conducted a Basic Assessment process (BA) for these Project Deviations as defined below:

- Extension of the construction footprint area at the Vlieëpoort Abstraction Weir;
- Pipeline route deviations;
- One (1) Storm water Channel, One (1) Sediment Discharge Point and One (1) Temporary Sediment Storage Area;
- One (1) Evaporation Pond;
- Two (2) Turning Points;
- Eight (8) Access Roads; and
- Seven (7) construction storage areas

DFFE issued a consolidated EA (Reference No. 14/12/16/3/3/2/1100) for the BA on 29 July 2022 as per Environmental Impact Assessment (EIA) Regulations, 2014 (as amended). DFFE provided this application in line with Regulation 25 (4) that states that *"the competent authority may replace an existing valid environmental authorisation with an environmental authorisation contemplated in this regulation, indicating the extent of replacement in the environmental authorisation, if the existing valid environmental authorisation is directly related to the application for environmental authorisation"*.

MCWAP 2A is also associated with 30 material sources i.e. borrow pits that was applied for at Department of Mineral Resources and Energy (DMRE). Twenty-three (23) of these borrow pits have already been subjected to an EIA process and received Environmental Authorisation (DMRE Reference: LP30/5/1/1/3/2/1 (00257) EM) on 6 January 2022. Seven (7) additional borrow pits have been subjected to individual Basic Assessment Processes for which Environmental Authorisation

(DMRE Reference: LP30/5/1/1/3/2/1 (00311,312,313, 314,315,316 &317 BP) EM) was received on 5 September 2022.

Refer to Annexure B for all the MCWAP 2A Environmental Authorisation.

1.3 Location and Property details

The proposed MCWAP-2A RMS Project occurs on portions of the farms Beestekraal 199JQ, Vaalkop 192JQ and Haakdoorndrift 373KQ in the Bojanala Platinum and Waterberg District Municipalities, Limpopo and Northwest Provinces (refer to **Figures 2-4**).

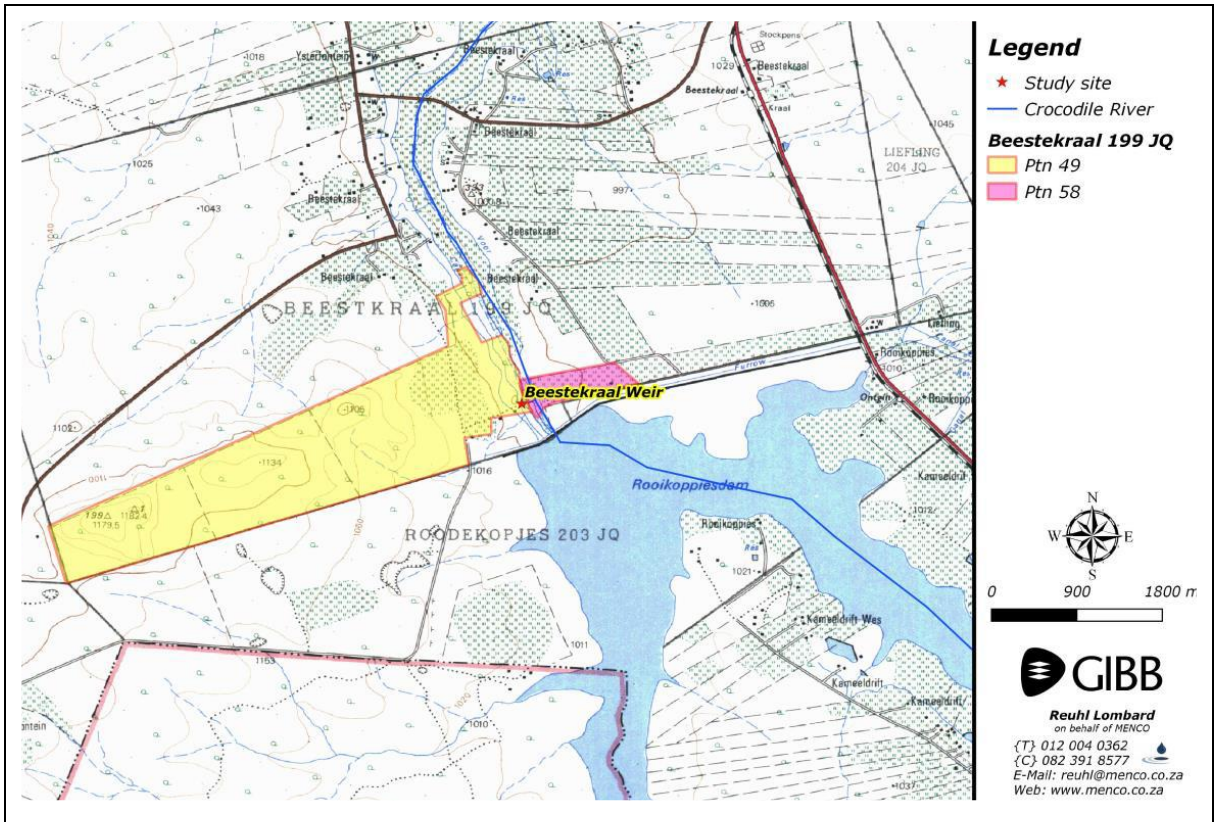


Figure 2: Local setting of Beestekraal Weir

The Roodekopjes Dam / Beestekraal Weir is situated approximately 35km northwest of the town of Brits, the Atlanta Weir is located 20m further north of this location and the Paul Hugo Weir, where the proposed new weir or gantry will be constructed is located 10km south of the town of Thabazimbi. The properties impacted by the three (3) gauging weirs and gantry alternative are shown in Table 1 and the coordinates are presented on Table 2.

Table 1: Properties that are affected by the three (3) gauging weirs

Property	Farm Name	SG Digit code	Landowner
1	Beestekraal gauging weir		
	Beestekraal 199JQ Portion 49	T0JQ00000000019900049	Thaba Lodge
	Beestekraal 199JQ Portion 58	T0JQ00000000019900058	Riekert TJ
	Roodekopjes 203 JQ Portion 17	T0JQ00000000020300017	National Government of the Republic of South Africa
2	Atlanta gauging weir		
	Vaalkop 192 JQ, Portion 21	T0JQ00000000019200000	Potgieter BAK
	Cornics 918 JQ	T0JQ00000000091800000	Griffiths JM
	Serendipity 945 JQ	T0JQ00000000094500000	Smit Hendrik Pieter Jacobus
3	Paul Hugo gauging weir including Gantry		
	Haakdoorn drift 373 KQ Portion REM	T0KQ00000000037300000	Coetzee Familie Trust
	Haakdoorn drift 373 KQ Portion 2	T0KQ00000000037300002	Buitendag Boerdery
	Haakdoorn drift 373 KQ Portion 3	T0KQ00000000037300003	Alfalfa Trust (Jan de Buys)
	Klipgat 348 Portion 13	T0KQ00000000034800013	Bethel Farm CC

Table 2: Project Components of the proposed three (3) gauging weirs

Beestekraal gauging weir	
Beestekraal gauging weir	Start: 25°24'13.22"S 27°34'28.50"E End: 25°24'11.03"S 27°34'34.36"E
Silt and Vegetation removal	Start: 25°24'11.43"S 27°34'33.71"E End: 25°24'15.69"S 27°34'35.90"E Centre: 25°24'13.63"S 27°34'34.63"E
Left bank Laydown Area	Centre: 25°24'13.19"S 27°34'27.55"E
Right bank Laydown Area	Centre 25°24'10.85"S 27°34'34.67"E
Stockpile Right bank	Centre: 25°24'13.99"S 27°34'43.02"E
Stockpile Left Bank	Centre: 25°24'13.49"S 27°34'25.08"E

Temp Access Road Left Bank	Start: 25°24'17.20"S 27°34'30.71"E End: 25°24'19.08"S 27°34'29.75"E
Permanent Access along canal	Start: 25°24'14.62"S 27°34'25.24"E End: 25°24'23.06"S 27°34'33.68"E
Permanent Access Road Right Bank	Start: 25°24'10.79"S 27°34'35.00"E End: 25°24'9.64"S 27°34'55.85"E
Permanent Access Road Left Bank	Start: 25°24'24.11"S 27°34'15.15"E End: 25°24'13.36"S 27°34'28.18"E
Permanent Access Road Dam Wall	Start: 25°24'29.15"S 27°34'18.67"E End: 25°24'12.14"S 27°34'57.82"E
Temporary road river crossing	Start: 25°24'29.15"S 27°34'18.67"E End: 25°24'14.68"S 27°34'36.20"E
Temporary construction road 1	Start: 25°24'12.41"S 27°34'43.73"E End: 25°24'13.25"S 27°34'44.05"E
Temporary construction road 2	Start: 25°24'11.32"S 27°34'48.65"E End: 25°24'12.34"S 27°34'47.81"E
Atlanta gauging weir	
Atlanta Weir	Start: 25°12'22.60"S 27°33'27.11"E End: 25°12'22.94"S 27°33'26.89"E
Temporary Stockpile of silt and vegetation	Centre: 25°12'23.52"S 27°33'26.10"E
Stockpile rock left bank	Centre: 25°12'22.40"S 27°33'25.86"E
Stockpile rock right bank	Centre: 25°12'22.39"S 27°33'28.78"E
Contractor Laydown Area	Centre: 25°12'21.62"S 27°33'24.78"E
Temporary left bank access road	Start: 25°12'22.91"S 27°33'25.64"E End: 25°12'22.89"S 27°33'23.62"E
Permanent left bank access road	Start: 25°12'22.87"S 27°33'23.65"E End: 25°12'20.05"S 27°33'15.52"E
Permanent right bank access road	Start :25°12'22.68"S 27°33'29.18"E End: 25°12'20.45"S 27°33'34.73"E
Erosion protection left bank	Start: 25°12'21.80"S 27°33'26.74"E End: 25°12'22.86"S 27°33'26.76"E
Erosion protection right bank	Start: 25°12'22.91"S 27°33'28.64"E End: 25°12'21.58"S 27°33'28.36"E
Atlanta crested wall	Start: 25°12'22.60"S 27°33'26.81"E End: 25°12'22.59"S 27°33'27.16"E
Paul Hugo gauging weir	
New Paul Hugo Weir	Start: 24°41'37.71"S 27°24'33.57"E End: 24°41'38.61"S 27°24'35.75"E
Contractor laydown area	Centre: 24°41'36.04"S 27°24'32.01"E
Stockpile left bank	Centre: 24°41'37.31"S 27°24'32.99"E

Stockpile right bank	Centre: 24°41'38.35"S 27°24'36.57"E
Temporary Stockpile of silt and vegetation	Start: 24°41'34.18"S 27°24'31.81"E End: 24°41'34.21"S 27°24'33.37"E
Erosion Protection	Start: 24°41'34.44"S 27°24'35.32"E End: 24°41'35.09"S 27°24'34.27"E
Permanent left bank access road	Start: 24°41'43.01"S 27°24'29.94"E End: 24°41'35.68"S 27°23'52.81"E
Temp Access Road right Bank	Start: 24°41'38.13"S 27°24'36.69"E End: 24°41'35.55"S 27°24'33.42"E
Permanent Access Road Right Bank	Start: 24°41'38.62"S 27°24'36.66"E End: 24°41'41.24"S 27°24'34.86"E
River crossing	Start: 24°41'35.60"S 27°24'33.45"E End: 24°41'38.13"S 27°24'36.68"E
River diversion culvert	Start: 24°41'35.11"S 27°24'34.32"E Centre: 24°41'39.83"S 27°24'31.69"E End: 24°41'43.33"S 27°24'30.56"E
Gantry structure 1	Start: 24°41'42.10"S 27°24'30.75"E Centre: 24°41'42.60"S 27°24'31.84"E End: 24°41'43.02"S 27°24'32.88"E
Gantry structure 2	Start: 24°41'46.51"S 27°24'30.26"E Centre: 24°41'46.35"S 27°24'31.38"E End: 24°41'46.18"S 27°24'32.59"E
Contractor laydown area right	Centre: 24°41'44.99"S 27°24'28.51"E
Contractor laydown area left	Centre: 24°41'44.07"S 27°24'32.85"E
Permanent left bank access road	Start: 24°41'42.96"S 27°24'29.94"E End: 24°41'46.62"S 27°24'29.43"E
Temp Access Road left bank	Start: 24°41'46.62"S 27°24'29.43"E End: 24°41'46.60"S 27°24'30.24"E
Permanent right bank access road	Start: 24°41'42.69"S 27°24'33.01"E End: 24°41'46.14"S 27°24'32.67"E

1.4 Resources Required for Construction and Operation

This section briefly outlines the resources that will be required to execute the project.

1.4.1 Water

During the construction stage, water will be required for various purposes, such as concrete batching, washing of plant and equipment in dedicated areas, dust suppression, potable use by construction workers, etc. Water for construction purposes will be sourced directly from watercourses on site and groundwater (boreholes) will also be utilised. Water tankers will also supply water to the site. Water for operational purposes will include domestic supply to the operational control centre.

All water uses triggered in terms of Section 21 of the NWA will comply with DWS' requirements.

Further provisions will be included in the EMPr as part of the EIA Report.

1.4.2 Electricity

Generators will be used to supply electricity during the construction phase.

1.4.3 Waste

Solid waste generated during the construction phase will be temporarily stored at suitable locations (e.g. at construction camps) and will be removed at regular intervals and disposed of at approved waste disposal sites within each of the local municipalities that are affected by the project. All the waste disposed of will be recorded. According to the Integrated Waste Management Plan for the Thabazimbi LM (2016), the Thabazimbi landfill and the Northam landfill are both licenced. According to the IDP for the Lephalale LM (2016), there is a permitted landfill within the municipality. All storage of general or hazardous waste in a waste storage facility (e.g. onsite waste transfer station) will comply with the national Norms and Standards (GN R. 926 of 29 November 2013). The waste storage facility will be established at the camp where waste from site will be collected, sorted, weighed and placed in skips and recycling containers for removal to service providers and appropriate registered landfill sites (hazardous and general sites, as required). Wastewater, which refers to any water adversely affected in quality through construction-related activities and human influence, will include the following:

- Sewage;
- Water used for washing purposes (e.g. equipment, staff); and
- Drainage over contaminated areas (e.g. cement batching / mixing areas, workshop, equipment storage areas).

All wastewater discharges will comply with legal requirements associated with the NWA, including the General Authorisation that specifically deals with Section 21(f) and Section 21(g) water uses. Suitable measures will be implemented to manage all wastewater generated during the construction period.

1.4.4 Details of Role Players

1.4.5 Details of the Applicant:

Department of Water and Sanitation is the Applicant, represented by Mr. Jabulani Maluleke for the Project. The details of the Applicant can be found in **Table 3** below.

Table 3: Details of the Applicant

Applicant:	Department of Water and Sanitation		
Contact Person:	Mr. Jabulani Maluleke		
Physical Address:	185 Francis Baard Street, Sedibeng Building, Pretoria		
Postal Address:	Private Bag X313, Pretoria		
Postal code:	0001	Fax:	N/A
Telephone:	012 336 8875	Cell:	066 300 5533
E-mail:	Malulekej2@dws.gov.za		

1.4.6 Details of the Environmental Assessment Practitioner

The Environmental Assessment Practitioner (EAP) representing the GBN-JV is Mr. Deon Esterhuizen, (EAPASA) – registration number: 2022/5762. Refer to **Table 4** for the EAP's details. Refer to Annexure F the EAP's CV and EAPASA registration certificate.

Table 4: Details of the Independent Environmental Assessment Practitioner (EAP)

Project EAP:	Gibb Bigen Nyeleti Joint Venture (GBN-JV)		
Contact Person:	Mr. Deon Esterhuizen		
Role in Project:	Environmental Assessment Practitioner		
Professional Registered	Environmental Assessment Practitioners Association of South Africa (EAPASA) – registration number: 2022/5762 South African Council for Natural Scientific Professions (SACNASP) – registration number: 400154/09		
Physical Address:	3rd Floor, Building 4, 19 Ninth Street, Houghton Estate Rosebank, 2196		
Postal Address:	P O Box 2700, Rivonia		
Postal code:	2128	Fax:	N/A
Telephone:	N/A	Cell:	0824451781
Email:	deon@mdte.co.za		
Expertise:	<p>Deon Esterhuizen has a MSc in Environmental Ecology with 30 years of experience in water related projects, which include water resource management, water quality management, water use registration and licencing of water users, including project management of multi-disciplinary studies.</p> <p>Key experienced gained as external reviewer for the Department of Water & Sanitation as well as other consulting firms.</p> <p>Acting as an independent external auditor in terms of National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA), Environmental Impact Assessment Regulations, 2014, as amended for various companies.</p>		

1.4.7 Details of the Project Team

Please refer to **Table 5** for the roles and responsibilities of other EIA Team Members on this project. CV's of the Project Team are included in Annexure F.

Table 5: Project Team and Experience

Project Role	Name	Experience
Environmental Officer	Minenhle Luthuli	<p>Ms. Minenhle Luthuli has a Post Graduate Degree in Water Management with six (6) years' work experience.</p> <p>Registered as a Certificated Natural Scientist with the South African Council for Natural Scientist Professionals (SACNASP); Registration No. 126777.</p>

1.4.8 Details of the Competent Authority

The Department of Forestry, Fisheries and the Environment (DFFE) is the competent authority (CA) for the Project. The details of the DFFE representative are listed in **Table 6** below.

Table 6: Details of Competent Authority

Competent Authority:	DFFE		
Case Officer:	Samkelisiwe Dlamini		
Postal Address:	Private Bag X 447, Pretoria		
Postal code:	0001	Fax:	n/a
Telephone:	0123999405	Cell:	n/a
Email:	SDlamini@dffe.gov.za		

1.5 Structure of this Report

This Draft BAR has been drafted in accordance with the requirements of the NEMA EIA Regulations. The Draft BAR has been compiled in a diligent and independent manner. **Table 7** indicates the relevant regulated requirements and the corresponding sections within this report which have been prepared to comply with these requirements.

Table 7: Legislated Requirements for BAR Content as Detailed in the EIA Regulations

LEGISLATED REQUIREMENTS	RELEVANT REPORT SECTION
1) A BAR must contain all the information that is necessary for the competent authority to consider and come to a decision on the application, and must include -	Section 1.2
(a) details of –	
i. the EAP who prepared the report; and	Section 1.2
ii. the expertise of the EAP, including a curriculum vitae;	Annexure F
(b) the location of the activity, including:	Section 1.4
i. the 21-digit Surveyor General code of each cadastral land parcel;	
ii. where available, the physical address and farm name;	
iii. where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	
(c) a plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is-	Section 1.4
i. a linear activity, a description, and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	
ii. on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	

LEGISLATED REQUIREMENTS	RELEVANT REPORT SECTION
<p>(d) a description of the scope of the proposed activity, including-</p> <ul style="list-style-type: none"> i. all listed and specified activities triggered and being applied for; and ii. a description of the activities to be undertaken including associated structures and infrastructure; 	<p>Section 2.1.2</p>
<p>(e) a description of the policy and legislative context within which the development is proposed including-</p> <ul style="list-style-type: none"> i. an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and ii. how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments 	<p>Section 2</p>
<p>(f) a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;</p>	<p>Section 3</p>
<p>(g) a motivation for the preferred site, activity, and technology alternative</p>	<p>Section 4</p>
<p>(h) a full description of the process followed to reach the proposed preferred alternative within the site, including:</p> <ul style="list-style-type: none"> i. details of all the alternatives considered; ii. details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; iii. a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; iv. the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; v. the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration, and probability of the impacts, including the degree to which these impacts- <ul style="list-style-type: none"> • can be reversed • may cause irreplaceable loss of resources; and • can be avoided, managed or mitigated; 	<p>Section 4 Section 5.8</p> <p>Comments will be added to the Final BAR</p> <p>Section 6 and Section 7</p>

LEGISLATED REQUIREMENTS	RELEVANT REPORT SECTION
<ul style="list-style-type: none"> vi. the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; vii. positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; viii. the possible mitigation measures that could be applied and level of residual risk; ix. the outcome of the site selection matrix; x. if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and xi. a concluding statement indicating the preferred alternatives, including preferred location of the activity. 	<p style="text-align: center;">Section 7</p> <p style="text-align: center;">Section 7</p> <p style="text-align: center;">Section 7</p> <p style="text-align: center;">Section 4</p> <p style="text-align: center;">Section 8</p>
<ul style="list-style-type: none"> (i) a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including- <ul style="list-style-type: none"> i. a description of all environmental issues and risks that were identified during the environmental impact assessment process; and ii. an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; 	<p style="text-align: center;">Section 7</p>
<ul style="list-style-type: none"> (j) an assessment of each identified potentially significant impact and risk, including- <ul style="list-style-type: none"> i. cumulative impacts; ii. the nature, significance, and consequences of the impact and risk; iii. the extent and duration of the impact and risk; iv. the probability of the impact and risk occurring; v. the degree to which the impact and risk can be reversed; vi. the degree to which the impact and risk may cause irreplaceable loss of resources; and vii. the degree to which the impact and risk can be avoided, managed, or mitigated; 	<p style="text-align: center;">Section 7</p>
<ul style="list-style-type: none"> (k) where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Annexure 6 to these 	<p style="text-align: center;">Annexure E</p>

LEGISLATED REQUIREMENTS	RELEVANT REPORT SECTION
Regulations and an indication as to how these findings and recommendations have been included in the final report;	
(l) an environmental impact statement which contains- <ul style="list-style-type: none"> i. a summary of the key findings of the environmental impact assessment; ii. a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and iii. a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; 	Section 8
(m) based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management objectives, and the impact management outcomes for the development for inclusion in the EMPr;	Annexure E
(n) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorization;	Section 8
(o) description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Annexure E
(p) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 8
(q) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalised;	N/A
(r) an undertaking under oath or affirmation by the EAP in relation to: <ul style="list-style-type: none"> i. the correctness of the information provided in the reports; ii. the inclusion of comments and inputs from stakeholders and interested and affected parties; iii. the inclusion of inputs and recommendations from the specialist reports where relevant; and iv. any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and 	Annexure F

LEGISLATED REQUIREMENTS	RELEVANT REPORT SECTION
(s) where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts	N/A
(t) any specific information that may be required by the competent authority; and	Section 8
(u) any other matters required in terms of section 24(4)(a) and (b) of the Act.	Annexure A

2 LEGAL REQUIREMENTS

This chapter details the applicable legal provisions and the policy context for the BA process. It provides a review of relevant legislation, regulations, and policy documents, which are applicable to (or have implications for) the Project.

The authorisation process associated with the Project will be carried out in compliance with South Africa's environmental legislation. The legal framework applicable to this project is diverse. A summary of the key environmental legislation and relevant policies and/or guidelines is provided in the following sections.

One of the focus points of this section is on the provisions of the NEMA. The NEMA is the primary South African legislation governing the requirements for EIA. In the context of the proposed three (3) gauging weirs, the provisions of NEMA and associated EIA Regulations (regarding BA) are of fundamental relevance.

The section also describes other legislation relevant to constitutional and administrative legal precepts in South African law, as well as environmental legislation of specific relevance to water resources, heritage, biodiversity, and land use planning, among others.

2.1 National Legislation

2.1.1 Constitution of the Republic of South Africa (No. 108 of 1996)

The Constitution of the Republic of South Africa is the legal source for all law, including environmental law, in South Africa. The Constitution enshrines the basic, fundamental, and inalienable rights of the citizens of the Republic. The Constitution provides that everyone has the right to a non-threatening environment and those reasonable measures are applied to protect the environment. This includes preventing pollution and promoting conservation and environmentally sustainable development, while promoting justifiable social and economic development.

The Constitution and the Bill of Rights provide that:

"Everyone has the right:

- a) *To an environment that is not harmful to their health or well-being; and*
- b) *To have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:
 - i) *Prevent pollution and ecological degradation;*
 - ii) *Promote conservation; and*
 - iii) *Secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."**

The NEMA (discussed below) is the enabling legislation to ensure that the Environmental Right enshrined in the Bill of Rights is given practical effect.

2.1.2 National Environmental Management Act (Act No. 107 of 1998)

The NEMA is the primary South African legislation governing the requirements for environmental management. Chapter 5 of NEMA, entitled "Integrated Environmental Management" establishes the environmental impact assessment regime in the RSA. Since 3 July 2006, the procedural and

substantive requirements for undertaking EIAs in South Africa have been regulated in terms of the provisions contained in section 24 of NEMA and the EIA Regulations.

The EIA Regulations identify lists of activities which have the potential to result in detrimental environmental impacts and thus require EA, subject to either BA or Scoping and Environmental Impact Reporting processes. The Regulations prescribe the procedural and substantive requirements for the undertaking of EIAs and the issue of EA's. Activities identified in terms of section 24(2)(a) and (d) of NEMA, which may not commence without EA from the Competent Authority and in respect of which the investigation, assessment, and communication of the potential impact of such activities must thus follow the procedure as described in the EIA Regulations.

In terms of the amendments to the EIA Regulations, activities listed in GNR 327 (Listing Notice 1), and GNR 324 (Listing Notice 3), as amended, require EA before they can proceed and be implemented, and the following listed activities in **Table 8** are deemed applicable to the Project.

The environmental application process in terms of the listing notices is described below:

- GNR 327 (as amended) (Listing Notice 1) identifies activities that require EA, subject to a BA process, prior to commencement of that activity; and
- GNR 324 (as amended) (Listing Notice 3) identifies activities within specific geographical areas of sensitivity that require EA subject to a BA process, prior to commencement of that activity.

Table 8: Listed Activities in terms of EIA Regulations

Activity No(s):	Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 1 of the EIA Regulations, 2014 as amended	Describe the portion of the proposed project to which the applicable listed activity relates.
12	<p>The development of—</p> <ul style="list-style-type: none"> i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres: or ii) infrastructure or structures with a physical footprint of 100 square metres or more where such development occurs— <ul style="list-style-type: none"> a) within a watercourse. b) in front of a development setback; or c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding— <ul style="list-style-type: none"> (aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour. (bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in 	<p>The proposed three (3) gauging weirs and alternative on various farm portions, in both Limpopo and Northwest Provinces.</p> <p>The proposed activities will entail the construction of infrastructure and structures (such as the crump weir, gantry, river diversion, camp sites, rehabilitation works erosion protection, laydown areas and etc.). The infrastructure and structures are expected to exceed a footprint of 100 m² and will be within drainage features and 32 m of the watercourses.</p>

	<p>Listing Notice 2 of 2014 applies(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such development occurs within an urban area;</p> <p>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</p> <p>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</p>	
19	<p>The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving—</p> <p>(a) will occur behind a development setback;</p> <p>(b) is for maintenance purposes undertaken in accordance with a maintenance management plan;</p> <p>(c) falls within the ambit of activity 21 in this Notice, in which case that activity applies;</p> <p>(d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or</p> <p>(e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.</p>	<p>The proposed project may entail the excavation, removal and moving of more than 10 m³ of soil, sand, pebbles, vegetation or rock from watercourses on site.</p>
24	<p>The development of a road—</p> <p>i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or</p> <p>(ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres;</p> <p>but excluding a road—</p>	<p>Access roads will be upgraded to access each of the main affected farm portions. The access roads are estimated to have a width ranging between 6 m and 8 m.</p> <p>The proposed project will take place outside of an urban area on land with indigenous vegetation.</p>

	<p>(a) which is identified and included in activity 27 in Listing Notice 2 of 2014 ;</p> <p>(b) where the entire road falls within an urban area; or</p> <p>(c) which is 1 kilometre or shorter.</p>	
27	<p>The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for –</p> <p>(i) the undertaking of a linear activity; or</p> <p>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</p>	<p>Clearance of indigenous vegetation will be required, but the extent will be limited as far as practical possible, but may still exceed 1 hectare, but definitely less than 20 hectares.</p>
48	<p>The expansion of—</p> <p>(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or</p> <p>(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more; where such expansion occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback; or</p> <p>(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding—</p> <p>(aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;</p> <p>(bb) where such expansion activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</p> <p>(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</p> <p>(dd) where such expansion occurs within an urban area; or</p> <p>(ee) where such expansion occurs within existing roads, road reserves or railway line reserves.</p>	<p>The RMS includes river outlets, gauging stations, etc., that are used for the management and monitoring of river flows. The infrastructure and structures are expected to exceed a footprint of 100 m² and some may occur within drainage features and 32 m of the watercourses.</p>

58	<p>The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—</p> <p>(i) where the existing reserve is wider than 13,5 meters; or</p> <p>(ii) where no reserve exists, where the existing road is wider than 8 metres;</p> <p>(iii) excluding where widening or lengthening occur inside urban areas.</p>	<p>Access roads will be upgraded to access each of the main affected farm portions. The access roads are estimated to have a width ranging between 6 m and 8 m.</p>
Activity No(s):	<p>Provide the relevant Scoping and EIA Activity(ies) as set out in Listing Notice 2 of the EIA Regulations, 2014 as amended</p>	<p>Describe the portion of the proposed project to which the applicable listed activity relates.</p>
	<p>Note: No activities triggered</p>	
Activity No(s):	<p>Provide the relevant Basic Assessment Activity(ies) as set out in Listing Notice 3 of the EIA Regulations, 2014 as amended</p>	<p>Describe the portion of the proposed project to which the applicable listed activity relates.</p>
4	<p>The development of a road wider than 4 metres with a reserve less than 13,5 metres.</p> <p>c. In North West:</p> <p>i. Outside urban areas, in:</p> <p>{aa) A protected area identified in terms of NEMPAA, excluding conservancies;</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(dd) Sites or areas identified in terms of an International Convention;</p> <p>(ee) Critical biodiversity areas (Terrestrial Type 1 and 2 and Aquatic Type 1) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(ff) Core areas in biosphere reserves;</p> <p>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from a biosphere reserve.</p> <p>ii. In urban areas:</p> <p>(aa) Areas zoned for use as public open space;</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks</p>	<p>Access roads are required for the entrance and exit to the three (3) gauging weirs sites. Access roads will be upgraded to access each of the main affected farm portions. The access roads are estimated to have a width ranging between 6 m and 8 m.</p>

	<p>adopted by the competent authority or zoned for a conservation purpose; (cc) Natural heritage sites</p> <p>e. Limpopo</p> <p>i. Outside urban areas:</p> <p>(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; (bb) National Protected Area Expansion Strategy Focus areas; (cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; (dd) Sites or areas identified in terms of an international convention; (ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (ff) Core areas in biosphere reserves; or (gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or</p> <p>ii. Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space; (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or (cc) Areas within urban protected areas.</p>	
<p>10</p>	<p>The development of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.</p> <p>(e) In Limpopo:</p> <p>i. All areas.</p> <p>(f) In North West:</p> <p>i. Outside urban areas</p>	<p>The Project will require the storage of hazardous materials for construction and operational activities, but is not expected to exceed 30 cubic meters.</p>

<p>12</p>	<p>The clearance an area of 300 square metres or more of indigenous vegetation</p> <p>i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;</p> <p>ii. Within critical biodiversity areas identified in bioregional plans; or</p> <p>iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose</p>	<p>Limited clearance of indigenous vegetation is expected.</p>
<p>14</p>	<p>The development of—</p> <p>i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceed 10 square metres: or</p> <p>ii) infrastructure or structures with a physical footprint of 10 square metres or more</p> <p>where such development occurs—</p> <p>(a) within a watercourse;</p> <p>b) in front of a development setback; or</p> <p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p> <p>(e) In North West:</p> <p>i. Outside urban areas, in:</p> <p>(aa) A protected area identified in terms of NEMPAA;</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) World Heritage Sites;</p> <p>(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act</p>	<p>All activities will take place within the Crocodile River, and all infrastructure will exceed 10 square meters.</p>

	<p>and as adopted by the competent authority;</p> <p>(ee) Sites or areas identified in terms of an International Convention;</p> <p>(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(gg) Core areas in biosphere reserves; or</p> <p>(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve; or</p> <p>ii. Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space; or</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose</p>	
<p>18</p>	<p>The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometer</p> <p>c. North West :</p> <p>i. Outside urban areas, in:</p> <p>(aa) A protected area identified in terms of NEMPAA;</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(dd) Sites or areas identified in terms of an International Convention;</p> <p>(ee) Critical biodiversity areas (Terrestrial Type 1 and 2) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(ff) Core areas in biosphere reserves; or</p> <p>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or</p> <p>ii. In urban areas:</p>	<p>Access roads are required for the entrance and exit to the three (3) gauging weirs sites. Access roads will be upgraded to access each of the main affected farm portions. The access roads are estimated to have a width ranging between 6 m and 8 m.</p>

	<p>(aa) Areas zoned for use as public open space;</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or</p> <p>(cc) Natural heritage sites.</p> <p>e. Limpopo</p> <p>i. Outside urban areas:</p> <p>(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas;</p> <p>(bb) National Protected Area Expansion Strategy Focus areas;</p> <p>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;</p> <p>(dd) Sites or areas identified in terms of an international convention;</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;</p> <p>(ff) Core areas in biosphere reserves; or</p> <p>gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas; or</p> <p>ii. Inside urban areas:</p> <p>(aa) Areas zoned for use as public open space;</p> <p>(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose; or</p> <p>(cc) Areas within urban protected areas.</p>	
<p>23</p>	<p>The expansion of—</p> <p>(i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or</p> <p>(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more; where such expansion occurs—</p> <p>(a) within a watercourse;</p> <p>(b) in front of a development setback adopted in the prescribed manner; or</p>	<p>The proposed three (3) gauging weirs and gantry on various farm portions, in both Limpopo and Northwest Provinces.</p> <p>The proposed weirs and gantry will entail the construction of building infrastructure and structures (such as the crump weir, gantry, river diversion, camp sites, rehabilitation works erosion protection, laydown areas and etc.). The infrastructure and structures are expected to exceed a footprint of 100 m² and will be within</p>

	<p>(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; excluding the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour.</p> <p>e. Limpopo</p> <p>i. Outside urban areas:</p> <p>(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority.</p> <p>(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p> <p>(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve.</p>	<p>drainage features and 32 m of the watercourses.</p>
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2.1.3 National Heritage Resources Act (Act 25 of 1999)

The National Heritage Resources Act (Act No. 25 of 1999) [NHRA] aims to introduce an integrated system for the management of South Africa's heritage resources. Further, the Act empowers civil society to nurture and conserve their heritage resources so that they can be passed on to future generations. The Act provides a framework for the management of heritage resources in South Africa and to protect heritage resources of national significance. In order to meet these objectives, the Act introduces an integrated system that can allow for the identification, assessment, and management of heritage resources in South Africa.

According to Section 38 (1) of NHRA:

Subject to the provisions of Subsections (7), (8) and (9) of the same section, any person who intends to undertake a development categorised as:

- The construction of a road, wall, power line, pipeline, canal or other similar form of linear development, or barrier exceeding 300m in length;
- The construction of a bridge or similar structure exceeding 50m in length;
- Any development or other activity which will change the character of a site:
 - i) Exceeding 5 000 m² in extent; or
 - ii) Involving three or more existing erven or subdivisions thereof; or
 - iii) Involving three or more erven or divisions thereof which have been consolidated within the past five years; or

- iv) The costs of which will exceed a sum set in terms of Regulations by the South African Heritage Resources Agency (SAHRA) or a Provincial Heritage Resources Authority (PHRA);
- v) The re-zoning of a site exceeding 10 000 m² in extent; or
- Any other category of development provided for in Regulations by the South African Heritage Resources Agency (SAHRA); must at the very earliest stages of initiating such a development, notify the responsible Heritage Resources Authority (HRA) and furnish it with details regarding the location, nature and extent of the proposed development.

A Heritage and Palaeontology Impact Assessment study was completed by CES on the three identified gauging weirs; namely, Paul Hugo gauging weir and alternative, Atlanta gauging weir and Beestekraal gauging weir. (Refer to Annexure D2). The outcome of the study for Heritage Impact Assessment was that: no archaeological sites were located during the site assessment and no apparent impact on the archaeological landscape is foreseen during the preconstruction, construction and operation phases of the project. The Palaeontology Impact Assessment outcome is that the geological structures suggest that the rocks are either the wrong kind or much too old to contain fossils.

2.1.4 National Environmental Management: Biodiversity Act (Act No. 10 of 2004)

The National Environmental Management: Biodiversity Act (Act No. 10 of 2004) [NEMBA] has as an objective to provide for the management and conservation of biological diversity within the Republic and of the components of such biological diversity. The focus of this legislation is on the preservation of species and ecosystems irrespective of whether they are situated in protected areas.

Chapter 4 of the NEM:BA is particularly relevant and provides for:

- The protection of threatened or protected ecosystems, with particular emphasis on critically endangered, endangered, vulnerable, and protected ecosystems. – List of Threatened Ecosystems (Notice 1002 of Government Gazette 34808 dated 9 December 2011);
- Listing of species that are threatened or in need of protection to ensure their survival in the wild, while regulating the activities, including trade, which may involve such listed threatened or protected species and activities which may have a potential impact on their long-term survival. - Threatened or Protected Species Regulations (Regulation 152 of 2007); and
- The protection of natural systems from invasive species.
- Chapter 5 of the Act specifically deals with species and organisms posing potential threats to biodiversity. To summarise, the purpose of Chapter 5 is to:
- Prevent the unauthorised introduction and spread of alien species and invasive species to ecosystems and habitats where they do not naturally occur.
- To manage and control alien species and invasive species to prevent or minimise harm to the environment and to biodiversity in particular; and
- To eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats.

Furthermore Section 73 (2) states that a person who is the owner of land on which a listed invasive species occurs must:

- Notify any relevant CA, in writing, of the listed invasive species occurring on that land.
- Take steps to control and eradicate the listed invasive species and to prevent it from spreading; and

- Take all the required steps to prevent or minimise negative impacts on biodiversity.

A terrestrial biodiversity assessment was conducted by M₂ Environmental Connections (Pty) Ltd (refer to Annexure D4) on the three identified gauging weirs; namely, near Paul Hugo, Atlanta and Beestekraal. The outcome of the study for Biodiversity Impact Assessment was that:

- 1) Beestekraal Weir was classified as having “high sensitivity”.
- 2) Atlanta Weir was classified as having “low/moderate sensitivity”.
- 3) Paul Hugo Weir was also classified as having “low/moderate sensitivity”.

No floral species of concern were identified and the faunal species which will be impacted will only be displaced during the construction phase of the project and will likely return once construction is completed. Therefore, no fatal flaws were identified.

2.2 National Water Act (Act No. 36 of 1998)

The National Water Act (Act No. 36 of 1998) [NWA] aims to provide management of the national water resources to achieve sustainable use of water for the benefit of all water users. This requires that the quality of water resources is protected as well as integrated management of water resources with the delegation of powers to institutions at the regional or catchment level. The purpose of the Act is to ensure that the nation’s water resources are protected, used, developed, conserved, managed, and controlled in responsible ways.

An Aquatic Biodiversity and Sedimentation Impact Assessment was undertaken by M₂ Environmental Connections (Pty) Ltd the near Paul Hugo, Atlanta and Beestekraal (refer to Annexure D1). The riparian areas are within the aquatic impact area as it falls within the direct construction area.

Environmental Assurance (Pty) Ltd undertook the surface water investigations on the three identified gauging weirs; namely, near Paul Hugo, Atlanta and Beestekraal. The outcome of the study for the Water Quality Impact Assessment Report was that construction phase and to a lesser extent the operational phase of the weir rehabilitation and re-construction will have an effect on water quality, flow regime, sediment concentration, nutrient levels, aquatic habitats and species, but can be effectively mitigated.

2.2.1 National Environmental Management: Air Quality Act (Act No. 39 of 2004)

The National Environment Management: Air Quality Act 39 of 2004 intends:

- a) to reform the law regulating air quality in order to protect the environment by providing reasonable measures for the prevention of pollution and ecological degradation and for securing ecologically sustainable development while promoting justifiable economic and social development;
- b) to provide for national norms and standards regulating air quality monitoring, management and control by all spheres of government;
- c) for specific air quality measures; and
- d) for matters incidental thereto.

Environmental Assurance (Pty) Ltd undertook the air quality and surface water investigations on the three identified gauging weirs; namely, near Paul Hugo, Atlanta and Beestekraal. The air quality impact will be of construction dust during the construction phase which will be limited to operation during designated construction hours as per the guidelines.

2.2.2 Noise Management

There is a potential for the generation of noise during construction of the Project. The guidelines provided by SANS 10103:2008, SANS 10328:2008, and the National Noise Control Regulations of 1992.

Rayten Engineering Solutions (Pty) Ltd undertook the study investigation on the three identified gauging weirs; namely, near Paul Hugo, Atlanta and Beestekraal. The outcome of the study for Noise Impact Assessment was that the construction works can have an impact on the surrounding environment. The noise impacts (after mitigation) are expected to have a low significance at all three (3) weir sites.

2.2.3 Health and Safety

Regulations in terms of the Occupational Health and Safety Act (Act No. 85 of 1998), address the health and safety of the employer and workers during both construction and operation of the proposed deviation. Error! Reference source not found. below provides a list of legislation that applies to the Project in terms of health and safety.

Table 9 : Employment and Health and Safety Related Legislation

LEGISLATION	DESCRIPTION
Occupational Health and Safety Act (No 85 of 1993)	This Act provides for the health and safety of persons at work and for the health and safety of persons in connection with the use of plant and machinery, and the protection of persons other than persons at work against hazards to health and safety arising out of or in connection with the activities of persons at work. Employers are required to provide a working environment that is safe and without risk to the health of their employees. Victimisation of employees who report unsafe conditions is expressly prohibited by the legislation.
Hazardous Substance Act (No 15 of 1973)	These regulations stipulate requirements for storage and handling of hazardous chemical substances and provide guidelines for training of staff. Any hazardous chemical substances used during the construction and operational phases must be identified, stored used and disposed of in accordance with this legislation.
Basic Conditions of Employment Act (No 75 of 1997)	These regulations specify optimal working conditions for staff including thermal conditions, illumination requirements, requirements for ventilation; noise levels etc. and specify requirements for housekeeping. The proponent and all its contractors must adhere to the requirements of this Act and recruitment employment of labour for construction.
General Administrative Regulations 2003	These regulations stipulate the administration of the various Occupational Health and Safety regulations incusing designation of health and safety committees, reporting and recording of incidents and occupational diseases.
Construction Regulations 2003	These Regulations apply to any persons involved in construction work and are therefore applicable to the construction phase. The regulations provide guidelines for safe operation during construction.

2.2.4 Waste Management

During construction and operation, the production of wastes, either liquid, solid or and/or hazardous, will require that they be adequately disposed of. **Table 10** below provides a list of the applicable waste legislation.

Table 10: Legislation for waste management which applies to the Project

LEGISLATION	DESCRIPTION
National Environmental Management Act 1998	Outlines principles that serve as the general framework within which environmental management and implementation plans must be formulated: "4 (iv) that waste is avoided, or where it cannot be altogether avoided, minimised and reused or recycled where possible and otherwise disposed of in a responsible manner;"
National Environmental Management: Waste Act (No 59 of 2008)	Section 20 of the NEMWA states that no person may commence, undertake or conduct a waste management activity except in accordance with a WML. A list of waste management activities that require a WML was published in GNR 921 (29 November 2013). GNR 921 states that a person who wishes to commence with a waste management activity must undertake the required process in accordance with GNR 326 stipulated under NEMA.

LEGISLATION	DESCRIPTION
	No authorisation will be required in terms of NEM: WA, as the project will not include any listed waste management activities in terms of GNR 921 of (29 November 2013)

2.2.5 Other Legal Requirements

The section below highlights any other applicable or relevant policies, legislation, guidelines, and standards associated with the project.

Table 11: Policies, Legislation, Guidelines and Standards Applicable to the BA

APPLICABLE LEGISLATION / GUIDELINE/ STANDARD	DETAILS / APPLICABLE SECTIONS
National Legislation	
Promotion of Access to Information Act, 2000 (Act 2 of 2000)	<p>The purpose of the Promotion of Access to Information Act (PAIA) is to give effect to the constitutional right of access to any information held by the State and any information that is held by another person and that is required for the exercise or protection of any rights, and to provide for matters connected therewith.</p> <p>For the purpose of the Project, information has been shared in line with legislative public participation guidelines.</p>
Explosive Act (No 26 of 1956)	<p>Blasting permits must be present on site before construction can commence. These permits must be acquired from the Department of Mineral Resources in accordance with the Explosives Act (Act No 26 of 1956). Prior to any blasting activities, the blasting contractor is required to submit a comprehensive blasting plan to the Engineer, Environmental Monitor (EM) and Social Monitor (SM) for approval. All affected parties must also be informed of the date and time of blasting.</p>
National Heritage Resources Act (No 25 of 1999)	<p>To introduce an integrated and interactive system for the management of the national heritage resources; to promote good government at all levels, to lay down general principles for governing heritage resources management throughout the Republic; to introduce an integrated system for the identification, assessment, and management of the heritage resources of South Africa. However, should anything of cultural or heritage significance be discovered during construction; the requirements of the legislation must be followed.</p>
Provincial Legislation	
Limpopo Environmental Management Act (No 7 of 2003)	<p>Deals with inter alia protected areas, wild and alien animals, professional hunting, aquatic biota and aquatic systems, invertebrates, indigenous plants, preservation of caves and cave – formations, limited development areas, environmental pollution, mountain catchment areas, as well as permits, exemptions, permissions and exclusions.</p>
Limpopo Provincial Heritage Regulations (No 103 of 2003)	<p>To consolidate and amend the environmental management legislation of or assigned to the province; and to provide for matters incidental thereto.</p>

APPLICABLE LEGISLATION / GUIDELINE/ STANDARD	DETAILS / APPLICABLE SECTIONS
	The Project must align itself with this Act in terms of cultural or heritage significance be discovered during construction;
Guidelines	
Strategic Infrastructure Projects (SIP) 18	<p>In terms of the Infrastructure Development Act, as amended in 2014, the Presidential Infrastructure Coordinating Commission (PICC) designated 18 Strategic Integrated Projects (SIPs). Projects designated as SIPs need to: be of significant economic or social importance to the Republic; contribute substantially to any national strategy or policy relating to infrastructure development; or be above a certain monetary value determined by the PICC.</p> <p>The strategic intent of the project stems from the necessity to support water requirements related to SIP 1, which aims to unlock SA's northern mineral belt, by utilising surplus return flows from Gauteng being discharged in the Crocodile River (West) Catchment.</p>
Guideline on Need and Desirability, Department of Environmental Affairs (2017)	This guideline contains information on best practice and how to meet the peremptory requirements prescribed by the legislation and sets out both the strategic and statutory context for the consideration of the need and desirability of a development involving any one of the NEMA listed activities. Need and desirability is based on the principle of sustainability, set out in the Constitution and in NEMA, and provided for in various policies and plans, including the National Development Plan 2030 (NDP). Addressing the need and desirability of a development is a way of ensuring sustainable development in other words that a development is ecologically sustainable and socially and economically justifiable and ensuring the simultaneous achievement of the triple bottom-line.
National Environmental Management Act (Act 107 of 1998) Public Participation Guideline (GN.R807 of 2012)	<p>In 2010, the Minister gazetted a new set of regulations on the requirements for conducting EIAs in terms of Chapter 5 of NEMA. In order to assist potential Applicants, interested and affected parties and environmental assessment practitioners to understand their role, the DEA has produced a series of guidelines. These guidelines must be read in line with NEMA and the EIA Regulations of 2010 as they do not substitute primary legislation. The guideline updates and revises the draft integrated environmental management guideline which was developed in 2005. The public participation guideline provides for inter alia: the minimum legal requirements for public participation processes (PPP); the steps of a PPP; guidelines for planning a PPP; and a description of the roles and responsibilities of the various role players.</p> <p>For the Project, public participation has taken into consideration all the legislative requirements for allowing the public to comment and provide their concerns throughout the process.</p>
Municipal Legislation	
Municipal Structures Act (No 117 of 1998)	The Municipal Structures Act defines the types and structures of municipalities and requires the municipality to develop a Spatial Development Framework (SDF) as part of its Integrated Development Plan (IDP), which must include the

APPLICABLE LEGISLATION / GUIDELINE/ STANDARD	DETAILS / APPLICABLE SECTIONS
	provision of basic guidelines for a land use management system in the municipality.
Municipal Systems Act (No 32 of 2000)	The Municipal Systems Act defines how local government should operate and allows for various types of partnership arrangements a municipality may enter to ensure the delivery of services. The Act requires all municipalities to undertake an IDP process to produce integrated development plans, which, in Section 35 of the Act is defined as the principle strategic planning instrument, which guides and informs all planning, and development, and all decisions regarding planning management and development in the municipality. The IDP legally binds the municipality in the exercise of its executive authority.
Spatial Planning and Land Use Management Act (No 16 of 2013)	To specify the relationship between the spatial planning and the land use management system; to provide procedures, processes, and systems necessary to facilitate and regulate land development.
Development Facilitation Act (No 67 of 1995)	This act is relevant to the relocation process that may be undertaken as part of the project. During the resettlement process, alternative land for occupation must be identified and as per best practice.
Extension of Security of Tenure Act (No 62 of 1997)	<p>ESTA aims to give security of tenure for vulnerable occupiers of rural and peri-urban land, and to allow for the acquisition of land by vulnerable occupiers. This Act:</p> <ul style="list-style-type: none"> •Protects occupiers against unfair evictions by the landowner. •Provides for legal evictions under certain circumstances. •Sets out the rights and duties of owners and occupiers. •Protects people living on land belonging to someone else by giving them a basic level of tenure security. This means that the occupiers have the right to continue living on and using this land, including the right to graze cattle and draw water. The landowner cannot cancel or change the occupiers' rights without their consent, unless there is good reason, and the occupiers have had a chance to answer complaints against them.

3 PROJECT DETAILS

This section of the report details the motivation for the Project as well as specifics relating to activities that will form part of the project.

3.1 Need and Desirability of the Project

The South African Government adopted a National Infrastructure Plan in 2012 that intends to transform our economic landscape while simultaneously creating significant numbers of new jobs, and to strengthen the delivery of basic services. The plan also supports the integration of African economies. The National Infrastructure Plan consists of eighteen (18) Strategic Integrated Projects (SIPs) spread across the country.

SIP 1 aims to unlock SA's northern mineral belt in one of the poorest provinces (Limpopo) through key infrastructure provision in the Waterberg and Steelpoort districts, initiating new energy and industrial development, shifting coal from road to rail in Mpumalanga and increasing rail capacity to Richards Bay whilst supporting regional integration. Fifteen percent (15%) of the country's total power generation is situated in Waterberg. The assurance of water supply to the current power stations is not acceptable and places the country's power supply at risk. The components associated with SIP 1 thus include the proposed MCWAP-2. The former Minister of Water Affairs approved the implementation of MCWAP-1 (MCWAP (Phase 1)), MCWAP-2A and MCWAP-3 (MCWAP (Phase-3)) as Government Waterworks in terms of Section 109 of the National Water Act (Act No. 36 of 1998) (NWA) on 14 May 2010, subject to the Environmental Authorisation of the project by the DFFE. The MCWAP-3 (River Management System) was since merged with MCWAP-2A.

The IDP for the Lephalale LM (2016) acknowledges the need for MCWAP and specifically states the following: "It is imperative to note that the outcome of the MCWAP project need to be implemented to address expected water shortages before any development in node area 1 will be viable, as currently the area does not have sufficient water resources to sustain any new development". MCWAP-2A is also included as one of the strategic projects in terms of Key Performance Area 2: Basic Services and Infrastructure investment. It is noted that Thabazimbi LM's water supply is from Magalies Water, though, and will not directly benefit from the MCWAP2A. According to the spatial vision presented in the IDP for the Thabazimbi LM (2017), the proposed footprint of MCWAP-2A falls primarily within the activity and government corridor, which extends northwards from the town of Thabazimbi (similar to Zone 11 of the Waterberg DM EMF).

3.2 Reasons for the application

The study team for the RMS considered thirteen (13) existing river gauging stations. A site visit was carried out on 6 and 7 December 2022 with the following objectives:

- a) Refine the scope of the number of existing weirs to be included for refurbishment;
- b) Refine the number of new weirs that will be included in the RMS; and
- c) Appraise the sites of existing weirs to identify rehabilitation and refurbishment requirements.

From this assessment three (3) flow gauging stations were identified where major works will be undertaken, these stations **Error! Reference source not found.** are listed below.

- A2H019 (Beestekraal Weir) on the Crocodile River (West);

- A2H059 (Atlanta Weir) on the Crocodile River (West); and
- A2H116/A2H132 (Paul Hugo Weir) on the Crocodile River (West).

The closest flow gauging weir to the proposed Vlieëpoort Weir Site is the Paul Hugo Weir (A2H132), which is located some 20 km upstream of the proposed Vlieëpoort Weir Site. There are no other functioning flow gauging weirs between the Paul Hugo Weir and the Proposed Vlieëpoort Weir Site. The Paul Hugo Weir, and the weir itself, will need to be upgraded to the same standard as the other DWS Flow Gauging Weirs along the Crocodile River (West) to ensure that data of comparable quantity and quality is available for use in the Proposed RMS. The original purpose of the Paul Hugo Weir is for irrigation and not for flow gauging.

Flow gauge A2H116 was constructed at the foot of the Paul Hugo Weir. It was not meant to augment the accuracy of the Paul Hugo Weir for low flows as it is too close to the main Paul Hugo Weir and becomes drowned when the main weir spills. It was established to measure small amounts of stored water upstream of the Paul Hugo Weir, which is released to the downstream farmers through a small sluice gate when the weir was not spilling. This requirement disappeared many years ago and the sluice gate cannot even be opened anymore.

The primary reason why a new flow gauging weir is proposed downstream of the Paul Hugo Weir, is that the accurate measurement of low flows before the confluence with the Sand River and the Bierspruit is important for management and control of the MCWAP-2. Since the Paul Hugo Weir was not designed as a flow gauging weir, and because it is just a rough broad crested storage weir, the low flows can currently only be estimated at best. Subsequent to this determination, a contactless radar flow monitoring system has been investigated that will be placed on a gantry, as an alternative to the construction of a new weir.

The confluences of the Sandrivier and Bierspruit with the Crocodile River (West) are located downstream of the Paul Hugo Weir and upstream of the Proposed Vlieëpoort Weir Site. This means that the contributions made by the Sandspruit and Bierspruit to the flow in the Crocodile River (West) are currently unknown other than through run-off calculations and cursory visual observations. However, the contributions of these two rivers are considered to be negligible, especially during low flow conditions, and even though Sandspruit and Bierspruit were authorised in the EA (Reference No. 14/12/16/3/3/2/1100) on 18 March 2019 the recommendation was to not have new weirs constructed in the tributaries of the Crocodile (West) River.

4 ALTERNATIVES

The EIA procedures and regulations stipulate that any environmental investigation needs to consider feasible and reasonable alternatives for any proposed activity. The term “alternatives” as per Government Notice No. 982 of the NEMA EIA Regulations is defined as follows:

“...in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to:

- *The property on which or location where it is proposed to undertake the activity;*
- *The type of activity to be undertaken;*
- *The design or layout of the activity;*
- *The technology to be used in the activity;*
- *The operational aspects of the activity; and*
- *The option of not implementing the activity.”*

The alternative gauging weirs has been considered for this Draft BAR and is further explained below.

4.1 Alternatives investigation

The GBN-JV conducted a technical investigation, undertook hydrology and system analysis, supported by specialist consultants and other technical specialists.

A site visit was also undertaken and took place on 6-7 December 2022. The site visit was undertaken by the following parties:

- Representatives from the Department of Water and Sanitation (DWS).
- Representatives from Trans-Caledon Tunnel Authority (TCTA).
- Gibb-Bigen-Nyeleti Joint Venture (GBN-JV) project team.

The site visit began at the Hartbeespoort Dam (A2R001) and concluded at proposed new weir at Vlieëpoort. The team visited the existing weirs and proposed new weirs as tabulated below **Error! Reference source not found..**

The outcome of the site visit indicates that the following gauging weirs will have the least risk:

- a) A2H019 (Roodekopjes Dam/ Beestekraal Weir) on the Crocodile River (West); S 25.403640°, E 27.574750°
- b) A2H059 (Atlanta Weir) on the Crocodile River (West); S 25.206310°, E 27.557940°
- c) Approximately 50 – 100m downstream of A2H116/A2H132 (Paul Hugo Weir) on the Crocodile River (West); S 24.69508°, E 27.40900°

A summary table, Table 12 below presents the key findings from site visit and reason for selecting the three (3) gauging weirs.

Table 12: Summary of existing and proposed weirs to be refined

Weir No.	Description	Critical for RMS	Geotechnical and Geohydrological Investigations Required	Survey Required	Structural Changes Proposed
A2R001	Hartbeespoort Dam	No	No	No	No
A2H083	D/S of Hartbeespoort Dam	No	Only right bank	Yes - calibration	Only maintenance to right bank
A2H048	Krokodilpoort	No	No	Yes - calibration	No
Proposed New Weir #1	Upstream of Roodekopjes Dam	No	No	No	No
A2H019	Beestekraal d/s of Roodekopjes Dam	Yes	Yes	Yes – calibration and new work	Yes – Raising of weir crest, raising of right non overflow crest
A2H111	Vaalkop Dam	No	No	No water from the Vaalkop to be used for RMS	No
A2H059	Atlanta	Yes	No	Yes - calibration	Left non-overflow crest to be TBC
A2H060	Nooitgedacht	Yes	Yes - d/s of weir towards Paul Hugo	Yes - calibration	No
A2H116/132	Paul Hugo	Yes	Yes	Yes	Yes – existing low flow crest and new low flow weir/s of existing structure
Proposed Additional Weir Site #4	Low water bridge at Thabazimbi golf course	No	No	No	No

Weir No.	Description	Critical for RMS	Geotechnical and Geohydrological Investigations Required	Survey Required	Structural Changes Proposed
Proposed New Weir #2	Bierspruit	No	No	No	No
A2H106	Klipvoor Dam	No	No	No	No
A2H021	Pienaars River	No	No	No	No
Proposed New Weir #3	Sand River	No	No	No	No
Proposed New Weir #5	Vlieëpoort	Yes	Outside scope	Outside scope	Outside scope
Proposed New Weir #6	D/S of Vlieëpoort	Yes	TBC	TBC	TBC

4.1.1 No Go Alternative

Accurate flow monitoring is essential for the successful implementation of the MCWAP2 project ensuring that all legal water uses, including the allocation for the Ecological Reserve, receive their water allocations. Furthermore, accurate low flow measurement is required, which justifies the need to upgrade the existing flow gauging weirs, and construct a flow measuring structure at the existing Paul Hugo weir, or alternatively a gantry.

5 BASELINE ENVIRONMENT AND SPECIALIST FINDINGS

This chapter provides a description of the baseline conditions of the receiving environment which may be affected by the proposed three (3) gauging weirs and gantry. The receiving environment herein is described in terms of biophysical environmental factors, those which could potentially be directly or indirectly affected by the proposed three (3) gauging weirs and gantry. The key findings from the various specialist studies undertaken are elaborated on in the sub sections below.

During a pre-application meeting, the DFFE advised that site sensitivity verification should be conducted for all the identified sensitivity themes even though there are themes that are low and medium sensitivity, DFFE still requires at least a sensitivity verification and compliance statement, either by an EAP or specialist. The GBN-JV therefore conducted the studies for all environmental themes. The following studies were utilised for this DBAR:

- a) Aquatic Biodiversity and Sedimentation Report prepared by M2 Environmental Connections (Pty) Ltd (2023) (refer to Annexure D1);
- b) Heritage and Palaeontological Impact Assessment by CES - Environmental and Social Advisory Services (2023) (Annexure D2);
- c) Environmental Ambient Noise Assessment prepared by Rayten Engineering Solutions (Pty) Ltd (2023) (refer to Annexure D3);
- d) Terrestrial Biodiversity Assessment prepared by M2 Environmental Connections (2023) (refer to Annexure D4);
- e) Agricultural Impact Assessment prepared by Nsovo Environmental Consulting cc (2023) (refer to Annexure D5);
- f) Surface Water by Environmental Assurance (Pty) Ltd (2023) (Annexure D6);
- g) Air Quality by Environmental Assurance (Pty) Ltd (2023) (Annexure D7);
- h) Civil Aviation Compliance Statement by Delta Built Environment Consultants (2023) (Annexure D8); and
- i) Defence Compliance Statement by MDTE (2023) (Annexure D9).

5.1 Baseline Environment

The project area is rural in nature. The proposed Project is mostly located on privately-owned properties that are primarily used for agricultural practices. The study area was primarily dominated by cultivation activities, while the surrounding areas are characterised by gauging weirs and residential areas. The agricultural practices in proximity to the proposed developments include vegetable (cabbage), maize, cotton, wheat, and pasture cultivation. These cultivation practices were under irrigation, making use of center pivots. **Figure 5** depicts the different land uses identified within the study area.



Figure 5: Land uses associated with the study area.

5.2 Biophysical Environment

This section includes baseline information relating to Climate, Topography, Geology and Soils, Agriculture, Aquatic Biodiversity, Terrestrial Biodiversity, Noise Impact, Air Quality, Surface Water, Civil Aviation, Heritage and Palaeontology as well as Defence.

5.2.1 Climate

The Atlanta and Beestekraal Weirs falls within the humid subtropical climate characterised by hot and humid summers and cool to mild winters. Most summer rainfall occurs during thunderstorms that build up due to the intense surface heating and subtropical solid sun angle. The Paul Hugo Weir falls within the hot semi-arid climate characterised by hot, sometimes extremely hot, summers and warm to cool winters, with some to minimal precipitation.

The mean annual rainfall ranges between 401 mm and 601 mm; this rainfall is not deemed adequate to support rain-fed agriculture and planting dates, and the length of the growing season may be affected and needs to be carefully considered.

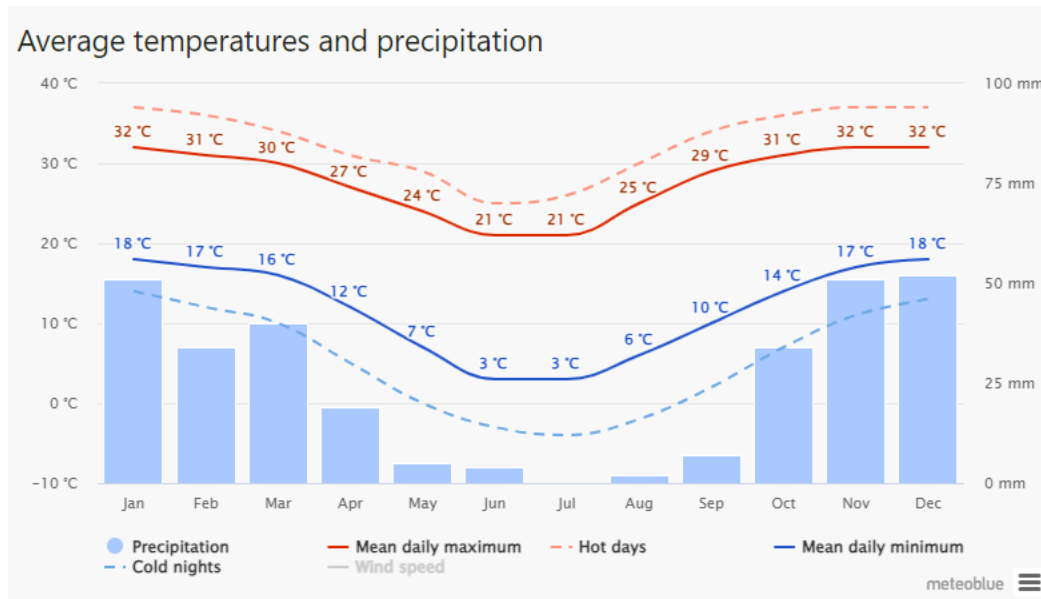


Figure 6: Climate data for Beestekraal and Atlanta sourced from Meteoblue

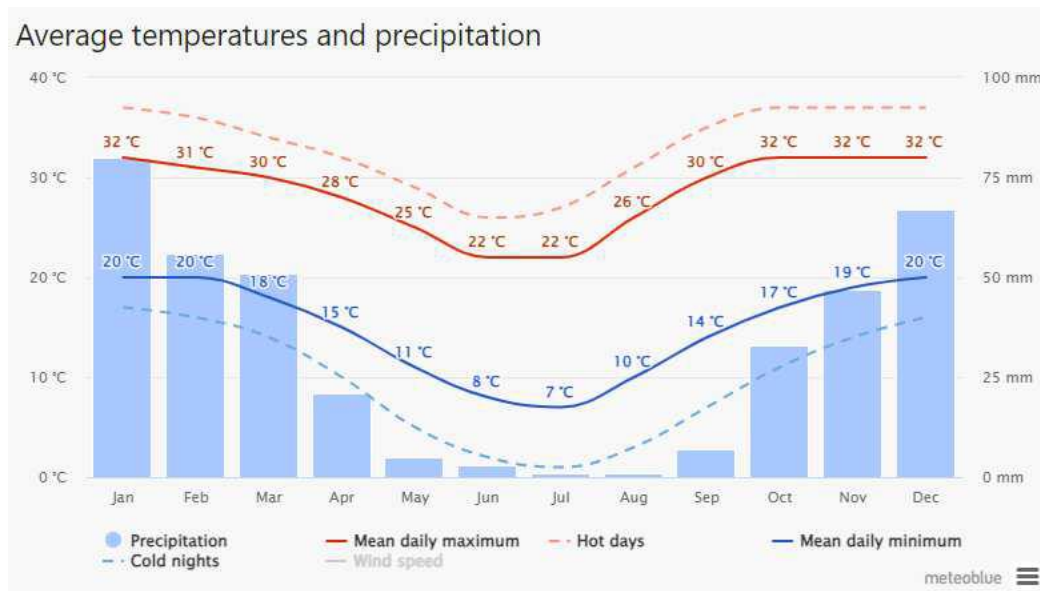


Figure 7: Climate data for Thabazimbi sourced from Meteoblue

January is the warmest month of the year. The temperature in January averages 24.7 °C. During the month of July, there is a notable drop in temperature, with an average low of approximately 13.6 °C | 56.5 °F. Refer to **Figure 6-7** for the average temperature experienced in Thabazimbi and Northwest.

5.2.2 Topography

The topography characteristics indicate that the sites between Beestekraal and Atlanta Weir have several fluctuations in elevation with the low point being located at the Atlanta Weir which is also associated with a floodplain wetland system. The elevation profile between the sediment discharge and Paul Hugo Weir has a much more gradient profile with two high points (hilltops being observed between the middle of these two sites). The elevation increases from approximately 898m to 1237m

downstream of the Paul Hugo Weir. The elevation profile also indicates a decline from 1018m to 952m above sea level within an 8 km distance.

5.2.3 Aquatic

The reach of the Crocodile (West) River within the survey area falls within a Limpopo water management area (refer to **Table 13**) that is dominated by game farming, cultivation of crops and mining operations. Natural to semi natural conditions dominate the riverine and riparian habitat with limited influence by infrastructure and other transforming pressures and drivers of ecological change. There tends to be a relatively large level of erosion within the catchment, which manifests in a high silt and sediment content within the watercourse. The sediments get deposited at various points within the river where hydraulic sheltering occurs, which culminates in sandbanks. The river within the survey area tends to have a deep and medium-fast flowing main channel, interspersed with slower-flowing shallower areas. Substrates tend to be dominated by sand, except where shallower areas occur that induce higher water velocities, where some stones and gravel substrates occur. Low level bridges, culverts and gauging weirs within the river reach also creates a degree of habitat diversity. Downstream of the obstructions there is an induced high-water velocity and turbulence, which, in turn, creates areas where substrates are dominated by stones. In general, however, the river reach is dominated by slow to medium-fast flowing water, ranging from medium to deep water, with the substrates dominated by sand.

Table 13: Regional Characteristics of the quaternary catchments

Attribute	Project Details
Water Management Area	Limpopo
Sub-water Management Area	Lower and Upper Crocodile
Quaternary Drainage Region	A24J, A24H, A24A, A21K and A21L
Main River	Crocodile River
River PES	Class D: Largely Modified
RQO Catchment PESC	Class D: Largely Modified
Rec. Ecological Category	Class C: Moderately Impaired
SANBI PES	Class D: Largely Modified
FRAI PES	Class C: Moderately Modified
SANBI NFEPA Status	Very High Priority

A Water Use Licence Application has not yet been approved by the DWS, although a preapplication meeting was conducted and various communication between the relevant authorities occurred. The Water Use Licence Application has been submitted to the DWS for decision-making.

5.2.4 Terrestrial Biodiversity

The DFFE screening tool outcome was that the project as a whole triggered themes and sensitivities for animal species, plant species and terrestrial biodiversity themes (**Table 14**)

Table 14: Screening Tool outcomes for critical conservation features of terrestrial biodiversity

Site	Theme	Sensitivity	Rationale
Beestekraal Weir	Animal Species	High	Sensitive species
	Plant Species	Low	Low sensitivity
	Terrestrial Biodiversity	Very High	CBA 2 National Protected Area Expansion Strategy (NPAES)
Atlanta Weir	Animal Species	High	Sensitive species
	Plant Species	Low	Low sensitivity
	Terrestrial Biodiversity	Very High	ESA 1
D/S of Paul Hugo Weir	Animal Species	High	Sensitive species
	Plant Species	Low	Low sensitivity
	Terrestrial Biodiversity	Very High	Low sensitivity but within Leana Nature Reserve

Based on the specialist information gathered from online databases, as well as a ground truthing site visit conducted on 17 – 18 October 2023, the specialist found that the sites in question does not necessarily correlate to the findings proposed by the Environmental Screening Tool. The following were found:

Beestekraal Weir was classified as having “high sensitivity”, with the project area characterised by a mosaic of non-delineated small wetland habitats, with mostly natural riparian habitats present on at least three terraces/levels and significant instream vegetation. Following the upgrade of the weir, at least one of these riparian terraces will be flooded and significant instream vegetation will be removed. The habitat at the Beestekraal weir consisted of a tall dense riparian zone comprising of *Combretum*, *Vachellia*, *Senegalia*, *Ziziphus*, *Searsia*, *Olea* species and an undergrowth of predominantly *Carissa bispinosa*, *Diospyros lycoides* and *Megathyrus maximus*, punctuated in places by *Scadoxus puniceus*, *Sansevieria aethiopica* and *Aloe davyana*. Well-developed reed beds (*Phragmites australis* and *Cyperus eragrostis*) facilitate significant terrestrial biodiversity by providing foraging and breeding habitat for birds, mammals, reptiles and amphibians with several faunal SCCs expected to utilise the habitat. No floral SCCs or protected species were identified on site. However, Cape Clawless Otter (NT) was observed on site and this is a protected species.

The Atlanta Weir was classified as having “low/moderate sensitivity”, with the project area characterised as having a narrow, sparse and highly invaded (dominant alien invasive plant species: *Morus alba*, *Melia azedarach*, *Arundo donax*) riparian area. The riverbank was found to be steep which will protect the majority of the riparian vegetation from flooding following upgrade of the weir. The riverbank is particularly prone to erosion and overgrazing as evident on site (short cropped *Cynodon dactylon* lawn). The entire riparian area defined by NFEPA as floodplain wetland, inflating the sensitivity of the site. Significant stands of dense reeds house protected reptile species as confirmed on site (African Rock Python) but impacts to this habitat expected to low. No floral SCCs or protected species were identified in the area of influence but once again evidence of otter presence (scat) was found.

The Paul Hugo Weir was also classified as having “low/moderate sensitivity”, with the upstream project area characterised by a broad, largely intact riparian area dominated by large trees (*Searsia*, *Celtis*, *Vachellia* species) with very limited undergrowth. Invasive trees such as *Melia azedarach* were pervasive (*Salix babylonica* to a lesser extent). Adjacent cultivated lands lie close to the river approximately 50 m from the riverbanks. The nature of the construction (new weir downstream of the existing weir) will limit possible impacts from occurring upstream from the existing weir and the riparian area, that will be flooded through the construction of the new downstream weir, was found to be heavily eroded and invaded (*Argemone ochroleuca*, *Ricinus communisi*, *Tagetes minuta*, *Verbena* spp) with few natural species occurring. Very few natural tall trees present in the area will be impacted. The entire riparian area defined by NFEPA as floodplain wetland inflating the sensitivity of the site. No floral SCCs or protected species were identified but there was evidence of otter presence on site (scat).

The project sites fall within the Central Bushveld Bioregion, with a temperate climate and summer rainfall in the form of heavy thunderstorms. The project area receives 400 – 700 mm mean annual precipitation, with annual evaporation of 1700 - 1800 mm per year.

Threatened ecosystems at risk of being transformed have been identified and listed as per Section 52 of NEMBA (GN1002 of December 2011, revised GN47526 November 2022), which aims to minimise ecosystem and species extinctions by preventing further degradation and loss of structure, function, and composition of threatened ecosystems (SANBI, 2011). Each of the weirs is located in a distinct vegetation type as indicated in **Table 15**:

Table 15: Relevant ecosystems and vegetation types

Site	Bioregion	Vegetation Type	Threat Status
Beestekraal Weir	Central Bushveld	Central Sandy Bushveld	Least Threatened
Atlanta Weir	Central Bushveld	Western Sandy Bushveld	Least Threatened
D/S of Paul Hugo Weir	Central Bushveld	Dwaalboom Thornveld	Least Threatened

5.2.5 Geology and soils

The Rustenburg, Lebowa, and Rашoop geological lithologies underlie the soils associated with the Beestekraal and Paul Hugo Weirs. These lithologies are part of the bushveld complex. It is known for its enormous concentrations of magmatic ores, a variety of pegmatitic and hydrothermal deposits, and industrial mineral deposits formed by the metamorphism of the floor rocks of the Complex. Because of the climatic conditions, the resultant soils are typically shallow, consisting of quartz pebbles and gravel. The Transvaal, Rooiberg, and Griqualand-West lithologies underlie the Atlanta Weir. **Figure 8** depicts the geological lithologies associated with the study area.

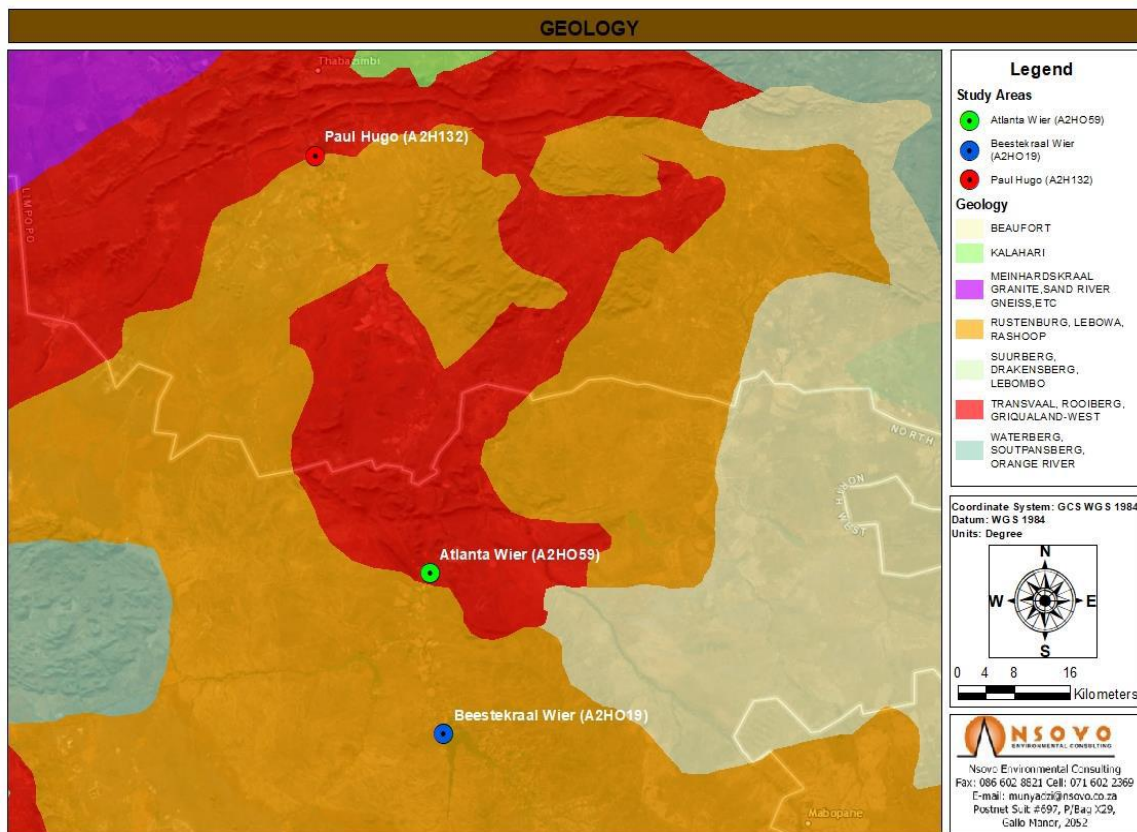


Figure 8: Geological formations associated with the study area

5.2.6 Heritage and Palaeontology

A Heritage and Palaeontology Impact Assessment Report is required:

- Paul Hugo gauging weir, Heritage Theme is of Low Sensitivity and Paleontology Theme is of Medium Sensitivity.
- Atlanta gauging weir, Heritage Theme is of Low Sensitivity and Paleontology Theme is of Very High Sensitivity.
- Beestekraal gauging weir, Heritage Theme is of Low Sensitivity and Paleontology Theme is of Medium Sensitivity.

Heritage and Palaeontology Impact Assessment outcome was that large portions of the project area and the baseline environment along the Crocodile River have been affected by historical and recent farming, as well as the construction of existing weirs and water pump facilities which possibly sterilized the landscape of prehistorical archaeological and other remnants. As no archaeological sites were located during the site assessment no apparent impact on the archaeological landscape is foreseen during the preconstruction, construction and operation phases of the project. However, since cultural (archaeological) layers are usually superficial, subsoil layers and that makes them easily vulnerable to destruction, the likelihood for encountering previously undetected cultural heritage or archaeological material sites as the land clearing process commences, or during construction of infrastructure should be considered. Site monitoring by an informed ECO will be required throughout the construction phase of the project in order to avoid the destruction of previously undetected heritage sites.

The Palaeontology Impact Assessment outcome is that the geological structures suggest that the rocks are either the wrong kind or much too old to contain fossils. Furthermore, the material to be excavated for foundations is soil or bedrock and these do not preserve fossils. Since there is an extremely small chance that trace fossils such as stromatolites from the Chuniespoort Subgroup may be disturbed (Site Atlanta A2H059 only) a Fossil Chance Find Protocol has been added to the report.

5.2.7 Air Quality

The temporary nature of the construction activities, and the likelihood that these activities will be localised and on small areas at any given time, reduces the potential for significant off-site impacts.

All sensitive receptors are more than 200 m from the proposed weirs and construction areas. Windblown particulates may be a problem in this area, but only under conditions of high wind speeds which, based on the historic weather dataset, is only likely to occur for a short duration throughout the year. PM10 particles are unlikely to impact on receptors more than 500 meters from the source of emissions. Larger particles of between 10 and 30 µm would settle within 500 m with coarse particles (greater than 30 µm) would deposit within 100 m from the source.

The closest residential receptors to the three weirs are summarised in **Table 16** overleaf.

Table 16: Sensitive Receptors

Weir	ID	Latitude	Longitude	Description	Distance (m)
Beestekraal	Sensitive Receptor BK 1	25.397843°	27.574044°	Shongololo Camping Site	630 m
Beestekraal	Sensitive Receptor BK 2	25.407603°	27.566436°	Thaba lodge	970 m
Beestekraal	Sensitive Receptor BK 3	25.407523°	27.569801°	Residential Houses (informal)	680 m
Atlanta	Sensitive Receptor AT 1	25.206677°	27.559716°	Residential Farmhouse	220 m
Atlanta	Sensitive Receptor AT 2	25.207234°	27.566377°	Residential Houses and Offices	860 m
Atlanta	Sensitive Receptor AT 3	25.210931°	27.543096°	Residential Farmhouse	1550 m
Paul Hugo	Sensitive Receptor PH 1	24.693229°	27.400652°	White Silo Guesthouse	830 m
Paul Hugo	Sensitive Receptor PH 2	24.698166°	24.698166°	Residential Farmhouse	850 m
Paul Hugo	Sensitive Receptor PH 3	24.693425°	27.395564°	Residential Houses (informal)	1360 m
Paul Hugo	Sensitive Receptor PH 4	24.694591°	27.389419°	Residential Farmhouse and storage facility	2000 m

The outcome of the study for the Air Quality Impact Assessment Report was that the proposed construction phase and to a lesser extent the operational phase of the weir rehabilitation and reconstruction will contribute to the total suspended load in the atmosphere, although off-site impacts are not expected, the impact is anticipated to be largely localised within the construction area. Mitigation measures were provided to enable the proposed development to minimise the impact.

5.2.8 Noise

During the construction of the three (3) gauging weirs, it is crucial to anticipate and address the potential noise generated throughout the various phases of the project. Construction activities often involve heavy machinery, drilling, blasting, and earthmoving, all of which can contribute to elevated noise levels. The operation of excavation equipment, such as bulldozers, excavators, crushers, and dump trucks, can produce continuous low-frequency noise, while drilling and blasting activities produce impulsive and high-intensity noise.

Farms, farm portions, public areas, residential areas, and potential noise-sensitive developments/receptors/communities are near the proposed three gauging weirs as detail below.



Figure 9: Sensitive Receptors Locations - Beestekraal weir

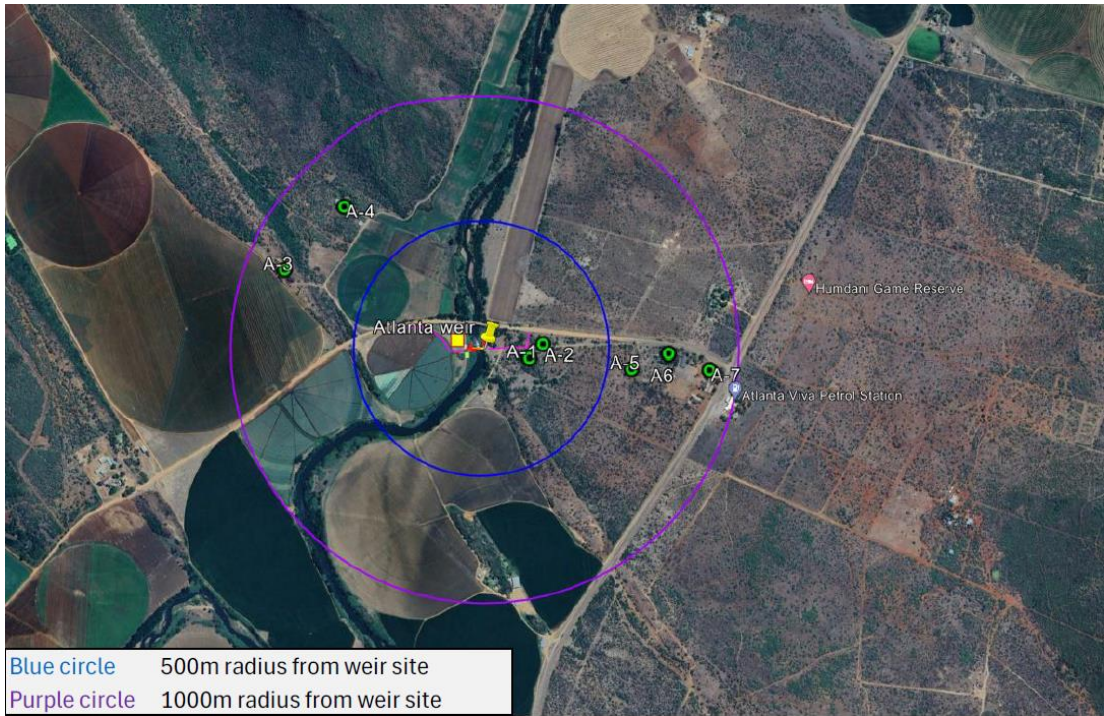


Figure 10: Sensitive Receptors Locations - Atlanta weir

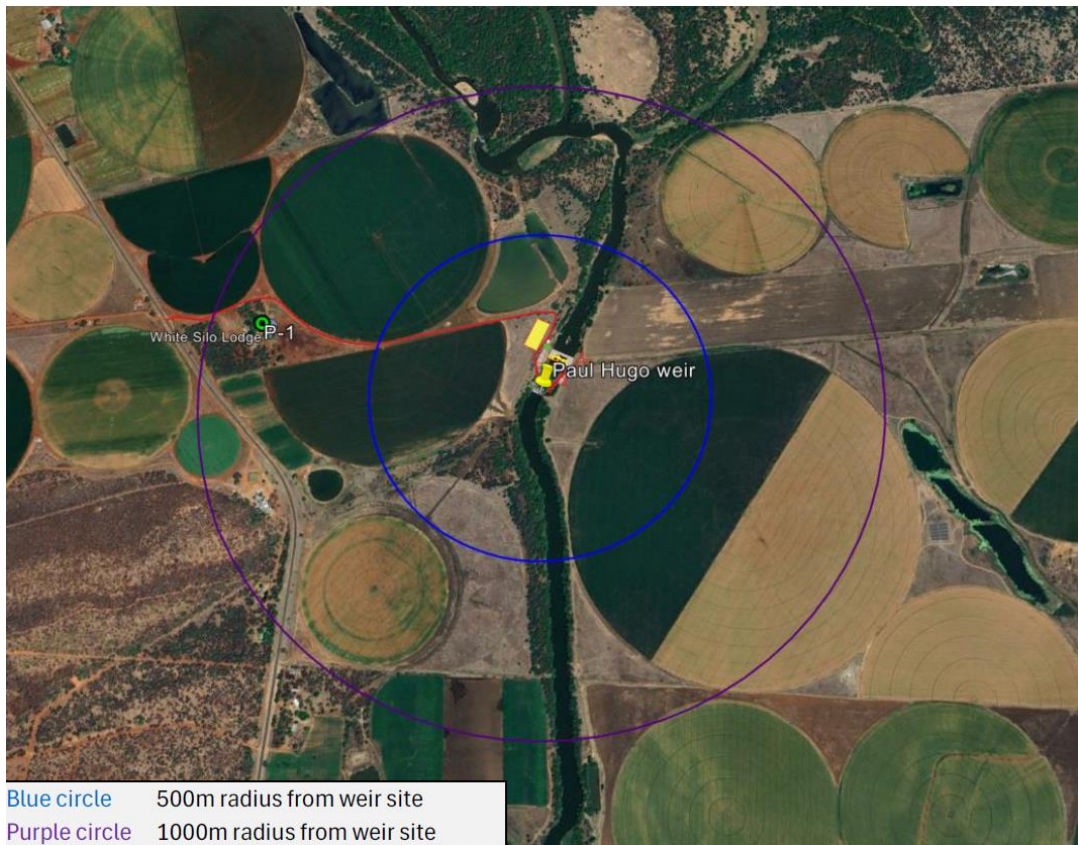


Figure 11: Sensitive Receptors Location – Paul Hugo weir

5.2.9 Civil Aviation

A Civil Aviation Compliance Report is required:

- Paul Hugo gauging weir, Civil Aviation Theme is of Medium Sensitivity.
- Atlanta gauging weir, Civil Aviation is of Medium Sensitivity.
- Beestekraal gauging weir, Civil Aviation is of High Sensitivity

The Specialist undertook a site sensitivity verification for this environmental theme. The assessment found the proposed gauging weirs will have no impact on any civil aviation infrastructure. The proposed pipeline deviation is situated a significant distance away from the aerodromes and may only have air valve structures with a height ranging from 1 to 1.5 m above ground level, which is below the elevation of the runways and their associated obstacle-free zones.

5.2.10 Defence

The Defence Theme is of Low Sensitivity for all three (3) gauging weirs.

The EAP undertook a site sensitivity verification for this environmental theme. The assessment found the proposed gauging weirs will have no impact on any defence infrastructure. The proposed development is unlikely to impact on military radar installations, and there are no defence installations in close proximity to the proposed weirs.

5.2.11 Agriculture

An Agriculture Impact Assessment Report is required, at Paul Hugo gauging weir where a Very High Sensitivity was identified. Atlanta gauging weir has a High Sensitivity and Beestekraal gauging weir has a Very High Sensitivity.

Land Capability is defined as the most intensive long-term use of land for purposes of rainfed farming, determined by the interaction of climate, soil, and terrain. The soil physical properties with which the agricultural potential for this assessment, agricultural sensitivity, was inferred in consideration of observed limitations to land use due to physical soil properties and prevailing climatic conditions. **Figures 12-14** below depict the study area's land capability and agricultural potential.

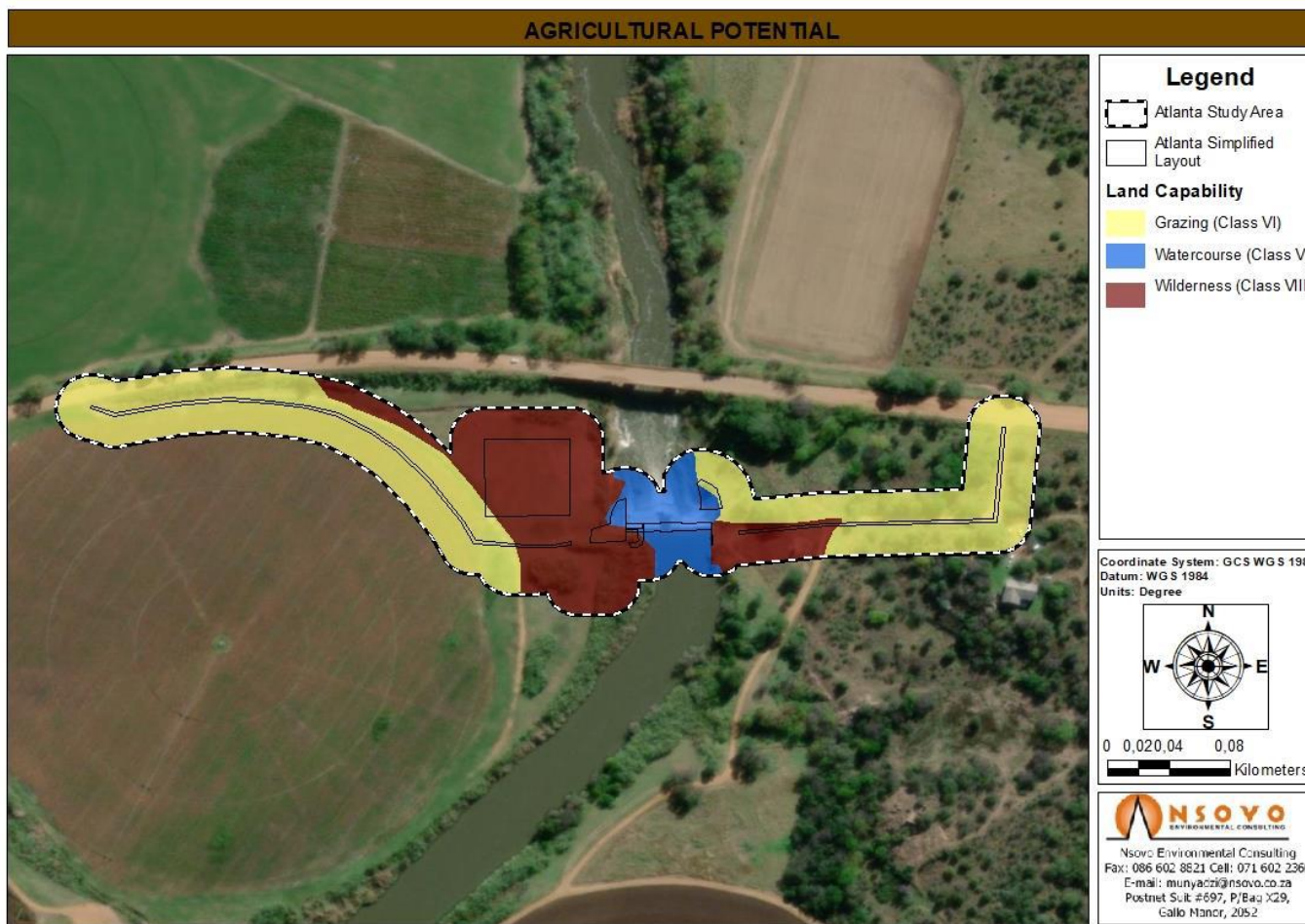


Figure 12: Agricultural potential for soils associated with the soils of the Atlanta weir study area

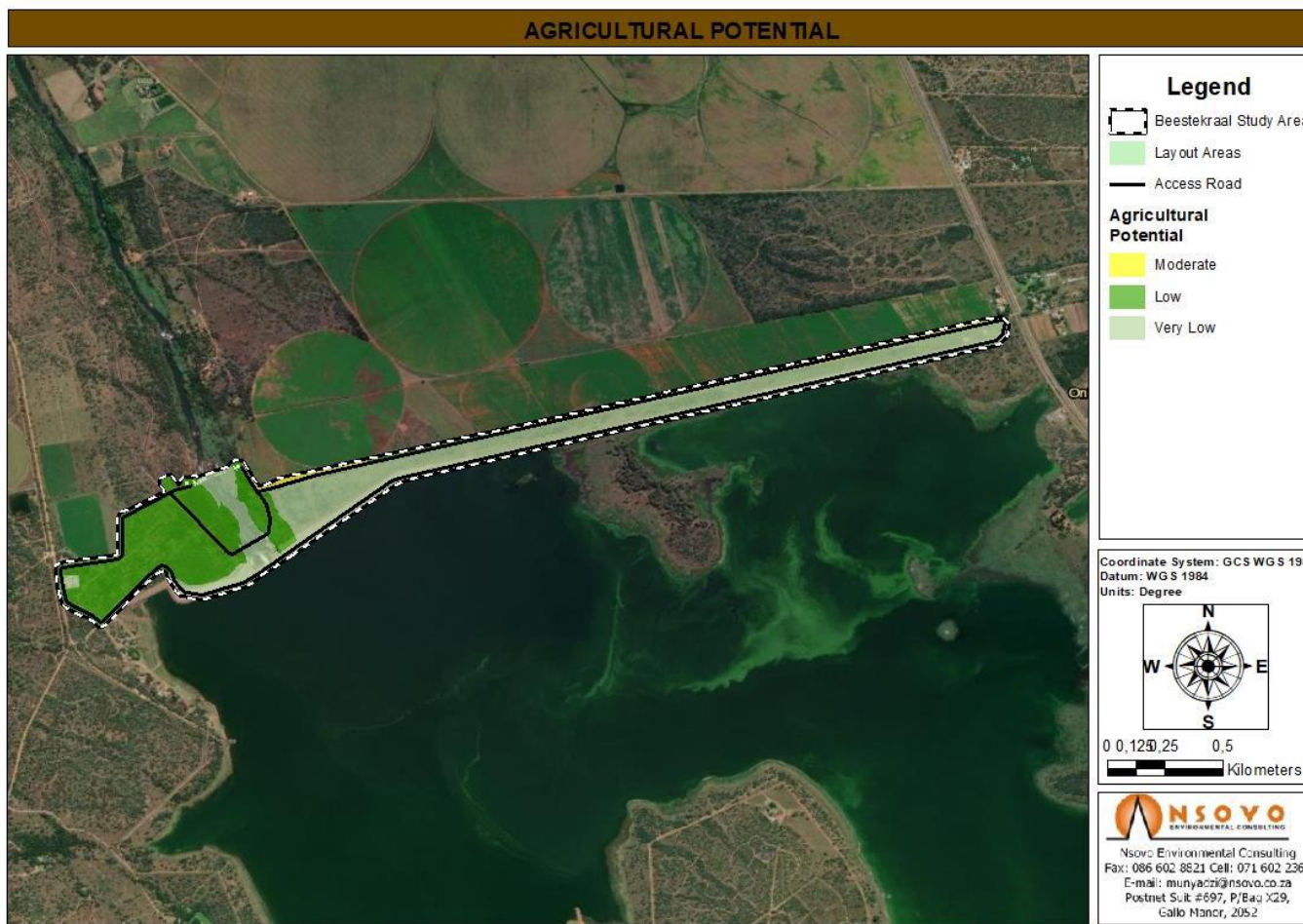


Figure 13: Agricultural potential for soils associated with the soils of the Beestekraal Weir study area

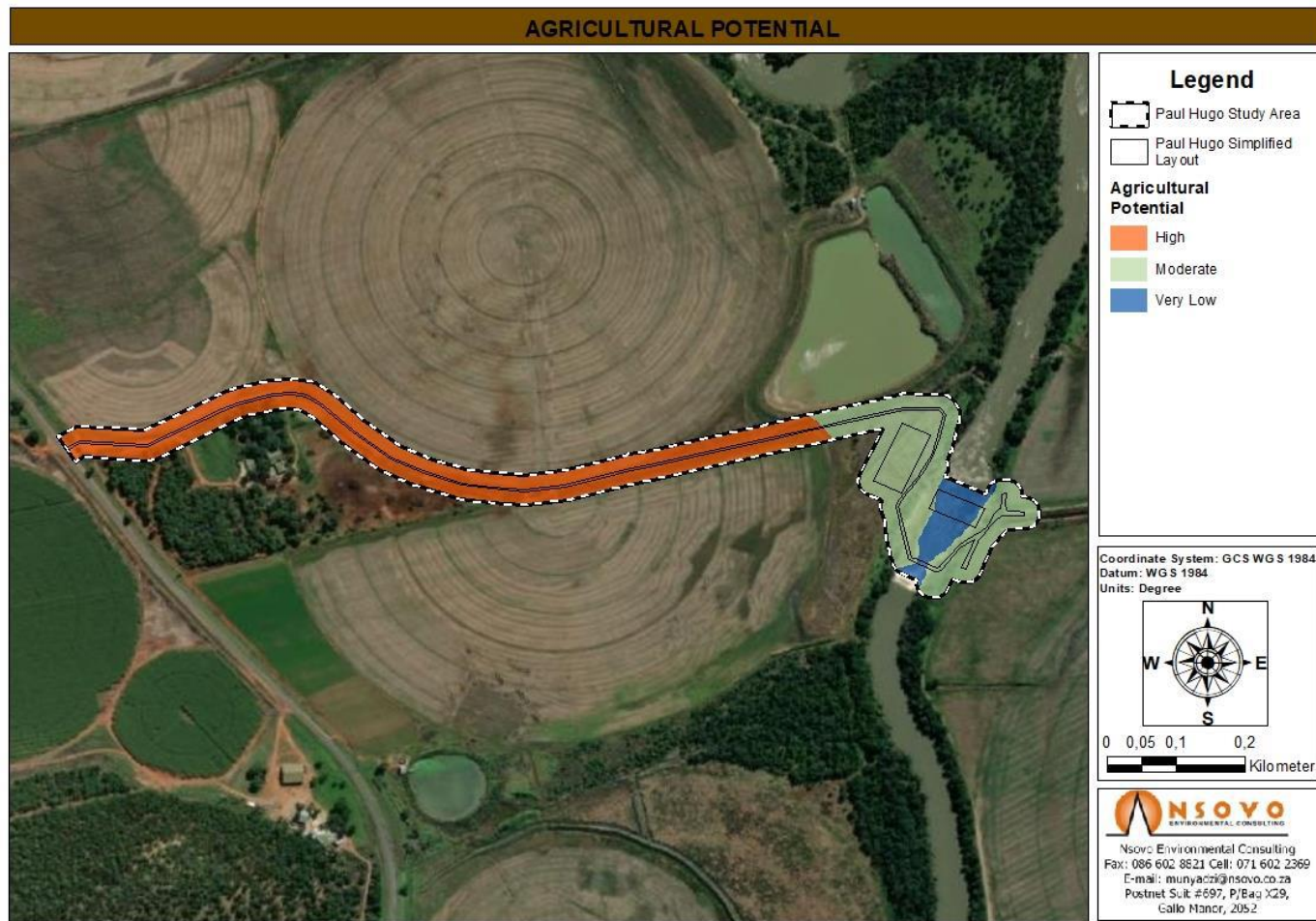


Figure 14: Agricultural potential for soils associated with the Paul Hugo Weir study area soils

6 IMPACT ASSESSMENT

6.1 Impact Identification and Assessment Methodology

GBN-JV, subsequent to the assessment conducted by various specialists, reviewed the impacts identified and assessed the inherent and residual risk posed to the receiving environment pre and post the application of mitigation measures.

The objective of the assessment of impacts is to identify and assess all the significant impacts that may arise as a result of the proposed three (3) gauging weirs implementation and place the consequences of the Proposed Deviation before the competent authority.

For each of the main project phases the existing and potential future impacts and benefits (associated only with the proposed three (3) gauging weirs and gantry alternative) were described using the criteria listed in **Table 17** below. This was done in accordance with the EIA Regulations, promulgated in terms of Section 24 of the NEMA and the criteria drawn from the Integrated Environmental Management (IEM) Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the Department of Environmental Affairs (April 1998).

The assignment of significance ratings has been undertaken based on experience of the EIA team, as well as through research. Subsequently, mitigation measures have been identified and considered for each impact and the assessment repeated in order to determine the significance of the residual impacts (the impact remaining after the mitigation measure has been implemented).

Table 17: Criteria and rating Scales which were used in the Assessment of the Potential Impacts

CRITERIA	RATING SCALES	NOTES
Nature	Positive	An evaluation of the effect of the impact related to the proposed development.
	Negative	
Extent	Footprint	The impact only affects the area in which the proposed activity will occur.
	Site	The impact will affect only the development area.
	Local	The impact affects the development area and adjacent properties.
	Regional	The effect of the impact extends beyond municipal boundaries.
	National	The effect of the impact extends beyond more than 2 regional/ provincial boundaries.
	International	The effect of the impact extends beyond country borders.
Duration	Temporary	The duration of the activity associated with the impact will last 0-6 months.
	Short term	The duration of the activity associated with the impact will last 6-18 months.
	Medium term	The duration of the activity associated with the impact will last 18 months-5 years.

CRITERIA	RATING SCALES	NOTES
	Long term	The duration of the activity associated with the impact will last more than 5 years.
Severity	High negative	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
	Moderate negative	The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
	Low negative	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected
	Low positive	The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved
	Moderate positive	The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected
	High positive	The severity of the impact is rated as High positive as the natural, cultural or social functions and processes are altered to the extent that valued, important, sensitive or vulnerable systems or communities are substantially positively affected.
	Potential for impact on irreplaceable resources	No
Yes		Irreplaceable resources will be impacted.
Consequence	Extremely detrimental	A combination of extent, duration, intensity and the potential for impact on irreplaceable resources.
	Highly detrimental	
	Moderately detrimental	
	Slightly detrimental	
	Negligible	
	Slightly beneficial	
	Moderately beneficial	
	Highly beneficial	
	Extremely beneficial	

CRITERIA	RATING SCALES	NOTES
Probability (the likelihood of the impact occurring)	Unlikely	It is highly unlikely or less than 50 % likely that an impact will occur.
	Likely	It is between 50 and 75 % certain that the impact will occur.
	Definite	It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.
Significance	Very high - negative	A function of Consequence and Probability.
	High - negative	
	Moderate - negative	
	Low - negative	
	Very low	
	Low - positive	
	Moderate - positive	
	High - positive	
	Very high - positive	

Table 18: Explanation of Assessment Criteria

CRITERIA	EXPLANATION
Nature	This is an evaluation of the type of effect (change) the construction, operation and management of the proposed development would have on the affected environment. Will the impact change in the environment be positive, negative or neutral?
Extent or Scale	This refers to the spatial scale at which the impact will occur. Extent of the impact is described as: footprint (affecting only the footprint of the development), site (limited to the site) and regional (limited to the immediate surroundings and closest towns to the site). Extent or scale refers to the actual physical footprint of the impact, not to the spatial significance. It is acknowledged that some impacts, even though they may be of small extent, are of very high importance, e.g. impacts on species of very restricted range. In order to avoid “double counting, specialists have been requested to indicate spatial significance under “intensity” or “impact on irreplaceable resources” but not under “extent” as well.
Duration	The lifespan of the impact is indicated as temporary, short, medium and long term.
Severity	This is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. Does the activity destroy the impacted environment, alter its functioning, or render it slightly altered?
Impact on irreplaceable resources	This refers to the potential for an environmental resource to be replaced, should it be impacted. A resource could possibly be replaced by natural processes (e.g. by natural colonisation from surrounding areas), through artificial means (e.g. by reseeding disturbed areas or replanting rescued species) or by providing a substitute resource, in

CRITERIA	EXPLANATION
	certain cases. In natural systems, providing substitute resources is usually not possible, but in social systems substitutes are often possible (e.g. by constructing new social facilities for those that are lost). Should it not be possible to replace a resource, the resource is essentially irreplaceable e.g. red data species that are restricted to a particular site or habitat of very limited extent.
Consequence	The consequence of the potential impacts is a summation of above criteria, namely the extent, duration, intensity and impact on irreplaceable resources.
Probability of occurrence	The probability of the impact actually occurring based on professional experience of the specialist with environments of a similar nature to the site and/or with similar projects. It is important to distinguish between probability of the impact occurring and probability that the activity causing a potential impact will occur. Probability is defined as the probability of the impact occurring, not as the probability of the activities that may result in the impact.
Significance	<p>Impact significance is defined to be a combination of the consequence (as described below) and probability of the impact occurring. The relationship between consequence and probability highlights that the risk (or impact significance) must be evaluated in terms of the seriousness (consequence) of the impact, weighted by the probability of the impact actually occurring.</p> <p>In simple terms, if the consequence and probability of an impact is high, then the impact will have a high significance. The significance defines the level to which the impact will influence the proposed development and/or environment. It determines whether mitigation measures need to be identified and implemented and whether the impact is important for decision-making.</p>
Degree of confidence in predictions	Specialists and the EAP team were required to provide an indication of the degree of confidence (low, medium or high) that there is in the predictions made for each impact, based on the available information and their level of knowledge and expertise. Degree of confidence is not taken into account in the determination of consequence or probability.
Mitigation measures	Mitigation measures are designed to reduce the consequence or probability of an impact, or to reduce both consequence and probability. The significance of impacts has been assessed both with mitigation and without mitigation.

Table 19: Impact Assessment Criteria and Rating Scales

Duration		Extent		Irreplaceable Resources		Severity		Consequence = (Duration+ Extent+ Impact irreplaceable resources x Severity		Likelihood		Significance = Consequence * Likelihood		Confidence
1	Temporary	1	Footprint	1	Yes	-3	High - negative	-25 to -33	Extremely detrimental	1	Unlikely	-73 to -99	Very high negative -	Low
2	Short term	2	Site	0	No	-2	Moderate negative -	-19 to -24	Highly detrimental	2	Likely	-55 to -72	High - negative	Medium
3	Medium term	3	Local			-1	Low -negative	-13 to -18	Moderately detrimental	3	Definite	-37 to -54	Moderate negative -	High
4	Long term	4	Regional			0	Negligible	-7 to -12	Slightly detrimental			-19 to -36	Low - negative	
		5	National			1	Low -positive	0 to -6	Negligible			0 to -18	Very low negative -	
		6	International			2	Moderate positive -							
						3	High - positive	0 to 6	Negligible			0 to 18	Very Low positive -	
								7 to 12	Slightly beneficial			19 to 36	Low - positive	
								13 to 18	Moderately beneficial			37 to 54	Moderate positive -	
								19 to 24	Highly beneficial			55 to 72	High - positive	
								25 to 33	Extremely beneficial			73 to 99	Very high positive -	

6.2 Ascribing Significance for Decision-Making

The best way of expressing the environmental costs/impacts and the inherent benefit implications for decision-making is to present them as risks. Risk is defined as the consequence (implication) of an event multiplied by the probability (likelihood) ¹ of that event. Many risks are accepted or tolerated daily because even if the consequence of the event is serious, the likelihood that the event will occur is low. A practical example is the consequence of a parachute not opening, is potentially death but the likelihood of such an event happening is so low that parachutists are prepared to take that risk and hurl themselves out of an airplane. The risk is low because the likelihood of the consequence is low even if the consequence is potentially severe.

It is also necessary to distinguish between the event itself (as the cause) and the consequence. Again, using the parachute example, the consequence of concern in the event that the parachute does not open is serious injury or death, but it does not necessarily follow that if a parachute does not open that the parachutist will die.

Various contingencies are provided to minimise the likelihood of the consequence (serious injury or death) in the event of the parachute not opening, such as a reserve parachute. In risk terms this means distinguishing between the inherent risk (the risk that a parachutist will die if the parachute does not open) and the residual risk (the risk that the parachutist will die if the parachute does not open but with the contingency of a reserve parachute) i.e. the risk before and after mitigation.

6.3 Consequence

The ascription of significance for decision-making becomes then relatively simple. It requires the consequences to be ranked and likelihood to be defined of that consequence. In **Table 20**, a scoring system for consequence ranking is shown. Two important features should be noted in the table, namely that the scoring doubles as the risk increases and that there is no equivalent 'high' score in respect of benefits as there is for the costs. This high negative score serves to give expression to the potential for a fatal flaw where a fatal flaw would be defined as an impact that cannot be mitigated effectively and where the associated risk is accordingly untenable. Stated differently, the high score on the costs, which is not matched on the benefits side, highlights that such a fatal flaw cannot be 'traded off' by a benefit and would render the proposed project to be unacceptable.

Table 20: Ranking of Consequence

Environmental Cost	Inherent risk
Human health – morbidity / mortality, loss of species	High
Material reductions in faunal populations, loss of livelihoods, individual economic loss	Moderate – high

¹ Because 'probability' has a specific mathematical/empirical connotation the term 'likelihood' is preferred in a qualitative application and is accordingly the term used in this document.

Material reductions in environmental quality – air, soil, water. Loss of habitat, loss of heritage, amenity	Moderate
Nuisance	Moderate – low
Negative change – with no other consequences	Low
Environmental Benefits	Inherent benefit
Net improvement in human welfare	Moderate – high
Improved environmental quality – air, soil, water. Improved individual livelihoods	Moderate
Economic Development	Moderate – Low
Positive change – with no other consequences	Low

6.4 Likelihood

Although the principle is one of probability, the term ‘likelihood’ is used to give expression to a qualitative rather than quantitative assessment, because the term ‘probability’ tends to denote a mathematical/empirical expression. A set of likelihood descriptors that can be used to characterise the likelihood of the costs and benefits occurring, is presented in **Table 21**.

Table 21: Likelihood Categories and Definitions

Likelihood Descriptors	Definitions
Highly unlikely	The possibility of the consequence occurring is negligible
Unlikely but possible	The possibility of the consequence occurring is low but cannot be discounted entirely
Likely	The consequence may not occur but a balance of probability suggests it will
Highly likely	The consequence may still not occur but it is most likely that it will
Definite	The consequence will definitely occur

It is very important to recognise that the likelihood question is asked twice. The first time the question is asked is the likelihood of the cause and the second as to the likelihood of the consequence. In the tables that follow the likelihood is presented of the cause and then the likelihood of the consequence is presented. A high likelihood of a cause does not necessarily translate into a high likelihood of the consequence. As such the likelihood of the consequence is not a mathematical or statistical ‘average’ of the causes but rather a qualitative estimate.

6.5 Residual Risk

The residual risk is then determined by the consequence and the likelihood of that consequence. The residual risk categories are shown in **Table 22**, where consequence scoring is shown in the rows and likelihood in the columns. The implications for decision-making of the different residual risk categories are shown in **Table 23**.

Table 22: Residual Risk Categories

		Residual risk				
Consequence	High	Moderate	High	High	Fatally flawed	
	Moderate – high	Low	Moderate	High	High	High
	Moderate	Low	Moderate	Moderate	Moderate	Moderate
	Moderate – low	Low	Low	Low	Low	Moderate
	Low	Low	Low	Low	Low	Low
		Highly unlikely	Unlikely but possible	Likely	Highly likely	Definite
		Likelihood				

Table 23: Implications for Decision-Making of the Different Residual Risk Categories

Rating	Nature of implication for Decision – Making
Low	Project can be authorised with low risk of environmental degradation
Moderate	Project can be authorised but with conditions and routine inspections
High	Project can be authorised but with strict conditions and high levels of compliance and enforcement
Fatally Flawed	The project cannot be authorised

6.6 Detailed Impact Assessment

All potential impacts associated have been categorised according to the respective phases (construction, operational, decommissioning) during which they will occur. Impacts associated with each alternative has been outlined below and discussed in terms of their anticipated duration, extent, severity, probability and significance both prior and post mitigation measures being implemented.

6.6.1 Pre-Construction Phase

The impacts anticipated for the Pre-construction Phase will be minimal and negligible. The site set up and demarcations for the site must be done in conjunction with the appointed independent Environmental

Control Officer (ECO) who will undertake scheduled compliance audits to ensure that the activities forming part of this phase are in line with the CEMPr associated with this project.

6.6.2 Construction Phase

Please refer below to some of the main impacts that may be experienced during construction.

BEESTEKRAAL WEIR CONSTRUCTION IMPACT ASSESSMENT

Flow Alterations				
PROJECT PHASE		<i>Construction</i>		
DIRECT IMPACT		<i>Flow alterations due to changes in flow patterns</i>		
INDIRECT IMPACT		<i>Habitat alteration and fragmentation</i>		
CUMULATIVE IMPACT		<i>Affecting the natural flow regime of river system</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-12	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly detrimental	Definite
SIGNIFICANCE	-36	<i>Low Negative</i>		
PROPOSED MITIGATION				
<i>Installing flow regulation mechanisms, such as adjustable gates or flow control structures, can help manage and maintain desired flow conditions within the weir systems.</i>				
<i>Undertaking habitat restoration initiatives, such as the creation of artificial habitats, the reintroduction of native vegetation, and the establishment of riparian buffers, can help offset the potential negative impacts of flow alterations.</i>				
<i>Implementing effective sediment management strategies, such as regular sediment removal and erosion control measures, can help mitigate the potential impacts of sedimentation caused by flow alterations within weir systems.</i>				

POST MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-5	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	-15	<i>Very Low Negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
IN-STREAM VEGETATION & SEDIMENT CLEARANCE				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Aquatic and riparian vegetation clearance upstream</i>			
INDIRECT IMPACT	<i>Increased siltation of aquatic biotopes downstream</i>			
CUMULATIVE IMPACT	<i>Sediment release & deposition downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-21	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		

SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted	Highly detrimental	Definite
SIGNIFICANCE	-63	High negative		
PROPOSED MITIGATION				
<i>Revegetate River banks with endemic aquatic vegetation to improve riverbank erosion</i>				
<i>The least destructive method of removal is to be used, including hand removal where possible.</i>				
<i>Erosion or bank collapse to be carefully avoided and managed, care should be taken with heavy machinery along verges.</i>				
<i>Only the vegetation within the demarcated area is to be removed</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-18	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted	Moderately detrimental	Definite
SIGNIFICANCE	-54	Moderate negative		
CONFIDENCE LEVEL				
<i>Medium</i>				

HABITAT DESTRUCTION DUE TO RAISING OF WEIR & SUBSEQUENT FLOODING				
PROJECT PHASE		<i>Operational</i>		
DIRECT IMPACT		<i>Localised loss of aquatic habitats</i>		
INDIRECT IMPACT		<i>Decrease of aquatic biotope diversity</i>		
CUMULATIVE IMPACT		<i>Flooding events increases bank erosion</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-18	3
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-54	<i>Moderate negative</i>		
PROPOSED MITIGATION				
<i>Cannot be mitigated</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-18	3
EXTENT	2	<i>The impact affects only the development area</i>		

SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Moderately detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-54	Moderate negative		
CONFIDENCE LEVEL				
<i>High</i>				
Weir elevation affecting Sediment transport affecting stormwater runoff behaviour				
PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Increased erosion downstream due to decreased sediment load</i>			
INDIRECT IMPACT	<i>Increased sediment build-up upstream</i>			
CUMULATIVE IMPACT	<i>Changes in hydro morphological regime</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-7	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Slightly detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-21	<i>Low Negative</i>		

PROPOSED MITIGATION				
<i>Riparian and aquatic vegetation upstream of weir is to be removed as they are currently covered in sediment and silt and do not currently have any advantages. The removal will increase natural sediment run-off downstream of weir.</i>				
<i>Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation.</i>				
<i>Stormwater management systems should be utilised effectively, proper stream velocity management could reduce erosion and sedimentation downstream.</i>				
<i>Ensure that downstream water is released effectively to minimise the risks of flooding.</i>				
<i>Weir heights should be set properly which would enable engineers to regulate the flow of stormwater and prevent excessive water build-up.</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	2	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Very Low Positive	Definite
SIGNIFICANCE	42	<i>Moderately positive</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
Barrier effect influencing migration patterns				
PROJECT PHASE	Operational			
DIRECT IMPACT	Fish migration route barriers			
INDIRECT IMPACT	Loss of species diversity			

CUMULATIVE IMPACT		Insignificant due to presence of Roodekoppies damwal		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	0	1
EXTENT	4	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	0	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Negligible</i>	<i>Unlikely</i>
SIGNIFICANCE	0	<i>Negligible</i>		
PROPOSED MITIGATION				
N/A				
POST MITIGATION				
DURATION	4	<i>The impact only affects the area in which the proposed activity will occur.</i>	0	1
EXTENT	4	<i>The impact affects only the development area</i>		
SEVERITY	0	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Negligible</i>	<i>Unlikely</i>
SIGNIFICANCE	0	<i>Negligible</i>		

CONFIDENCE LEVEL				
<i>Medium</i>				
Direct impacts of construction activities in aquatic ecosystems				
PROJECT PHASE		<i>Construction</i>		
DIRECT IMPACT		<i>Destruction of key aquatic habitat biotopes</i>		
INDIRECT IMPACT		<i>Temporary reduction of aquatic macro invertebrate assemblages</i>		
CUMULATIVE IMPACT		<i>Insignificant Cumulative Impact</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-10	3
EXTENT	2	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Los of key aquatic habitat types</i>	<i>Slightly detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-30	<i>Low negative</i>		
PROPOSED MITIGATION				
<i>Construction vehicle to be kept out of the riparian zone at all times.</i>				
<i>Ensure that erosion protective measures are put into place once construction activities starts.</i>				
<i>Ensure that the 32m riparian buffer is being implemented at all times and that that all applicable infrastructure is stored outside the buffer zone. Note that the riparian zone only applies to areas outside the aquatic relevant area</i>				

<i>No-go areas to be clearly demarcated. Construction activities to be limited to the smallest footprint possible.</i>				
<i>Special care should be taken to not disturb key aquatic habitat types. The mobilisation of machinery instream should be conducted as far as possible from aquatic vegetation.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	0	2
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	0	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	0	<i>Very Low Negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
EROSION AND BANK DESTABILISATION				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Loss of topsoil. Destabilisation of banks can cause erosion and sedimentation which can impact downstream environments</i>			
INDIRECT IMPACT	<i>Vegetation unable to establish. Loss of riparian habitat</i>			
CUMULATIVE IMPACT	<i>Sediment release & deposition downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				

DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-42	<i>Moderate-negative</i>		
PROPOSED MITIGATION				
<i>Suitable erosion protective measures to be implemented for access roads, weir structures and stabilisation of river banks once vegetation has been removed</i>				
<i>Stabilisation of cleared areas to prevent and control erosion. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site-specific conditions.</i>				
<i>Monitoring to be conducted to detect erosion (e.g. on steep slopes). Exposed areas to be rehabilitated as soon as possible to prevent erosion.</i>				
<i>Implement an ecologically-sound storm water management plan during construction. This includes protection of topsoil stockpiles and stormwater management in the laydown and camp areas.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-3	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		

IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted	Negligible	Unlikely
SIGNIFICANCE	-3	Very Low-negative		
CONFIDENCE LEVEL				
<i>Medium</i>				
Phosphate and nitrate assimilation				
PROJECT PHASE	Operational			
DIRECT IMPACT	Increase in nutrients and algae blooms			
INDIRECT IMPACT	Reduction of habitat availability and water quality decline			
CUMULATIVE IMPACT	Increased nutrient load within environment			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years.	-21	3
EXTENT	3	The impact affects the development area and adjacent properties.		
SEVERITY	-3	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.		
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted	Highly detrimental	Definite
SIGNIFICANCE	-63	Moderate-negative		
PROPOSED MITIGATION				

Integrating constructed wetlands near weirs can significantly improve phosphate and nitrate assimilation. They can effectively reduce nutrient levels in stormwater run-off before it enters downstream water bodies.

Establishing and maintaining riparian buffers along the banks of water bodies can help enhance nutrient assimilation at weirs.

Implementing permeable reactive barriers, such as permeable reactive interlocking blocks or permeable reactive gates, can effectively reduce phosphate and nitrate levels at weirs.

Implementing nutrient management practices, such as reducing fertilizer use and implementing sustainable agricultural practices in upstream areas

POST MITIGATION

DURATION	3	<i>The duration of the activity associated with the impact will last 18-5 years.</i>	-10	2
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Slightly Detrimental</i>	<i>Likely</i>
SIGNIFICANCE	-20	<i>Low Negative</i>		

CONFIDENCE LEVEL

High

HYDROCARBON & CHEMICAL SPILLAGES

PROJECT PHASE	Construction
DIRECT IMPACT	Hydrocarbon & Chemical pollution of water and soil
INDIRECT IMPACT	Loss of aquatic macro invertebrates

CUMULATIVE IMPACT		Pollution of ground water resources, impaired surface water quality leading to lowered ecological state		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-24	1
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Highly detrimental	Unlikely
SIGNIFICANCE	-24	<i>Low-negative</i>		
PROPOSED MITIGATION				
<i>All hydrocarbon & Chemical spills to be cleaned with spill kits immediately. Spill kit training to take place prior to the initiation of the construction phase.</i>				
<i>All hydrocarbon & Chemicals to be stored according to best practice guidelines</i>				
<i>Stationary vehicles to be fitted with drip trays when standing overnight</i>				
<i>Vehicles to be adequately maintained (off-site) and checked regularly for leaks</i>				
POST MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-3	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		

SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-3	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
Changes in water temperature and quality				
PROJECT PHASE	Construction & Operational			
DIRECT IMPACT	Impact on sensitive species			
INDIRECT IMPACT	Changes in aquatic assemblages			
CUMULATIVE IMPACT	Slightly alternates some water quality parameters further downstream			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18-5 years.</i>	-10	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Slightly detrimental</i>	<i>Likely</i>

SIGNIFICANCE	-20	Low		
PROPOSED MITIGATION				
<i>Protecting and preserving natural riparian vegetation along the banks of water bodies can help regulate water temperature and maintain water quality.</i>				
<i>Implementing effective water flow management strategies at weirs can help regulate water temperatures and maintain water quality.</i>				
<i>Implementing comprehensive stormwater run-off treatment systems, such as constructed wetlands, bio filtration systems, and sedimentation basins, can help reduce the influx of pollutants and contaminants that can contribute to changes in water quality and temperature.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-8	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

Damage or Destruction of Archaeological Sites, Built Environment, Graves, Other Heritage Features	
PROJECT PHASE	<i>Construction Phase</i>
DIRECT IMPACT	<i>Site clearing, excavations and drilling may damage or destroy or alter any archaeological sites, Built Environment, Graves, other Heritage Features that might be present in the rocks.</i>

INDIRECT IMPACT		<i>Loss of knowledge of our local and regional heritage.</i>		
CUMULATIVE IMPACT		--		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years</i>	-4	1
EXTENT	1	<i>The extent of the impact is rated as site as it will affect only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>	Negligible	Definite
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-5	<i>Very low negative</i>		
PROPOSED MITIGATION MEASURES				
<i>General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.</i>				
<i>Close-Out Reporting where by the ECO review management procedures and ensure that effective measures were implemented.</i>				
<i>General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.</i>				
<i>Close-Out Reporting where by the ECO review management procedures and ensure that effective measures were implemented.</i>				
<i>Comply with the requirements of the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA):</i>				
<i>In terms of the Act:</i>				
<i>“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority.” (34. [1] 1999:58) “No person may, without a permit issued by the responsible heritage resources authority-</i>				
<i>destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;</i>				
<i>destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;</i>				
<i>trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or</i>				

bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58)."

"No person may, without a permit issued by SAHRA or a provincial heritage resources agency- destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;

destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;

bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60)."

POST-MITIGATION

DURATION	1	The duration of the activity associated with the impact will last 0-6 months. Temporary	0	1
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur		
SEVERITY	0	Negligible	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted.		
SIGNIFICANCE	10	Very low positive		

CONFIDENCE LEVEL

Medium

Damage or Destruction of Fossils

PROJECT PHASE	Construction Phase			
DIRECT IMPACT	Excavations and drilling may damage or destroy any fossils that might be present in the rocks.			
INDIRECT IMPACT	Loss of knowledge of our palaeontological heritage.			
CUMULATIVE IMPACT	--			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD

PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years</i>	-4	1
EXTENT	1	<i>The extent of the impact is rated as site as it will affect only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>	Negligible	Definite
IMPACT ON IRREPLACEABLE REOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-5	<i>very low negative</i>		
PROPOSED MITIGATION MEASURES				
<i>Photograph and record position (GPS) of any potential fossil found on the surface or in the excavated rocks.</i>				
<i>Remove any fossils found on the surface or in excavations and placed nearby (fossils must not leave the site).</i>				
<i>Send photographs to a palaeontologist to verify their scientific importance.</i>				
<i>Based on the palaeontologist's recommendation the "fossil" can be a. disregarded; b. representative sample collected by the palaeontologist or all fossils collected once a valid permit from SAHRA has been obtained; c. fossils housed in a recognised institution (museum or university palaeontology collection for further study).</i>				
<i>Comply with the requirements of the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA):</i>				
<i>In terms of section 35(4) of the Act no person may without a permit issued by the responsible Heritage Resources Authority – destroy, damage, excavate, alter, deface, or otherwise disturb any palaeontological site; destroy, damage, excavate, remove from its original position, collect, or own any palaeontological material or object; trade in, sell for private gain, export, or attempt to export from the Republic any category of palaeontological material or object; or bring onto or use at a palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or palaeontological material or objects</i>				
POST MITIGATION				

DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months. Temporary</i>	0	1
EXTENT	1	<i>The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur</i>		
SEVERITY	0	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low positive</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

VEGETATION CLEARANCE FOR SITE CAMPS & LAYDOWN AREAS				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Floral destruction and faunal displacement within a Vulnerable ecosystem (listed in literature)</i>			
INDIRECT IMPACT	<i>Loss of Critical Biodiversity Areas</i>			
CUMULATIVE IMPACT	<i>Insignificant cumulative impact</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18months.</i>	-6	3
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		

SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	-18	<i>Very low negative</i>		
PROPOSED MITIGATION				
<i>Avoid removal of mature trees where possible. If necessitated, tree removal should be selective and restricted to non-protected species</i>				
<i>Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation</i>				
<i>Small scale Alien Invasive Management Plan to be implemented</i>				
<i>Area to be clearly demarcated with no activity to be permitted outside the laydown boundaries. No go areas to be clearly communicated through a qualified ECO who will be responsible for managing environmental aspects on site.</i>				
<i>Site to be rehabilitated following construction. Compacted soils to be ripped and tilled, topsoil returned, and area to be sown with naturally occurring grasses.</i>				
POST MITIGATION				
VEGETATION CLEARANCE FOR SITE CAMPS & LAYDOWN AREAS				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Floral destruction and faunal displacement within a Vulnerable ecosystem (listed in literature)</i>			
INDIRECT IMPACT	<i>Loss of Critical Biodiversity Areas</i>			
CUMULATIVE IMPACT	<i>Insignificant cumulative impact</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-6	3

EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	-18	<i>Very low negative</i>		
PROPOSED MITIGATION				
<i>Avoid removal of mature trees where possible. If necessitated, tree removal should be selective and restricted to non-protected species</i>				
<i>Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation</i>				
<i>Small scale Alien Invasive Management Plan to be implemented</i>				
<i>Area to be clearly demarcated with no activity to be permitted outside the laydown boundaries. No go areas to be clearly communicated through a qualified ECO who will be responsible for managing environmental aspects on site.</i>				
<i>Site to be rehabilitated following construction. Compacted soils to be ripped and tilled, topsoil returned, and area to be sown with naturally occurring grasses.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>		
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>	-3	2
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-6	<i>Very low negative</i>		

CONFIDENCE LEVEL				
<i>High</i>				
IN-STREAM VEGETATION & SEDIMENT CLEARANCE				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Floral destruction and faunal displacement within sensitive habitat</i>			
INDIRECT IMPACT	<i>Loss of foraging habitat for faunal species of conservation concern, Loss of CBA habitat</i>			
CUMULATIVEIMPACT	<i>Sediment release & deposition downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than5 years.</i>	-21	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued,important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Highly detrimental	Definite
SIGNIFICANCE	-63	<i>High negative</i>		
PROPOSED MITIGATION				
<i>Vegetation clearance to take place outside the breeding season, during the dry season when river levels are low. This will minimise sedimentreleased downstream.</i>				
<i>The least destructive method of removal is to be used, including hand removal where possible.</i>				
<i>Erosion or bank collapse to be carefully avoided and managed, care should be taken with heavy machinery along verges.</i>				

<i>Only the vegetation within the demarcated area is to be removed.</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-18	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Moderately detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-54	<i>Moderate negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
HABITAT DESTRUCTION DUE TO RAISING OF WEIR & SUBSEQUENT FLOODING				
PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Localised loss of current riparian vegetation</i>			
INDIRECT IMPACT	<i>Loss of CBA and transformation of vegetation bordering the riparian zone (to be lost)</i>			
CUMULATIVE IMPACT	<i>Insignificant, small area of riparian vegetation to be lost will re-establish over time</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-18	3
EXTENT	2	<i>The impact affects only the development area</i>		

SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Moderately detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-54	<i>Moderate negative</i>		
PROPOSED MITIGATION				
<i>Overall habitat loss related to flooding cannot be mitigated however if SCCs are identified on site during the pre-construction phase, such species should be relocated to suitable habitat outside of the area of influence.</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-18	3
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Moderately detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-54	<i>Moderate negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
FAUNAL DISPLACEMENT DUE TO HABITAT DISTRUCTION AND VEGETATION CLEARANCE				
PROJECT PHASE	<i>Construction</i>			

DIRECT IMPACT		<i>Temporary displacement of fauna</i>		
INDIRECT IMPACT		<i>Loss of foraging areas for faunal species of conservation concern, loss of CBA</i>		
CUMULATIVEIMPACT		<i>Insignificant</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18months.</i>	-4	3
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affectsthe environment in such a way that natural, cultural and social functionsand processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	-12	<i>Very low negative</i>		
PROPOSED MITIGATION				
<i>Avoid removal of mature trees where possible. If necessitated, tree removal should be selective and restricted to non-protected species</i>				
<i>Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation</i>				
<i>Small scale Alien Invasive Management Plan to be implemented</i>				
<i>Area to be clearly demarcated with no activity to be permitted outside the laydown boundaries. No go areas to be clearly communicatedthrough a qualified ECO who will be responsible for managing environmental aspects on site.</i>				
<i>Site to be rehabilitated following construction. Compacted soils to be ripped and tilled, topsoil returned, and area to be sown with naturallyoccurring grasses.</i>				
<i>Vegetation clearance to take place outside the breeding season, during the dry season when river levels are low. This will minimise sedimentreleased downstream.</i>				
<i>The least destructive method of in-stream vegetation removal is to be used, including hand removal where possible.</i>				
<i>Erosion or bank collapse to be carefully avoided and managed, care should be taken with heavy machinery along verges.</i>				

<i>Only the vegetation within the demarcated area is to be removed</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	1
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-4	<i>Very low negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
LOSS OF HABITAT CONNECTIVITY & FAUNAL MOVEMENT CORRIDORS				
PROJECT PHASE	Construction & Operational			
DIRECT IMPACT	Loss of local movement corridors due to demarcated laydown areas and in-stream vegetation removal			
INDIRECT IMPACT	Loss of CBA, local changes in species assemblages			
CUMULATIVE IMPACT	Insignificant			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	2
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		

IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-8	<i>Very low negative</i>		
PROPOSED MITIGATION				
<i>Site to be rehabilitated following construction. Removal of erected fences. Compacted soils to be ripped and tilled, topsoil returned, and areato be sown with naturally occurring grasses.</i>				
<i>Vegetation clearance to take place outside the breeding season, during the dry season when river levels are low. Displacement likely to betemporary with species returning post-construction.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18months.</i>	-4	1
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affectsthe environment in such a way that natural, cultural and social functionsand processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-4	<i>Very low negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
ALIEN INVASIVE PLANT SPECIES SPREAD/PROPAGATION				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Spread and propagation of alien invasive plant species</i>			
INDIRECT IMPACT	<i>Impact on CBAs; Invasive species encroachment and outcompeting natural vegetation</i>			
CUMULATIVEIMPACT	<i>Overall encroachment on a larger spatial scale</i>			

DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-24	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Invasive species spread into wetland habitats</i>	Highly detrimental	Definite
SIGNIFICANCE	-72	<i>High negative</i>		
PROPOSED MITIGATION				
<i>Construction vehicle movement to be limited to existing roads and pre-determined areas to limit vehicle related spread</i>				
<i>Environmental awareness training on identification and removal procedures for invasive species likely to occur on site</i>				
<i>Small scale Alien Invasive Management Plan to be implemented.</i>				
<i>Construction to be limited to the non-flowering season to limit seed dispersal</i>				
<i>Avoid translocating stockpiles of topsoil to sensitive riparian areas to prevent translocation of soil seed banks of alien species.</i>				
POST MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-3	2
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		

IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Invasive species spread into wetland habitats</i>	Negligible	Likely
SIGNIFICANCE	-6	<i>Very low negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
EROSION AND BANK DESTABILISATION				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Loss of topsoil. Destabilisation of banks can cause erosion and sedimentation which can impact downstream environments</i>			
INDIRECT IMPACT	<i>Vegetation unable to establish. Loss of riparian habitat</i>			
CUMULATIVE IMPACT	<i>Sediment release & deposition downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-42	<i>Moderate-negative</i>		
PROPOSED MITIGATION				

<i>Suitable erosion protective measures to be implemented for access roads, weir structures and stabilisation of river banks once vegetation has been removed.</i>				
<i>Stabilisation of cleared areas to prevent and control erosion. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site-specific conditions.</i>				
<i>Monitoring to be conducted to detect erosion (e.g. on steep slopes). Exposed areas to be rehabilitated as soon as possible to prevent erosion.</i>				
<i>Implement an ecologically-sound storm water management plan during construction. This includes protection of topsoil stockpiles and stormwater management in the laydown and camp areas.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-3	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-3	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
FLORA/FAUNA POACHING & DIRECT MORTALITY DUE TO VEHICLE COLLISION				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Loss of floral and faunal species</i>			
INDIRECT IMPACT	<i>Changes to species composition and loss of ecological functional integrity</i>			
CUMULATIVEIMPACT	<i>Insignificant</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD

PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18months-5 years.</i>	-12	2
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly detrimental	Likely
SIGNIFICANCE	-24	<i>Low-negative</i>		
PROPOSED MITIGATION				
<i>Strict speed limits to be enforced.</i>				
<i>Construction to be limited to daylight hours.</i>				
<i>Environmental awareness training by a suitably qualified ECO on basic environmental principles. No poaching of any plants or animals or collection of surface water to be permitted.</i>				
<i>No-go areas to be clearly demarcated. Construction activities to be limited to the smallest footprint possible.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-3	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-3	<i>Very Low-negative</i>		

CONFIDENCE LEVEL				
<i>Medium</i>				
HYDROCARBON & CHEMICAL SPILLAGES				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Hydrocarbon & Chemical pollution of water and soil</i>			
INDIRECT IMPACT	<i>Loss of fauna & flora</i>			
CUMULATIVEIMPACT	<i>Pollution of ground water resources, impaired surface water quality leading to lowered ecological state</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than5 years.</i>	-24	1
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued,important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	<i>Highly detrimental</i>	<i>Unlikely</i>
PROPOSED MITIGATION				
<i>All hydrocarbon & Chemical spills to be cleaned with spill kits immediately. Spill kit training to take place prior to the initiation of theconstruction phase.</i>				
<i>All hydrocarbon & Chemicals to be stored according to best practice guidelines</i>				
<i>Stationary vehicles to be fitted with drip trays when standing overnight</i>				
<i>Vehicles to be adequately maintained (off-site) and checked regularly for leaks</i>				

POST MITIGATION				
DURATION	1	The duration of the activity associated with the impact will last 0-6 months.	-3	1
EXTENT	1	The impact only affects the area in which the proposed activity will occur.		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted	Negligible	Unlikely
SIGNIFICANCE	-3	Very Low-negative		
CONFIDENCE LEVEL				
Medium				
FAUNAL DISPLACEMENT DUE TO NOISE IMPACT				
PROJECT PHASE	Construction			
DIRECT IMPACT	Displacement of Fauna			
INDIRECT IMPACT	Changes to species assemblages and loss of ecological functional integrity			
CUMULATIVEIMPACT	Insignificant			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	The duration of the activity associated with the impact will last 6-18 months.	-4	2
EXTENT	2	The impact will affect only the development area.		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected		

IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-8	<i>Very Low-negative</i>		
PROPOSED MITIGATION				
<i>Construction to take place outside of peak faunal breeding season (i.e winter dry months).</i>				
<i>Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures such as: Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material. Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised. Use of vehicle horns should be minimized where possible.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	1
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-4	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

WEIR REHABILITATION AND CONSTRUCTION				
PROJECT PHASE		<i>Construction and Maintenance Phase.</i>		
DIRECT IMPACT		<i>Land Clearing activities such as clearing and grubbing of vegetation and topsoil. This can result in potential sedimentation and nutrient runoff.</i>		
INDIRECT IMPACT		<i>Suffocation of plant species within Critical Biodiversity Areas and Ecological Support Areas, as well as a decrease in water quality which could potentially affect surrounding ecosystems and residential areas.</i>		
CUMULATIVE IMPACT		<i>Low</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact is deemed not to last for more than 6 months and is therefore rated as Temporary.</i>	- 3	2
EXTENT	2	<i>The extent of the impact is rated as site as it will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	- 6	<i>Very low negative</i>		
PROPOSED MITIGATION MEASURES				
<p>Reduce through controlling measures: Appoint a responsible person, such as an environmental officer or safety, health & environmental manager, to ensure compliance with the EA / EMP. This person should be responsible for the following:</p> <ul style="list-style-type: none"> • ensure compliance with all legislative conditions; • implementation of all mitigation measures; • compilation and/or storage of relevant documents (such as maintenance checklists, complaints register, etc.). These documents should be readily available in the event of a site inspection; 				

- submitting all required reports (e.g., annual report, etc.);
- submitting a summary of complaints (monthly);
- notifying the relevant Competent Authority when needed;
- Undertake/facilitate training for key personnel/contractors or staff to ensure compliance with the internal management plans and conditions.
- Conduct water quality monitoring and ensure that monitoring is undertaken in accordance with nationally or internationally acceptable methods.
- Should an Environmental Management Programme (EMPr) be compiled for the proposed construction project as part of the EIA process, all recommendations and conditions contained within the EMPr must be implemented and complied with.

POST-MITIGATION

DURATION	1	<i>The duration of the activity associated with the impact will last up to 6 months and as such is rated as short term</i>	-3	2
EXTENT	2	<i>The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.</i>	<i>Negligible</i>	<i>Likely</i>
IMPACT ON IRREPLACEBLE REOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	0	<i>Very low negative</i>		

CONFIDENCE LEVEL

Low

IMPACT ON LAND CAPABILITY

PROJECT PHASE	<i>Construction Phase.</i>			
DIRECT IMPACT	<i>Site clearing activities, such as removing topsoil material adjacent to cultivated fields to develop a foundation for contraction of the gauging weir structures and laydown areas. Road upgrades and maintenance potentially encroaching on cultivated areas.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material.</i>			
CUMULATIVE IMPACT	<i>Less available soil material for cultivation.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD

PRE-MITIGATION				
DURATION	3	<i>The activity associated with the impact will last 18 months-5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit, in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected.</i>	Slightly detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative.</i>		

PROPOSED MITIGATION MEASURES

The project operations must be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.

Avoid permanently impacting topsoil and subsoil, but salvage the maximum depth of these when clearing areas for infrastructure. The maximum salvageable depth for the shallower soils of the Mispah/Glenrosa is 30 cm, and for the Vaalbos/Nkonkoni/it is 80 cm.

Use geotextiles and contours to control soil erosion and revegetate exposed soil surfaces where possible.

IMPACT ON LAND CAPABILITY

Bare soils within the access roads can be regularly dampened with water to suppress dust during construction, especially when strong wind conditions are predicted according to the local weather forecast.

Topsoil stripping and stockpiling should not be conducted during wet periods.

Suppose soils are going to be left in a stockpile. In that case, they must be vegetated with locally indigenous grasses and forbs to maintain biological processes, stabilise the soil, and reduce soil loss due to erosion.

Following construction, the topsoil should be placed as the final soil layer before seeding.

POST-MITIGATION

DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months and, as such, is rated as short term</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible.</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low negative.</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL EROSION				
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The activity associated with the impact will last 18 months-5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit, in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected.</i>	Slightly detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative.</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				

No site clearing activities should take place during periods of excessive rainfall or characterised as thunderstorms. This information can be obtained through the South African Weather Service (SAWS), as thunderstorms can displace soils and cause sedimentation of nearby streams and rivers.

Use geotextiles and contours to control soil erosion and revegetate exposed soil surfaces where possible.

Consideration needs to be given to the use of water for dust suppression– the use of binding agents like molasses should be considered for unsealed roads and dust suppression.

Suppose soils are going to be left in a stockpile. In that case, they must be vegetated with locally indigenous grasses and forbs to maintain biological processes, stabilise the soil, and reduce soil loss due to erosion.

Following construction, the topsoil should be placed as the final soil layer before seeding.

Access roads should be inspected and maintained as necessary.

POST-MITIGATION

DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months and as such, is rated as Short term</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		

IMPACT ON SOIL EROSION

SEVERITY	-1	<i>Negligible</i>	<i>Negligible</i>	<i>Likely</i>
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low negative</i>		

CONFIDENCE LEVEL

Medium

PROJECT PHASE	<i>Construction Phase.</i>
DIRECT IMPACT	<i>Heavy vehicle traffic within and around the infrastructure area potentially compacts the soil.</i>
INDIRECT IMPACT	<i>Surface crusting through soil compaction.</i>

CUMULATIVE IMPACT		<i>Increased bulk density and reduced infiltrability of the soil cause increased runoff in the absence of vegetation.</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The activity associated with the impact will last 18 months-5 years.</i>	-12	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit, in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected.</i>	<i>Slightly detrimental</i>	<i>Definite</i>
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-36	<i>Low negative.</i>		

IMPACT ON SOIL COMPACTION				
PROPOSED MITIGATION MEASURES				
<i>The project operations should be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				
<i>Trafficking and movement over the areas not targeted for construction must be avoided if not minimised, especially heavy machinery.</i>				
<i>No site clearing activities should take place during periods of excessive rainfall or characterised as thunderstorms. This information can be obtained through the South African Weather Service (SAWS), as thunderstorms can displace soils and cause sedimentation of nearby streams and rivers.</i>				
<i>Loosening of the soil through ripping and discing prior to the stripping process is recommended to break up crusting.</i>				
<i>Compacted soils should be ripped at least 20cm to alleviate.</i>				
<i>Consideration needs to be given to the use of water for dust suppression– the use of binding agents like molasses should be considered for unsealed roads and dust suppression.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months and, as such, is rated as Short term.</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible.</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low negative.</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL CONTAMINATION				
PROJECT PHASE		<i>Construction Phase.</i>		
DIRECT IMPACT		<i>Direct chemical spills on soils from construction vehicles or other construction equipment used.</i>		
IMPACT ON SOIL CONTAMINATION				
INDIRECT IMPACT		<i>Contamination of soil</i>		
CUMULATIVE IMPACT		<i>Change in the soil chemical status of soil which may impact soil fertility status.</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The activity associated with the impact will last 18 months-5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties due to potential pollution migration.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	Slightly detrimental	Definite
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations should be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				
<i>Ensure appropriate handling and storage of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets).</i>				
<i>Maintenance of vehicles and equipment should be carried out in designated facilities fitted with spillage containment, floors, and sumps to capture any fugitive oils and greases.</i>				
<i>Implementing regular site inspections for materials handling and storage.</i>				

<i>Development of detailed procedures for spill containment and soil clean up.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months and as such, is rated as Short term</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

ATLANTA WEIR CONSTRUCTION IMPACT ASSESSMENT

Flow Alterations				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Flow alterations due to changes in flow patterns</i>			
INDIRECT IMPACT	<i>habitat alteration and fragmentation</i>			
CUMULATIVE IMPACT	<i>Affecting the natural flow regime of river system</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-10	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly detrimental	Definite
SIGNIFICANCE	-30	<i>Low Negative</i>		
PROPOSED MITIGATION				
<i>Installing flow regulation mechanisms, such as adjustable gates or flow control structures, can help manage and maintain desired flow conditions within the weir systems.</i>				
<i>Undertaking habitat restoration initiatives, such as the creation of artificial habitats, the reintroduction of native vegetation, and the establishment of riparian buffers, can help offset the potential negative impacts of flow alterations.</i>				
<i>Implementing effective sediment management strategies, such as regular sediment removal and erosion control measures, can help mitigate the potential impacts of sedimentation caused by flow alterations within weir systems.</i>				
POST MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-5	3

EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	-15	<i>Very Low Negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
Bank vegetation clearance and alternation				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Aquatic and riparian vegetation clearance</i>			
INDIRECT IMPACT	<i>Decrease of vegetation biotope on-site</i>			
CUMULATIVE IMPACT	<i>Sediment release & deposition downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely

SIGNIFICANCE	-10	Very Low Negative		
PROPOSED MITIGATION				
<i>Revegetate River banks with endemic aquatic vegetation to improve riverbank erosion</i>				
<i>Construct erosion protective structures where River banks are vulnerable</i>				
<i>Erosion or bank collapse to be carefully avoided and managed, care should be taken with heavy machinery along verges.</i>				
<i>Only the vegetation within the demarcated area is to be removed</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	6	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	1	<i>The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	18	Very Low Positive		
CONFIDENCE LEVEL				
<i>Medium</i>				
HABITAT DESTRUCTION DUE TO WEIR & SUBSEQUENT FLOODING				
PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Localised loss of aquatic habitats</i>			
INDIRECT IMPACT	<i>Decrease of aquatic biotope diversity</i>			
CUMULATIVE IMPACT	<i>Flooding events increases bank erosion</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD

PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-18	3
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-54	<i>Moderate negative</i>		
PROPOSED MITIGATION				
<i>Cannot be mitigated</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-18	3
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-54	<i>Moderate negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				

Sediment transport and stormwater runoff				
PROJECT PHASE		<i>Operational</i>		
DIRECT IMPACT		<i>Increased erosion downstream due to decreased sediment load</i>		
INDIRECT IMPACT		<i>Increased sediment build-up upstream</i>		
CUMULATIVE IMPACT		<i>Changes in hydro morphological regime</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	5	3
EXTENT	2	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	15	<i>Very Low Positive</i>		
PROPOSED MITIGATION				
<i>Riparian and aquatic vegetation upstream of weir is to be removed as they are currently covered in sediment and silt and do not currently have any advantages. The removal will increase natural sediment run-off downstream of weir.</i>				
<i>Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation</i>				
<i>Stormwater management systems should be utilised effectively, proper stream velocity management could reduce erosion and sedimentation downstream.</i>				
<i>Ensure that downstream water is released effectively to minimise the risks of flooding</i>				

<i>Weir heights should be set properly which would enable engineers to regulate the flow of stormwater and prevent excessive water build-up</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	6	3
EXTENT	2	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	1	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Very Low Positive	Definite
SIGNIFICANCE	18	<i>Very Low Positive</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
Barrier effect influencing migration patterns				
PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Migration route barriers to fish</i>			
INDIRECT IMPACT	<i>Loss of species diversity</i>			
CUMULATIVE IMPACT	<i>Potential barrier to some species</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	0	1
EXTENT	4	<i>The impact only affects the area in which the proposed activity will occur.</i>		

SEVERITY	0	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	0	<i>Very low Negative</i>		
PROPOSED MITIGATION				
<i>A possible implementation of a fish ladder could be considered.</i>				
POST MITIGATION				
DURATION	4	<i>The impact only affects the area in which the proposed activity will occur.</i>	0	1
EXTENT	4	<i>The impact affects only the development area</i>		
SEVERITY	-0	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	0	<i>Very low Negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
Direct impacts of construction activities in aquatic ecosystems				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Destruction of key aquatic habitat biotopes</i>			
INDIRECT IMPACT	<i>Temporary reduction of aquatic macro invertebrate assemblages</i>			

CUMULATIVE IMPACT		<i>Insignificant Cumulative Impact</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-5	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Los of key aquatic habitat types</i>	Negligible	Definite
SIGNIFICANCE	-15	<i>Very Low negative</i>		
PROPOSED MITIGATION				
<i>Construction vehicles to be kept out of the riparian zone at all times.</i>				
<i>Ensure that erosion protective measures are put into place once construction activities start.</i>				
<i>Ensure that the 32m riparian buffer is being implemented at all times and that that all applicable infrastructure is stored outside the buffer zone. Note that the riparian zone only applies to areas outside the aquatic relevant area</i>				
<i>No-go areas to be clearly demarcated. Construction activities to be limited to the smallest footprint possible.</i>				
<i>Special care should be taken to not disturb key aquatic habitat types. The mobilisation of machinery instream should be conducted as far as possible from aquatic vegetation.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	2
EXTENT	2	<i>The impact will affect only the development area.</i>		

SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>				
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>		Negligible	Likely	
SIGNIFICANCE	-8	<i>Very Low negative</i>				
CONFIDENCE LEVEL						
<i>High</i>						
EROSION AND BANK DESTABILISATION						
PROJECT PHASE	<i>Construction</i>					
DIRECT IMPACT	<i>Loss of topsoil. Destabilisation of banks can cause erosion and sedimentation which can impact downstream environments</i>					
INDIRECT IMPACT	<i>Vegetation unable to establish. Loss of riparian habitat</i>					
CUMULATIVE IMPACT	<i>Sediment release & deposition downstream</i>					
DIMENSION	RATING	MOTIVATION		CONSEQUENCE	LIKELIHOOD	
PRE-MITIGATION						
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>			-10	3
EXTENT	2	<i>The impact affects the development area and adjacent properties.</i>				
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>				
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>		<i>Slightly detrimental</i>	<i>Definite</i>	

SIGNIFICANCE	-30	Low-negative		
PROPOSED MITIGATION				
<i>Suitable erosion protective measures to be implemented for access roads, weir structures and stabilisation of river banks once vegetation has been removed</i>				
<i>Stabilisation of cleared areas to prevent and control erosion. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site-specific conditions.</i>				
<i>Monitoring to be conducted to detect erosion (e.g on steep slopes). Exposed areas to be rehabilitated as soon as possible to prevent erosion.</i>				
<i>Implement an ecologically-sound storm water management plan during construction. This includes protection of topsoil stockpiles and stormwater management in the laydown and camp areas.</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	12	1
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	2	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly beneficial	Unlikely
SIGNIFICANCE	12	Very Low-positive		
CONFIDENCE LEVEL				
<i>Medium</i>				
Phosphate and nitrate assimilation				
PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Increase in nutrients and algae blooms</i>			
INDIRECT IMPACT	<i>Reduction of habitat availability and water quality decline</i>			

CUMULATIVE IMPACT		<i>Increased nutrient load within environment</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Moderately detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-42	<i>Moderate-negative</i>		
PROPOSED MITIGATION				
<i>Integrating constructed wetlands near weirs can significantly improve phosphate and nitrate assimilation. They can effectively reduce nutrient levels in stormwater run-off before it enters downstream water bodies.</i>				
<i>Establishing and maintaining riparian buffers along the banks of water bodies can help enhance nutrient assimilation at weirs.</i>				
<i>Implementing permeable reactive barriers, such as permeable reactive interlocking blocks or permeable reactive gates, can effectively reduce phosphate and nitrate levels at weirs.</i>				
<i>Implementing nutrient management practices, such as reducing fertilizer use and implementing sustainable agricultural practices in upstream areas</i>				
POST MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18-5 years.</i>	-10	2
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		

SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Slightly Detrimental</i>	<i>Likely</i>
SIGNIFICANCE	-20	<i>Low Negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
HYDROCARBON & CHEMICAL SPILLAGES				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Hydrocarbon & Chemical pollution of water and soil</i>			
INDIRECT IMPACT	<i>Loss of aquatic macro invertebrates</i>			
CUMULATIVE IMPACT	<i>Pollution of ground water resources, impaired surface water quality leading to lowered ecological state</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-24	1
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		

IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	<i>Highly detrimental</i>	<i>Unlikely</i>
SIGNIFICANCE	-24	<i>Low-negative</i>		
PROPOSED MITIGATION				
<i>All hydrocarbon & Chemical spills to be cleaned with spill kits immediately. Spill kit training to take place prior to the initiation of the construction phase.</i>				
<i>All hydrocarbon & Chemicals to be stored according to best practice guidelines</i>				
<i>Stationary vehicles to be fitted with drip trays when standing overnight</i>				
<i>Vehicles to be adequately maintained (off-site) and checked regularly for leaks</i>				
POST MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-3	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	<i>Negligible</i>	<i>Unlikely</i>
SIGNIFICANCE	-3	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
Changes in water temperature and quality				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Impact on sensitive species</i>			

INDIRECT IMPACT		<i>Changes in aquatic assemblages</i>		
CUMULATIVE IMPACT		<i>slightly alternates some water quality parameters further downstream</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18-5 years.</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-10	<i>Very Low Negative</i>		
PROPOSED MITIGATION				
<i>Protecting and preserving natural riparian vegetation along the banks of water bodies can help regulate water temperature and maintain water quality.</i>				
<i>Implementing effective water flow management strategies at weirs can help regulate water temperatures and maintain water quality.</i>				
<i>Implementing comprehensive stormwater run-off treatment systems, such as constructed wetlands, biofiltration systems, and sedimentation basins, can help reduce the influx of pollutants and contaminants that can contribute to changes in water quality and temperature.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely

SIGNIFICANCE	-8	Very Low-negative		
CONFIDENCE LEVEL				
Medium				

Damage or Destruction of Archaeological Sites, Built Environment, Graves, Other Heritage Features				
PROJECT PHASE	Construction Phase			
DIRECT IMPACT	Site clearing, excavations and drilling may damage or destroy or alter any archaeological sites, Built Environment, Graves, other Heritage Features that might be present in the rocks.			
INDIRECT IMPACT	Loss of knowledge of our local and regional heritage.			
CUMULATIVE IMPACT	--			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years	-4	1
EXTENT	1	The extent of the impact is rated as site as it will affect only the development area		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Definite
IMPACT ON IRREPLACEABLE REOURCES	0	No irreplaceable resources will be impacted.		
SIGNIFICANCE	-5	Very low negative		
PROPOSED MITIGATION MEASURES				

<i>General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.</i>				
<i>Close-Out Reporting where by the ECO review management procedures and ensure that effective measures were implemented.</i>				
<i>General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.</i>				
<i>Close-Out Reporting where by the ECO review management procedures and ensure that effective measures were implemented.</i>				
<i>Comply with the requirements of the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA):</i>				
<i>In terms of the Act:</i>				
<i>“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority.” (34. [1] 1999:58) “No person may, without a permit issued by the responsible heritage resources authority-</i>				
<i>(a) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;</i>				
<i>(b) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;</i>				
<i>(c) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or</i>				
<i>(d) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58).”</i>				
<i>“No person may, without a permit issued by SAHRA or a provincial heritage resources agency-</i>				
<i>(a) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;</i>				
<i>(b) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;</i>				
<i>(c) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60).”</i>				
POST-MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months. Temporary</i>	0	1
EXTENT	1	<i>The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur</i>		
SEVERITY	0	<i>Negligible</i>	<i>Negligible</i>	<i>Likely</i>

IMPACT ON IRREPLACEABLE REOURCES	0	No irreplaceable resources will be impacted.		
SIGNIFICANCE	10	Very low positive		
CONFIDENCE LEVEL				
Medium				

Damage or Destruction of Fossils				
PROJECT PHASE	Construction Phase			
DIRECT IMPACT	Excavations and drilling may damage or destroy any fossils that might be present in the rocks.			
INDIRECT IMPACT	Loss of knowledge of our palaeontological heritage.			
CUMULATIVE IMPACT	--			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years	-4	1
EXTENT	1	The extent of the impact is rated as site as it will affect only the development area		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected	Negligible	Definite
IMPACT ON IRREPLACEABLE REOURCES	0	No irreplaceable resources will be impacted.		
SIGNIFICANCE	-5	very low negative		
PROPOSED MITIGATION MEASURES				

<i>Photograph and record position (GPS) of any potential fossil found on the surface or in the excavated rocks.</i>				
<i>Remove any fossils found on the surface or in excavations and placed nearby (fossils must not leave the site).</i>				
<i>Send photographs to a palaeontologist to verify their scientific importance</i>				
<i>Based on the palaeontologist's recommendation the "fossil" can be a. disregarded; b. representative sample collected by the palaeontologist or all fossils collected once a valid permit from SAHRA has been obtained; c. fossils housed in a recognised institution (museum or university palaeontology collection for further study).</i>				
<i>Comply with the requirements of the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA):</i>				
<i>In terms of section 35(4) of the Act no person may without a permit issued by the responsible Heritage Resources Authority –</i>				
<ul style="list-style-type: none"> • <i>destroy, damage, excavate, alter, deface, or otherwise disturb any palaeontological site;</i> • <i>destroy, damage, excavate, remove from its original position, collect, or own any palaeontological material or object;</i> • <i>trade in, sell for private gain, export, or attempt to export from the Republic any category of palaeontological material or object; or</i> • <i>bring onto or use at a palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or palaeontological material or objects</i> 				
POST-MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months. Temporary</i>	0	1
EXTENT	1	<i>The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur</i>		
SEVERITY	0	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>Very low positive</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

VEGETATION CLEARANCE FOR SITE CAMPS & LAYDOWN AREAS				
PROJECT PHASE		<i>Construction</i>		
DIRECT IMPACT		<i>Floral destruction and faunal displacement within a Vulnerable ecosystem (listed in literature)</i>		
INDIRECT IMPACT		<i>Loss of Critical Biodiversity Areas</i>		
CUMULATIVE IMPACT		<i>Insignificant cumulative impact</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-6	3
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-42	<i>Moderate negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
FAUNAL DISPLACEMENT DUE TO HABITAT DISTRUCTION AND VEGETATION CLEARANCE				
PROJECT PHASE		<i>Construction</i>		
DIRECT IMPACT		<i>Temporary displacement of fauna</i>		
INDIRECT IMPACT		<i>Loss of foraging areas for faunal species of conservation concern, loss of ESA</i>		

CUMULATIVE IMPACT		<i>Insignificant</i>		
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	3
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	-12	<i>Very low negative</i>		
PROPOSED MITIGATION				
<i>Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation</i>				
<i>Area to be clearly demarcated with no activity to be permitted outside the laydown boundaries. No go areas to be clearly communicated through a qualified ECO who will be responsible for managing environmental aspects on site.</i>				
<i>Site to be rehabilitated following construction. Compacted soils to be ripped and tilled, topsoil returned, and area to be sown with naturally occurring grasses.</i>				
<i>Vegetation clearance to take place outside the breeding season, during the dry season when river levels are low. This will minimise sediment released downstream.</i>				
<i>Erosion or bank collapse to be carefully avoided and managed, care should be taken with heavy machinery along verges.</i>				
POST MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-3	2
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		

IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-6	<i>Very low negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
ALIEN INVASIVE PLANT SPECIES SPREAD/PROPAGATION				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Spread and propagation of alien invasive plant species</i>			
INDIRECT IMPACT	<i>Impact on ESA; Invasive species encroachment and outcompeting natural vegetation (already highly impacted)</i>			
CUMULATIVE IMPACT	<i>Overall encroachment on a larger spatial scale</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-24	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Invasive species spread into wetland habitats</i>	Highly Detrimental	Definite
SIGNIFICANCE	-72	<i>High negative</i>		
PROPOSED MITIGATION				
<i>Construction vehicle movement to be limited to existing roads and pre-determined areas to limit vehicle related spread.</i>				
<i>Environmental awareness training on identification and removal procedures for invasive species likely to occur on site.</i>				

<i>Small scale Alien Invasive Management Plan to be implemented.</i>				
<i>Construction to be limited to the non-flowering season to limit seed dispersal.</i>				
<i>Avoid translocating stockpiles of topsoil to sensitive riparian areas to prevent translocation of soil seed banks of alien species.</i>				
POST MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-3	2
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Invasive species spread into wetland habitats</i>	Negligible	Likely
SIGNIFICANCE	-6	<i>Very low negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
<i>Medium</i>				
EROSION AND BANK DESTABILISATION				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Loss of topsoil in laydown areas. Destabilisation of banks can cause erosion and sedimentation which can impact downstream environments</i>			
INDIRECT IMPACT	<i>Vegetation unable to establish. Bank collapse can lead to loss of avian breeding colonies</i>			
CUMULATIVE IMPACT	<i>Insignificant</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-16	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		

SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	<i>Moderately Detrimental</i>	<i>Definite</i>
SIGNIFICANCE	--48	<i>Moderate-negative</i>		
PROPOSED MITIGATION				
<i>Suitable erosion protective measures to be implemented for access roads, weir structures and stabilisation of river banks.</i>				
<i>Stabilisation of cleared areas to prevent and control erosion. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site-specific conditions.</i>				
<i>Monitoring to be conducted to detect erosion (e.g. on steep slopes). Exposed areas to be rehabilitated as soon as possible to prevent erosion.</i>				
<i>Implement an ecologically-sound storm water management plan during construction. This includes protection of topsoil stockpiles and stormwater management in the laydown and camp areas.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>No irreplaceable resources will be impacted</i>	<i>Negligible</i>	<i>Unlikely</i>
SIGNIFICANCE	-4	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
Medium				

HYDROCARBON & CHEMICAL SPILLAGES				
PROJECT PHASE	Construction			
DIRECT IMPACT	Hydrocarbon & Chemical pollution of water and soil			
INDIRECT IMPACT	Loss of aquatic macro invertebrates			
CUMULATIVE IMPACT	Pollution of ground water resources, impaired surface water quality leading to lowered ecological state			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years.	-24	1
EXTENT	3	The impact affects the development area and adjacent properties.		
SEVERITY	-3	The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.		
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted	Highly detrimental	Unlikely
SIGNIFICANCE	-24	Low-negative		
PROPOSED MITIGATION				
All hydrocarbon & Chemical spills to be cleaned with spill kits immediately. Spill kit training to take place prior to the initiation of the construction phase.				
All hydrocarbon & Chemicals to be stored according to best practice guidelines				
Stationary vehicles to be fitted with drip trays when standing overnight				

Vehicles to be adequately maintained (off-site) and checked regularly for leaks				
POST MITIGATION				
DURATION	1	The duration of the activity associated with the impact will last 0-6 months.	-3	1
EXTENT	1	The impact only affects the area in which the proposed activity will occur.		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted	Negligible	Unlikely
SIGNIFICANCE	-3	Very Low-negative		
CONFIDENCE LEVEL				
Medium				

PAUL HUGO CONSTRUCTION PHASE IMPACTS

Flow Alterations				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Flow alterations due to changes in flow patterns</i>			
INDIRECT IMPACT	<i>habitat alteration and fragmentation</i>			
CUMULATIVE IMPACT	<i>Affecting the natural flow regime of river system</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-21	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Highly detrimental	Definite
SIGNIFICANCE	-63	<i>High Negative</i>		
PROPOSED MITIGATION				
<i>Installing flow regulation mechanisms, such as adjustable gates or flow control structures, can help manage and maintain desired flow conditions within the weir systems.</i>				
<i>Undertaking habitat restoration initiatives, such as the creation of artificial habitats, the reintroduction of native vegetation, and the establishment of riparian buffers, can help offset the potential negative impacts of flow alterations.</i>				
<i>Implementing effective sediment management strategies, such as regular sediment removal and erosion control measures, can help mitigate the potential impacts of sedimentation caused by flow alterations within weir systems.</i>				
POST MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-5	3

EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Definite
SIGNIFICANCE	-15	<i>Very Low Negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
IN-STREAM VEGETATION & SEDIMENT CLEARANCE				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Aquatic and riparian vegetation clearance upstream</i>			
INDIRECT IMPACT	<i>Increased siltation of aquatic biotopes downstream</i>			
CUMULATIVE IMPACT	<i>Sediment release & deposition downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-21	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		

SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Highly detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-63	<i>High negative</i>		
PROPOSED MITIGATION				
<i>Revegetate River banks with endemic aquatic vegetation to improve riverbank erosion</i>				
<i>The least destructive method of removal is to be used, including hand removal where possible.</i>				
<i>Erosion or bank collapse to be carefully avoided and managed, care should be taken with heavy machinery along verges.</i>				
<i>Only the vegetation within the demarcated area is to be removed</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	<i>-12</i>	<i>3</i>
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Slightly detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-36	<i>Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

HABITAT DESTRUCTION DUE TO RAISING OF WEIR & SUBSEQUENT FLOODING				
PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Localised loss of aquatic habitats</i>			
INDIRECT IMPACT	<i>Decrease of aquatic biotope diversity</i>			
CUMULATIVE IMPACT	<i>Flooding events increases bank erosion</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18months - 5 years.</i>	-18	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-54	<i>Moderate negative</i>		
PROPOSED MITIGATION				
<i>Cannot be mitigated</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-12	3
EXTENT	2	<i>The impact affects only the development area</i>		

SEVERITY	-2	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Slightly detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-36	<i>Low-negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
Weir elevation affecting Sediment transport affecting stormwater runoff behaviour				
PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Increased erosion downstream due to decreased sediment load</i>			
INDIRECT IMPACT	<i>Increased sediment build-up upstream</i>			
CUMULATIVE IMPACT	<i>Changes in hydro morphological regime</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		

IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted	Moderately detrimental	Definite
SIGNIFICANCE	-42	Moderate Negative		
PROPOSED MITIGATION				
Riparian and aquatic vegetation upstream of weir is to be removed as they are currently covered in sediment and silt and do not currently have any advantages. The removal will increase natural sediment run-off downstream of weir.				
Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation				
Stormwater management systems should be utilised effectively, proper stream velocity management could reduce erosion and sedimentation downstream.				
Ensure that downstream water is released effectively to minimise the risks of flooding				
Weir heights should be set properly which would enable engineers to regulate the flow of stormwater and prevent excessive water build-up				
POST MITIGATION				
DURATION	4	The duration of the activity associated with the impact will last more than 5 years.	12	3
EXTENT	2	The impact affects the development area and adjacent properties.		
SEVERITY	2	The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted	Very Low Positive	Definite
SIGNIFICANCE	36	Low positive		
CONFIDENCE LEVEL				
Medium				

Barrier effect influencing migration patterns				
PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Migration route barriers to fish</i>			
INDIRECT IMPACT	<i>Loss of species diversity</i>			
CUMULATIVE IMPACT	<i>Sensitive species such as Barbs and Yellow fish</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-21	2
EXTENT	4	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Low Negative	Likely
SIGNIFICANCE	-42	<i>Moderate Negative</i>		
PROPOSED MITIGATION				
<i>A possible implementation of a fish ladder could be considered but is not completely feasible due to the Paul Hugo Dam barrier.</i>				
<i>A FRAI Monitoring programme should be initiated upstream of the weir to ensure that migration dependant fish species could spawn successfully.</i>				
POST MITIGATION				
DURATION	1	<i>The impact only affects the area in which the proposed activity will occur.</i>	-2	1

EXTENT	1	<i>The impact affects only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-2	<i>Very Low Negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
Direct impacts of construction activities in aquatic ecosystems				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Destruction of key aquatic habitat biotopes</i>			
INDIRECT IMPACT	<i>Temporary reduction of aquatic macro invertebrate assemblages</i>			
CUMULATIVE IMPACT	<i>Insignificant Cumulative Impact</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-10	3
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		

IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Los of key aquatic habitat types</i>	<i>Slightly detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-30	<i>Low negative</i>		
PROPOSED MITIGATION				
<i>Construction vehicle to be kept out of the riparian zone at all times.</i>				
<i>Ensure that erosion protective measures are put into place once construction activities start.</i>				
<i>Ensure that the 32m riparian buffer is being implemented at all times and that that all applicable infrastructure is stored outside the buffer zone. Note that the riparian zone only applies to areas outside the aquatic relevant area</i>				
<i>No-go areas to be clearly demarcated. Construction activities to be limited to the smallest footprint possible.</i>				
<i>Special care should be taken to not disturb key aquatic habitat types. The mobilisation of machinery instream should be conducted as far as possible from aquatic vegetation.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>		
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>	-4	2
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	<i>Negligible</i>	<i>Likely</i>
SIGNIFICANCE	-8	<i>Slightly detrimental</i>		
CONFIDENCE LEVEL				
<i>High</i>				
EROSION AND BANK DESTABILISATION				

PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Loss of topsoil. Destabilisation of banks can cause erosion and sedimentation which can impact downstream environments</i>			
INDIRECT IMPACT	<i>Vegetation unable to establish. Loss of riparian habitat</i>			
CUMULATIVE IMPACT	<i>Sediment release & deposition downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-21	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Highly detrimental	Definite
SIGNIFICANCE	-63	<i>High negative</i>		
PROPOSED MITIGATION				
<i>Suitable erosion protective measures to be implemented for access roads, weir structures and stabilisation of river banks once vegetation has been removed</i>				
<i>Stabilisation of cleared areas to prevent and control erosion. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site-specific conditions.</i>				
<i>Monitoring to be conducted to detect erosion (e.g on steep slopes). Exposed areas to be rehabilitated as soon as possible to prevent erosion.</i>				

Implement an ecologically-sound storm water management plan during construction. This includes protection of topsoil stockpiles and stormwater management in the laydown and camp areas.

POST MITIGATION

DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	4	1
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	1	<i>The severity of the impact is rated as Low positive as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally improved</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	4	<i>Very Low-positive</i>		

CONFIDENCE LEVEL

Medium

Phosphate and nitrate assimilation

PROJECT PHASE	<i>Operational</i>			
DIRECT IMPACT	<i>Increase in nutrients and algae blooms</i>			
INDIRECT IMPACT	<i>Reduction of habitat availability and water quality decline</i>			
CUMULATIVE IMPACT	<i>Increased nutrient load within environment</i>			

DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-12	3
EXTENT	2	<i>The impact affects only the development area</i>		

SEVERITY	-2	<i>The severity of the impact is rated as Moderate positive as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are positively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly detrimental	Definite
SIGNIFICANCE	-36	<i>Low-negative</i>		
PROPOSED MITIGATION				
<i>Integrating constructed wetlands near weirs can significantly improve phosphate and nitrate assimilation. They can effectively reduce nutrient levels in stormwater run-off before it enters downstream water bodies.</i>				
<i>Establishing and maintaining riparian buffers along the banks of water bodies can help enhance nutrient assimilation at weirs.</i>				
<i>Implementing permeable reactive barriers, such as permeable reactive interlocking blocks or permeable reactive gates, can effectively reduce phosphate and nitrate levels at weirs.</i>				
<i>Implementing nutrient management practices, such as reducing fertilizer use and implementing sustainable agricultural practices in upstream areas</i>				
POST MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18-5 years.</i>	-10	2
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly Detrimental	Likely
SIGNIFICANCE	-20	<i>Low Negative</i>		

CONFIDENCE LEVEL				
<i>High</i>				
HYDROCARBON & CHEMICAL SPILLAGES				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Hydrocarbon & Chemical pollution of water and soil</i>			
INDIRECT IMPACT	<i>Loss of aquatic macro invertebrates</i>			
CUMULATIVE IMPACT	<i>Pollution of ground water resources, impaired surface water quality leading to lowered ecological state</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-24	1
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Highly detrimental	Unlikely
SIGNIFICANCE	-24	<i>Low-negative</i>		
PROPOSED MITIGATION				
<i>All hydrocarbon & Chemical spills to be cleaned with spill kits immediately. Spill kit training to take place prior to the initiation of the construction phase.</i>				
<i>All hydrocarbon & Chemicals to be stored according to best practice guidelines</i>				
<i>Stationary vehicle to be fitted with drip trays when standing overnight</i>				

<i>Vehicles to be adequately maintained (off-site) and checked regularly for leaks</i>				
POST MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-3	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-3	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
Changes in water temperature and quality				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Impact on sensitive species</i>			
INDIRECT IMPACT	<i>Changes in aquatic assemblages</i>			
CUMULATIVE IMPACT	<i>Slightly alternates some water quality parameters further downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18-5 years.</i>	-10	2
EXTENT	2	<i>The impact will affect only the development area.</i>		

SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly detrimental	Likely
SIGNIFICANCE	-20	Low		
PROPOSED MITIGATION				
<i>Protecting and preserving natural riparian vegetation along the banks of water bodies can help regulate water temperature and maintain water quality.</i>				
<i>Implementing effective water flow management strategies at weirs can help regulate water temperatures and maintain water quality.</i>				
<i>Implementing comprehensive stormwater run-off treatment systems, such as constructed wetlands, biofiltration systems, and sedimentation basins, can help reduce the influx of pollutants and contaminants that can contribute to changes in water quality and temperature.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-8	Very Low-negative		
CONFIDENCE LEVEL				
<i>Medium</i>				

Damage or Destruction of Archaeological Sites, Built Environment, Graves, Other Heritage Features				
PROJECT PHASE	<i>Construction Phase</i>			
DIRECT IMPACT	<i>Site clearing, excavations and drilling may damage or destroy or alter any archaeological sites, Built Environment, Graves, other Heritage Features that might be present in the rocks.</i>			
INDIRECT IMPACT	<i>Loss of knowledge of our local and regional heritage.</i>			
CUMULATIVE IMPACT	--			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years</i>	-4	1
EXTENT	1	<i>The extent of the impact is rated as site as it will affect only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>	Negligible	Definite
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-5	<i>Very low negative</i>		
PROPOSED MITIGATION MEASURES				
<i>General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.</i>				
<i>Close-Out Reporting where by the ECO review management procedures and ensure that effective measures were implemented.</i>				
<i>General Site Monitoring in order to detect the presence of and limit impact on previously undocumented heritage receptors during construction / site clearing / earth moving.</i>				
<i>Close-Out Reporting where by the ECO review management procedures and ensure that effective measures were implemented.</i>				

Comply with the requirements of the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA):

In terms of the Act:

“No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit by the relevant provincial heritage resources authority.” (34. [1] 1999:58) “No person may, without a permit issued by the responsible heritage resources authority-

- (e) destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site or any meteorite;
- (f) destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite;
- (g) trade in, sell for private gain, export or attempt to export from the Republic any category of archaeological or palaeontological material or object, or any meteorite; or
- (h) bring onto or use at an archaeological or palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or archaeological and palaeontological material or objects, or use such equipment for the recovery of meteorites. (35. [4] 1999:58).”

“No person may, without a permit issued by SAHRA or a provincial heritage resources agency-

- (d) destroy, damage, alter, exhume or remove from its original position or otherwise disturb the grave of a victim of conflict, or any burial ground or part thereof which contains such graves;
- (e) destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority;
- (f) bring onto or use at a burial ground or grave referred to in paragraph (a) or (b) and excavation equipment, or any equipment which assists in the detection or recovery of metals (36. [3] 1999:60).”

POST-MITIGATION

DURATION	1	The duration of the activity associated with the impact will last 0-6 months. Temporary		
EXTENT	1	The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur	0	1
SEVERITY	0	Negligible		
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted.	Negligible	Likely

SIGNIFICANCE	10	Very low positive		
CONFIDENCE LEVEL				
Medium				

Damage or Destruction of Fossils				
PROJECT PHASE	<i>Construction Phase</i>			
DIRECT IMPACT	<i>Excavations and drilling may damage or destroy any fossils that might be present in the rocks.</i>			
INDIRECT IMPACT	<i>Loss of knowledge of our palaeontological heritage.</i>			
CUMULATIVE IMPACT	--			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years</i>	-4	1
EXTENT	1	<i>The extent of the impact is rated as site as it will affect only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>	Negligible	Definite
IMPACT ON IRREPLACEABLE REOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-5	<i>very low negative</i>		
PROPOSED MITIGATION MEASURES				
<i>Photograph and record position (GPS) of any potential fossil found on the surface or in the excavated rocks.</i>				

Damage or Destruction of Fossils				
<i>Remove any fossils found on the surface or in excavations and placed nearby (fossils must not leave the site).</i>				
<i>Send photographs to a palaeontologist to verify their scientific importance</i>				
<i>Based on the palaeontologist's recommendation the "fossil" can be a. disregarded; b. representative sample collected by the palaeontologist or all fossils collected once a valid permit from SAHRA has been obtained; c. fossils housed in a recognised institution (museum or university palaeontology collection for further study).</i>				
<i>Comply with the requirements of the regulations of the South African Heritage Resources Agency (SAHRA) in terms of Section 38(8) of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) (NHRA):</i>				
<i>In terms of section 35(4) of the Act no person may without a permit issued by the responsible Heritage Resources Authority – destroy, damage, excavate, alter, deface, or otherwise disturb any palaeontological site; destroy, damage, excavate, remove from its original position, collect, or own any palaeontological material or object; trade in, sell for private gain, export, or attempt to export from the Republic any category of palaeontological material or object; or bring onto or use at a palaeontological site any excavation equipment or any equipment which assist in the detection or recovery of metals or palaeontological material or objects</i>				
POST-MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months. Temporary</i>	0	1
EXTENT	1	<i>The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur</i>		
SEVERITY	0	<i>Negligible</i>	Negligible	Likely
IMPACT IRREPLACEABLE REOURCES ON	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low positive</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

VEGETATION CLEARANCE FOR SITE CAMPS & LAYDOWN AREAS	
PROJECT PHASE	<i>Construction</i>
DIRECT IMPACT	<i>Floral destruction and faunal displacement</i>

INDIRECT IMPACT	<i>Temporary loss of agricultural land</i>			
CUMULATIVE IMPACT	<i>Insignificant cumulative impact</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-3	3
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		

IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted	Negligible	Definite
SIGNIFICANCE	-9	Very low negative		
PROPOSED MITIGATION				
<i>Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation</i>				
<i>Small scale Alien Invasive Management Plan to be implemented</i>				
<i>Area to be clearly demarcated with no activity to be permitted outside the laydown boundaries. No go areas to be clearly communicated through a qualified ECO who will be responsible for managing environmental aspects on site.</i>				
<i>Site to be rehabilitated following construction. Compacted soils to be ripped and tilled, topsoil returned, and area characteristics returned to previous land use</i>				
POST MITIGATION				
DURATION	2	The duration of the activity associated with the impact will last 6-18 months.	-3	1
EXTENT	1	The impact only affects the area in which the proposed activity will occur.		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	0	No irreplaceable resources will be impacted	Negligible	Unlikely
SIGNIFICANCE	-3	Very low negative		
CONFIDENCE LEVEL				
<i>High</i>				
HABITAT DESTRUCTION DUE TO CONSTRUCTION OF NEW WEIR & SUBSEQUENT FLOODING				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Localised loss of current riparian and in-stream habitats, disturbance and loss of floodplain wetland habitat</i>			
INDIRECT IMPACT	<i>Transformation of vegetation bordering the riparian zone</i>			

CUMULATIVE IMPACT	<i>Insignificant</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Moderate detrimental	Definite
SIGNIFICANCE	-42	<i>Moderate negative</i>		
PROPOSED MITIGATION				
<i>Overall habitat loss related to flooding cannot be mitigated however if SCCs are identified on site during the pre-construction phase, such species should be relocated to suitable habitat outside of the area of influence.</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Moderate detrimental	Definite
SIGNIFICANCE	-42	<i>Moderate negative</i>		

CONFIDENCE LEVEL				
<i>High</i>				
FAUNAL DISPLACEMENT DUE TO HABITAT DISTRUCTION AND VEGETATION CLEARANCE				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Temporary or permanent displacement of fauna</i>			
INDIRECT IMPACT	<i>Loss of foraging areas for faunal species of conservation concern, potential loss of breeding areas for fauna</i>			
CUMULATIVE IMPACT	<i>Insignificant</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-12	3
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	<i>Slightly detrimental</i>	<i>Definite</i>
SIGNIFICANCE	-36	<i>Low negative</i>		
PROPOSED MITIGATION				
<i>Avoid removal of mature trees where possible. If necessitated, tree removal should be selective and restricted to non-protected species</i>				
<i>Topsoil removed should be stockpiled according to best practice guidelines, for use in rehabilitation</i>				
<i>Intensive, small scale Alien Invasive Management Plan to be implemented. Site is heavily invaded.</i>				
<i>Area to be clearly demarcated with no activity to be permitted outside the laydown boundaries. No go areas to be clearly communicated through a qualified ECO who will be responsible for managing environmental aspects on site.</i>				

Site to be rehabilitated following construction. Compacted soils to be ripped and tilled, topsoil returned, and area to be returned to functionality of previous land use.

Vegetation clearance to take place outside the breeding season, during the dry season when river levels are low. This will minimise sediment released downstream.

The least destructive method of in-stream vegetation removal is to be used, including hand removal where possible.

Erosion or bank collapse to be carefully avoided and managed, care should be taken with heavy machinery along verges.

During Geophysical investigation care should be taken to not disturb/destroy downstream avian breeding colony sites on the eastern bank

Only the vegetation within the necessary demarcated areas are to be removed

POST MITIGATION

DURATION	3	The duration of the activity associated with the impact will last 18 months-5 years.	-6	3
EXTENT	2	The impact affects only the development area		
SEVERITY	-1	The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected		
IMPACT ON IRREPLACEABLE RESOURCES	1	Irreplaceable resources will be impacted	Negligible	Definite
SIGNIFICANCE	-18	Very Low negative		

CONFIDENCE LEVEL

Medium

LOSS OF HABITAT CONNECTIVITY & FAUNAL MOVEMENT CORRIDORS

PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Loss of local movement corridors</i>			
INDIRECT IMPACT	<i>Temporary local changes in species assemblages</i>			
CUMULATIVE IMPACT	<i>Insignificant</i>			

DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
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PRE-MITIGATION

DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	2
EXTENT	2	<i>The impact affects only the development area</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-8	<i>Very low negative</i>		
PROPOSED MITIGATION				
<i>Site to be rehabilitated following construction. Removal of erected fences (if relevant). Compacted soils to be ripped and tilled, topsoil returned, and area to be restored to functionality of previous land use.</i>				
<i>Vegetation clearance to take place outside the breeding season, during the dry season when river levels are low. Displacement likely to be temporary with species returning post-construction.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-3	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-3	<i>Very low negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

ALIEN INVASIVE PLANT SPECIES SPREAD/PROPAGATION				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Spread and propagation of alien invasive plant species</i>			
INDIRECT IMPACT	<i>Invasive species encroachment and outcompeting natural vegetation (already highly invaded)</i>			
CUMULATIVE IMPACT	<i>Overall encroachment on a larger spatial scale</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-24	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Invasive species spread into wetland habitats</i>	Highly detrimental	Definite
SIGNIFICANCE	-72	<i>High negative</i>		
PROPOSED MITIGATION				
<i>Construction vehicle movement to be limited to existing roads and pre-determined areas to limit vehicle related spread</i>				
<i>Environmental awareness training on identification and removal procedures for invasive species likely to occur on site</i>				
<i>Intensive, small scale Alien Invasive Management Plan to be implemented. Site heavily invaded</i>				
<i>Construction to be limited to the non-flowering season to limit seed dispersal</i>				
<i>Avoid translocating stockpiles of topsoil to sensitive riparian zones to prevent translocation of soil seed banks of alien species.</i>				
POST MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-3	2
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		

SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Invasive species spread into wetland habitats</i>	Negligible	Likely
SIGNIFICANCE	-6	<i>Very low negative</i>		
CONFIDENCE LEVEL				
<i>High</i>				
EROSION AND BANK DESTABILISATION				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Loss of topsoil. Destabilisation of banks can cause erosion and sedimentation which can impact downstream environments</i>			
INDIRECT IMPACT	<i>Vegetation unable to establish. Loss of riparian habitat. Changes to flow regime and related impacts</i>			
CUMULATIVE IMPACT	<i>Sediment release & deposition downstream</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-16	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-48	<i>Moderate-negative</i>		
PROPOSED MITIGATION				

<i>Suitable erosion protective measures to be implemented for access roads, weir structures and stabilisation of river banks once vegetation has been removed</i>				
<i>Stabilisation of cleared areas to prevent and control erosion. The method chosen (e.g. watering, planting, retaining structures, commercial anti-erosion compounds) will be selected according to the site-specific conditions.</i>				
<i>Monitoring to be conducted to detect erosion (e.g on steep slopes) and assess bank stability in both construction and operational phases. Exposed areas to be rehabilitated as soon as possible to prevent erosion.</i>				
<i>Implement an ecologically-sound storm water management plan during construction. This includes protection of topsoil stockpiles and stormwater management in the laydown and camp areas.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>		
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		-4
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>		1
SIGNIFICANCE	-4	<i>Very Low-negative</i>		Negligible
				Unlikely
CONFIDENCE LEVEL				
<i>Medium</i>				
FLORA/FAUNA POACHING & DIRECT MORTALITY DUE TO VEHICLE COLLISION				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Loss of floral and faunal species</i>			
INDIRECT IMPACT	<i>Changes to species composition and loss of ecological functional integrity</i>			
CUMULATIVE IMPACT	<i>Insignificant</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				

DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-12	2
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly detrimental	Likely
SIGNIFICANCE	-24	<i>Low-negative</i>		
PROPOSED MITIGATION				
<i>Strict speed limits to be enforced</i>				
<i>Construction to be limited to daylight hours</i>				
<i>Environmental awareness training by a suitably qualified ECO on basic environmental principles. No poaching of any plants or animals or collection of surface water to be permitted.</i>				
<i>No-go areas to be clearly demarcated. Construction activities to be limited to the smallest footprint possible.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-3	1
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-3	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

HYDROCARBON & CHEMICAL SPILLAGES				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Hydrocarbon & Chemical pollution of water and soil</i>			
INDIRECT IMPACT	<i>Loss of fauna & flora</i>			
CUMULATIVE IMPACT	<i>Pollution of ground water resources, impaired surface water quality leading to lowered ecological state</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-24	1
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>		
SIGNIFICANCE	-24	<i>Low-negative</i>		
PROPOSED MITIGATION				
<i>All hydrocarbon & Chemical spills to be cleaned with spill kits immediately. Spill kit training to take place prior to the initiation of the construction phase.</i>				
<i>All hydrocarbon & Chemicals to be stored according to best practice guidelines</i>				
<i>Stationary vehicles to be fitted with drip trays when standing overnight</i>				
<i>Vehicles to be adequately maintained (off-site) and checked regularly for leaks</i>				
POST MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-3	1

EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-3	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
FAUNAL DISPLACEMENT DUE TO NOISE IMPACT				
PROJECT PHASE	<i>Construction</i>			
DIRECT IMPACT	<i>Displacement of Fauna</i>			
INDIRECT IMPACT	<i>Changes to species assemblages and loss of ecological functional integrity</i>			
CUMULATIVE IMPACT	<i>Insignificant</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-8	<i>Very Low-negative</i>		
PROPOSED MITIGATION				

<i>Construction to take place outside of peak faunal breeding season (i.e winter dry months)</i>				
<i>Ensure that equipment is well maintained and fitted with the correct and appropriate noise abatement measures such as:</i>				
<ul style="list-style-type: none"> • <i>Engine bay covers over heavy equipment could be pre-fitted with sound absorbing material.</i> • <i>Heavy equipment that fully encloses the engine bay should be considered, ensuring that the seam gap between the hood and vehicle body is minimised</i> • <i>Use of vehicle horns should be minimized where possible.</i> 				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	1
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Negligible	Unlikely
SIGNIFICANCE	-4	<i>Very Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

Weir Rehabilitation and Construction				
PROJECT PHASE	<i>Construction and Maintenance Phase.</i>			
DIRECT IMPACT	<i>Land Clearing activities such as clearing and grubbing of vegetation and topsoil. This can result in potential sedimentation and nutrient runoff.</i>			
INDIRECT IMPACT	<i>Suffocation of plant species within Critical Biodiversity Areas and Ecological Support Areas, as well as a decrease in water quality which could potentially affect surrounding ecosystems and residential areas.</i>			
CUMULATIVE IMPACT	<i>Low</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	1	<i>The duration of the activity associated with the impact is deemed not to last for more than 6 months and is therefore rated as Temporary.</i>	- 3	2
EXTENT	2	<i>The extent of the impact is rated as site as it will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.</i>	<i>Negligible</i>	<i>Likely</i>
IMPACT ON IRREPLACEBLE REOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	- 6	<i>Very low negative</i>		
PROPOSED MITIGATION MEASURES				

Reduce through controlling measures:

- *Appoint a responsible person, such as an environmental officer or safety, health & environmental manager, to ensure compliance with the EA / EMPr. This person should be responsible for the following:*
 - *ensure compliance with all legislative conditions;*
 - *implementation of all mitigation measures;*
 - *compilation and/or storage of relevant documents (such as maintenance checklists, complaints register, etc.). These documents should be readily available in the event of a site inspection;*
 - *submitting all required reports (e.g., annual report, etc.);*
 - *submitting a summary of complaints (monthly);*
 - *notifying the relevant Competent Authority when needed;*
- *Undertake/facilitate training for key personnel/contractors or staff to ensure compliance with the internal management plans and conditions.*
- *Submit an application to the relevant Competent Authority, should any changes be required. The application should be submitted to the relevant licencing authority prior to the changes being made. Any changes to the following will require approval:*
 - *Production processes*
 - *Production increases*
 - *Ownership*
 - *Contact details*
 - *Type and quantities of input materials*
 - *Type and quantities of products*
 - *Production equipment*
 - *Treatment facilities*
 - *Building, plant, site layout or site works*
- *Conduct water quality monitoring and ensure that monitoring is undertaken in accordance with nationally or internationally acceptable methods.*
- *Maintain and report monthly to the Competent Authority a complaint register. Should a complaint be logged, a report, should be submitted to the authority.*
- *Should an Environmental Management Programme (EMPr) be compiled for the proposed construction project as part of the EIA process, all recommendations and conditions contained within the EMPr must be implemented and complied with.*

POST-MITIGATION

DURATION	1	<i>The duration of the activity associated with the impact will last up to 6 months and as such is rated as short term</i>	-3	2
EXTENT	2	<i>The extent of the impact is rated as footprint as it only affects the area in which the proposed activity will occur</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected.</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	0	<i>No irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	0	<i>Very low negative</i>		
CONFIDENCE LEVEL				
<i>Low</i>				

IMPACT ON LAND CAPABILITY				
PROJECT PHASE	<i>Construction Phase</i>			
DIRECT IMPACT	<i>Site clearing activities include removing topsoil material to create foundation for contraction of the gauging weir structures laydown areas. Road upgrades and maintenance potentially encroaching on areas cultivated with Maize and Wheat.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material.</i>			
CUMULATIVE IMPACT	<i>Less available soil material for cultivation.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD

IMPACT ON LAND CAPABILITY				
PRE-MITIGATION				
DURATION	3	The duration of the activity associated with the impact will last 18 months-5 years.	-21	3
EXTENT	3	The impact affects the development area and adjacent properties.		
SEVERITY	-3	The severity of the impact is rated as High negative as the natural, cultural, or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease, and valued, important, sensitive, or vulnerable systems or communities are substantially affected.	Highly detrimental	Definite
IMPACT ON IRREPLACEABLE REOURCES	1	Irreplaceable resources will be impacted.		
SIGNIFICANCE	-63	High negative		
PROPOSED MITIGATION MEASURES				
<i>The project operations should be kept within the demarcated footprint areas as far as practically possible and avoid construction on active agricultural soils.</i>				
<i>Avoid permanently impacting topsoil and subsoil but salvage the maximum depth of these when clearing areas for infrastructure. For the soils of the Hutton formation, the maximum salvageable depth is 150 cm, and for the Valsrivier/Swartland, 120 cm.</i>				
<i>Make use of geotextiles and contours to control soil erosion and revegetation of exposed soil surfaces where possible.</i>				
<i>Topsoil stripping and stockpiling should not be conducted during wet periods.</i>				
<i>If soils are going to be left in stockpile for a significant period, they must be vegetated with locally indigenous grasses and forbs to maintain biological processes, stabilise the soil and reduce soil loss due to erosion.</i>				
<i>Following the construction phase, the topsoil should be placed as the final soil layer before seeding.</i>				
POST-MITIGATION				
DURATION	2	The duration of the activity associated with the impact will last 6-18 months and as such, is rated as short term	-5	2
EXTENT	2	The impact will affect only the development area.		

SEVERITY	-1	<i>Negligible</i>	<i>Negligible</i>	<i>Likely</i>
IMPACT ON LAND CAPABILITY				
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL EROSION				
PROJECT PHASE	<i>Construction Phase.</i>			
DIRECT IMPACT	<i>Site clearing activities include removing topsoil material to create foundation for contraction of the gauging weir structures laydown areas. Road upgrades and maintenance potentially encroaching on areas cultivated with cabbage.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material through soil erosion.</i>			
CUMULATIVE IMPACT	<i>Loss of fertile topsoil and sedimentation of nearby water sources.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-21	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	<i>Highly detrimental</i>	<i>Definite</i>

IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-63	<i>Highly negative</i>		

IMPACT ON SOIL EROSION				
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				
<i>Soils with finer particles of silt and clay associated with the soils of Valsrivier/Swartland are more susceptible to erosion by water due to a lower permeability and therefore vegetation clearing should occur in parallel with the construction progress to minimise erosion and/or run-off.</i>				
<i>No site clearing activities should take place during periods of excessive rainfall or characterised as thunderstorms. This information can be obtained through the South African Weather Service (SAWS) as thunderstorms can displace soils and causing sedimentation of nearby streams and rivers.</i>				
<i>Use geotextiles and contours to control soil erosion and revegetate exposed soil surfaces where possible.</i>				
<i>Consideration needs to be given to the use of water for dust suppression– the use of binding agents like molasses should be considered for unsealed roads and dust suppression.</i>				
<i>Stockpiled soils must be vegetated with locally indigenous grasses and forbs to maintain biological processes, stabilise the soil and reduce soil loss due to erosion.</i>				
<i>Following the construction phase, the topsoil should be placed as the final soil layer before seeding.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months and as such, is rated as Short term</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
IMPACT ON SOIL COMPACTION				
PROJECT PHASE	<i>Construction Phase.</i>			

DIRECT IMPACT	<i>Heavy vehicle traffic within and around the infrastructure area and potentially compacting the soil.</i>			
INDIRECT IMPACT	<i>Surface crusting through soil compaction.</i>			
CUMULATIVE IMPACT	<i>Increased bulk density and reduced infiltrability of the soil cause increased runoff in the absence of vegetation.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	5-14	3
EXTENT	3	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected.</i>	Moderately detrimental	Definite
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative.</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations should be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				
<i>Trafficking and movement over the areas not targeted for construction must be avoided if not minimised, especially heavy machinery.</i>				
<i>No site clearing activities should take place during periods of excessive rainfall or characterised as thunderstorms. This information can be obtained through the South African Weather Service (SAWS) as thunderstorms can displace soils and causing sedimentation of nearby streams and rivers.</i>				
<i>Loosening of the soil through ripping and discing prior to the stripping process is recommended to break up crusting.</i>				
<i>Compacted soils should be ripped at least 20cm to alleviate compaction.</i>				
<i>Consideration needs to be given to the use of water for dust suppression– the use of binding agents like molasses should be considered for unsealed roads and dust suppression.</i>				

IMPACT ON SOIL COMPACTION				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months and, as such, is rated as Short term.</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible.</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low negative.</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL CONTAMINATION				
PROJECT PHASE	<i>Construction Phase.</i>			
DIRECT IMPACT	<i>Direct chemical spills on soils from construction vehicles or other construction equipment used.</i>			
INDIRECT IMPACT	<i>Contamination of soil.</i>			
CUMULATIVE IMPACT	<i>Change in the soil chemical status of soil which may impact soil fertility status.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	3	<i>The duration of the activity associated with the impact will last 18 months-5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties due to potential pollution migration.</i>		

IMPACT ON SOIL CONTAMINATION				
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected.</i>	<i>Slightly detrimental</i>	<i>Definite</i>
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative.</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations should be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				
<i>Ensure appropriate handling and storage of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets).</i>				
<i>Maintenance of vehicles and equipment should be carried out in designated facilities fitted with spillage containment, floors, and sumps to capture any fugitive oils and greases.</i>				
<i>Implementing regular site inspections for materials handling and storage.</i>				
<i>Development of detailed procedures for spill containment and soil clean up.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months and as such, is rated as Short term</i>	-5	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	<i>Negligible</i>	<i>Likely</i>
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	10	<i>very low negative</i>		

CONFIDENCE LEVEL
<i>Medium</i>

6.6.3 Operational Phase

Please refer below to some of the main impacts that may be experienced during operations.

BEESTEKRAAL OPERATIONAL PHASE IMPACTS

IMPACT ON LAND CAPABILITY				
PROJECT PHASE	<i>Operational Phase</i>			
DIRECT IMPACT	<i>Operation of the gaging weirs constant traffic, and frequent disturbances of soils resulting in loss of land capability.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material.</i>			
CUMULATIVE IMPACT	<i>Decreased productivity of soil material</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than five years.</i>	-14	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	Slightly detrimental	Definite
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				
<i>Maintenance vehicles should stick to demarcated roads as far as practically possible to minimise soil compaction of adjacent soils.</i>				
<i>Effective soil cover and adequate protection from wind (dust) and dirty water contamination through revegetation or rock cladding</i>				

IMPACT ON LAND CAPABILITY				
<i>Regularly clean and maintain all haulage ways, conveyancing routes and service ways, drains and storm water control facilities.</i>				
<i>Soil replacement and the preparation of a seedbed to facilitate and accelerate the revegetation program and to limit potential erosion and siltation of the surrounding water sources.</i>				
<i>Measures such as speed humps and signage should be implemented to reduce speeding and airborne dust.</i>				
<i>Following the construction phase, the topsoil should be placed as the final soil layer before seeding.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than five years.</i>	-7	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	14	very low negative		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL EROSION				
PROJECT PHASE	<i>Operational Phase</i>			
DIRECT IMPACT	<i>Frequent disturbances of soils, resulting in risk of soil erosion.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material through soil erosion</i>			
CUMULATIVE IMPACT	<i>Loss of fertile topsoil and sedimentation of nearby water sources</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years</i>	-14	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	Slightly detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects (impacts on areas beyond the construction footprint due to ineffective care and management)</i>				
<i>In relation to the wetlands and watercourses, any areas where active erosion is observed must be immediately rehabilitated (re-shaping of slopes, revegetation with indigenous species where necessary, etc.) in such a way as to ensure that the hydrology and geomorphological characteristics of the area are re-instated to conditions which are as natural as possible.</i>				

IMPACT ON SOIL EROSION				
<i>Erosion controls must be regularly maintained, at least fortnightly, particularly if rain is forecast or immediately following a rainfall event.</i>				
<i>Disturbed areas adjacent to the footprint should be revegetated with indigenous grass mix to limit soil erosion.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-6	2
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	12	very low negative		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL COMPACTION	
PROJECT PHASE	<i>Operational Phase.</i>
DIRECT IMPACT	<i>Constant heavy vehicle traffic within and around the infrastructure area and potentially compacting the soil.</i>
INDIRECT IMPACT	<i>Surface crusting through soil compaction.</i>
CUMULATIVE IMPACT	<i>Increased bulk density and reduced infiltrability of the soil cause increased runoff in the absence of vegetation.</i>

IMPACT ON SOIL COMPACTION				
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	<i>Slightly detrimental</i>	<i>Definite</i>
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects (impacts on areas beyond the construction footprint due to ineffective care and management).</i>				
<i>Unnecessary trafficking and movement over the areas targeted for construction must be avoided, especially heavy machinery.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-7	2
EXTENT	2	<i>The impact will affect only the development area.</i>		

SEVERITY	-1	<i>Negligible</i>	<i>Negligible</i>	<i>Likely</i>
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IMPACT ON SOIL COMPACTION				
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	14	very low negative		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL CONTAMINATION				
PROJECT PHASE	<i>Operational Phase.</i>			
DIRECT IMPACT	<i>Leaching of hydrocarbon chemicals into the soils from maintenance equipment leads to alteration of the soil chemical status as well as contamination of groundwater. Potential hazardous and non-hazardous waste disposal, including waste material spills and refuse deposits into the soil.</i>			
INDIRECT IMPACT	<i>Contamination of soi</i>			
CUMULATIVE IMPACT	<i>Change in the soil chemical status of soil which may impact soil fertility status.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-16	3
EXTENT	3	<i>The impact affects the development area and adjacent properties due to potential pollution migration.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified</i>	<i>Slightly detrimental</i>	<i>Definite</i>

IMPACT ON SOIL CONTAMINATION				
		<i>way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-48	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>Ensure proper handling and storage of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets.</i>				
<i>Maintenance vehicles should be checked for leakages of hydrocarbons before the commencement of maintenance activities.</i>				
<i>Implementing regular site inspections for materials handling and storage.</i>				
<i>Ensure that the necessary materials and equipment for dealing with spills and leaks are available on-site, where practicable.</i>				
<i>In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, break down, and encapsulate a minor hydrocarbon spillage.</i>				
<i>Development of detailed procedures for spills containment and soil clean up.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-7	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	<i>Negligible</i>	<i>Likely</i>

IMPACT ON SOIL CONTAMINATION				
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	14	very low negative		
CONFIDENCE LEVEL				
<i>Medium</i>				

ATLANTA AREA OPERATIONAL PHASE IMPACTS

IMPACT ON LAND CAPABILITY				
PROJECT PHASE	<i>Operational Phase</i>			
DIRECT IMPACT	<i>Operation of the gaging weirs, constant traffic, and frequent soil disturbances result in loss of land capability.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material.</i>			
CUMULATIVE IMPACT	<i>Decreased productivity of soil material</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-16	3
EXTENT	3	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified</i>	<i>Moderately detrimental</i>	<i>Definite</i>

IMPACT ON LAND CAPABILITY				
		<i>way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-48	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				
<i>Maintenance vehicles should stick to demarcated roads as far as practically possible to minimise soil compaction of adjacent soils.</i>				
<i>Effective soil cover and adequate protection from wind (dust) and dirty water contamination through revegetation or rock cladding.</i>				
<i>Regular cleaning and maintenance of all haulage ways, conveyancing routes and service ways, drains, and stormwater control facilities.</i>				
<i>Soil replacement and the preparation of a seedbed to facilitate and accelerate the revegetation program and to limit potential erosion and siltation of the surrounding water sources.</i>				
<i>Measures such as speed humps and signage should be implemented to reduce speeding and airborne dust.</i>				
<i>Following the construction phase, the topsoil should be placed as the final soil layer prior to seeding.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>		
EXTENT	2	<i>The impact will affect only the development area.</i>	-7	2
SEVERITY	-1	<i>Negligible</i>		
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>	<i>Negligible</i>	<i>Likely</i>
SIGNIFICANCE	14	<i>very low negative</i>		
IMPACT ON LAND CAPABILITY				
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL EROSION				
PROJECT PHASE	<i>Operational Phase</i>			
DIRECT IMPACT	<i>Frequent disturbances of soils, resulting in risk of soil erosion.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material through soil erosion</i>			
CUMULATIVE IMPACT	<i>Loss of fertile topsoil and sedimentation of nearby water sources</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years</i>	-14	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	Slightly detrimental	Definite
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative</i>		

IMPACT ON SOIL EROSION				
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects (impacts on areas beyond the construction footprint due to ineffective care and management)</i>				
<i>In relation to the wetlands and watercourses, any areas where active erosion is observed must be immediately rehabilitated (re-shaping of slopes, revegetation with indigenous species where necessary, etc.) in such a way as to ensure that the hydrology and geomorphological characteristics of the area are re-instated to conditions which are as natural as possible.</i>				
<i>Erosion controls must be regularly maintained, at least fortnightly or monthly, particularly if rain is forecast or immediately following a rainfall event.</i>				
<i>Disturbed areas adjacent to the footprint should be revegetated with indigenous grass mix to limit soil erosion.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>		
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>	-6	2
SEVERITY	-1	<i>Negligible</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>	<i>Negligible</i>	<i>Likely</i>
SIGNIFICANCE	12	<i>very low negative</i>		

CONFIDENCE LEVEL
<i>Medium</i>

IMPACT ON SOIL COMPACTION				
PROJECT PHASE	<i>Operational Phase.</i>			
DIRECT IMPACT	<i>Constant heavy vehicle traffic within and around the infrastructure area and potentially compacting the soil.</i>			
INDIRECT IMPACT	<i>Surface crusting through soil compaction.</i>			
CUMULATIVE IMPACT	<i>Increased bulk density and reduced infiltrability of the soil cause increased runoff in the absence of vegetation.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	Slightly detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative</i>		

PROPOSED MITIGATION MEASURES

The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects (impacts on areas beyond the construction footprint due to ineffective

care and management).

Unnecessary trafficking and movement over the areas targeted for construction must be avoided, especially heavy machinery.

Access roads should be inspected and maintained as necessary.

IMPACT ON SOIL COMPACTION				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-7	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	14	very low negative		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL CONTAMINATION	
PROJECT PHASE	<i>Operational Phase.</i>
DIRECT IMPACT	<i>Leaching of hydrocarbon chemicals into the soils from maintenance equipment leads to alteration of the soil chemical status as well as contamination of</i>

	<i>groundwater. Potential hazardous and non-hazardous waste disposal, including waste material spills and refuse deposits into the soil.</i>			
INDIRECT IMPACT	<i>Contamination of soil.</i>			
CUMULATIVE IMPACT	<i>Change in the soil chemical status of soil which may impact soil fertility status.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				

IMPACT ON SOIL CONTAMINATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-16	3
EXTENT	3	<i>The impact affects the development area and adjacent properties due to potential pollution migration.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-48	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>Ensure proper handling and storage of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets.</i>				
<i>Maintenance vehicles should be checked for leakages of hydrocarbons before the commencement of maintenance activities.</i>				
<i>Implementing regular site inspections for materials handling and storage.</i>				

<i>Ensure that the necessary materials and equipment for dealing with spills and leaks are available on-site, where practicable.</i>				
<i>In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of</i>				
<i>an appropriate absorbent material readily available to absorb, break down, and encapsulate a minor hydrocarbon spillage.</i>				
<i>Development of detailed procedures for spill containment and soil clean up.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-7	2

IMPACT ON SOIL CONTAMINATION				
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	<i>Negligible</i>	<i>Likely</i>
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	14	<i>very low negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				

PAUL HUGO STUDY AREA OPERATIONAL PHASE IMPACTS

IMPACT ON LAND CAPABILITY				
PROJECT PHASE	<i>Operational Phase</i>			
DIRECT IMPACT	<i>Operation of the gaging weirs and constant traffic, and frequent disturbances of soils resulting in loss of land capability.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material.</i>			
CUMULATIVE IMPACT	<i>Decreased productivity of soil material</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-24	2
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural, or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease, and valued, important, sensitive, or vulnerable systems or communities are substantially affected.</i>	Highly detrimental	Definite
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-48	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects.</i>				
<i>Maintenance vehicles should stick to demarcated roads as far as practically possible to minimise soil compaction of adjacent soils.</i>				
<i>Effective soil cover and adequate protection from wind (dust) and dirty water contamination through revegetation or rock cladding.</i>				
<i>Regular cleaning and maintenance of all haulage ways, conveyancing routes and service ways, drains, and stormwater control facilities.</i>				
<i>Soil replacement and the preparation of a seedbed to facilitate and accelerate the revegetation program and to limit potential erosion and siltation of the surrounding water sources.</i>				

Measures such as speed humps and signage should be implemented to reduce speeding and airborne dust.

Following the construction phase, the topsoil should be placed as the final soil layer before seeding.

POST MITIGATION

DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-7	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	14	<i>very low negative</i>		

CONFIDENCE LEVEL

Medium

IMPACT ON SOIL EROSION

PROJECT PHASE	<i>Operational Phase</i>			
DIRECT IMPACT	<i>Frequent disturbances of soils, resulting in risk of soil erosion.</i>			
INDIRECT IMPACT	<i>Loss of valuable topsoil material through soil erosion</i>			
CUMULATIVE IMPACT	<i>Loss of fertile topsoil and sedimentation of nearby water sources</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD

PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years</i>	-14	3
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	Slightly detrimental	Definite
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-42	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects (impacts on areas beyond the construction footprint due to ineffective care and management)</i>				
<i>High clay soils of the Valrivier/Swartland formation should be revegetated and monitored to control erosion by absorbing some of the water and providing additional resistance so the water doesn't flow as fast and reduce sedimentation of the nearby water source.</i>				
<i>In relation to the wetlands and watercourses, any areas where active erosion is observed must be immediately rehabilitated (re-shaping of slopes, revegetation with indigenous species where necessary, etc.) in such a way as to ensure that the hydrology and geomorphological characteristics of the area are re-instated to conditions which are as natural as possible.</i>				
<i>Erosion controls must be regularly maintained, at least fortnightly or monthly, particularly if rain is forecast or immediately following a rainfall event.</i>				

Disturbed areas adjacent to the footprint should be revegetated with indigenous grass mix to limit soil erosion.

Access roads should be inspected and maintained as necessary.

POST-MITIGATION

DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-6	2
EXTENT	1	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	12	very low negative		
CONFIDENCE LEVEL				
<i>Medium</i>				

IMPACT ON SOIL COMPACTION

PROJECT PHASE	<i>Operational Phase.</i>
DIRECT IMPACT	<i>Constant heavy vehicle traffic within and around the infrastructure area and potentially compacting the soil.</i>

INDIRECT IMPACT	<i>Surface crusting through soil compaction.</i>			
CUMULATIVE IMPACT	<i>Increased bulk density and reduced infiltrability of the soil cause increased runoff in the absence of vegetation.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-16	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	Moderately detrimental	Definite
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-48	<i>Moderate negative</i>		
CONFIDENCE				
Medium				

Phosphate and nitrate assimilation				
PROJECT PHASE	Operational			
DIRECT IMPACT	Increase in nutrients and algae blooms			
INDIRECT IMPACT	Reduction of habitat availability and water quality decline			
CUMULATIVE IMPACT	Increased nutrient load within environment			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-14	3
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Moderately detrimental	Definite
SIGNIFICANCE	-42	<i>Moderate-negative</i>		
PROPOSED MITIGATION				

Integrating constructed wetlands near weirs can significantly improve phosphate and nitrate assimilation. They can effectively reduce nutrient levels in stormwater run-off before it enters downstream water bodies.

Establishing and maintaining riparian buffers along the banks of water bodies can help enhance nutrient assimilation at weirs.

Implementing permeable reactive barriers, such as permeable reactive interlocking blocks or permeable reactive gates, can effectively reduce phosphate and nitrate levels at weirs.

Implementing nutrient management practices, such as reducing fertilizer use and implementing sustainable agricultural practices in upstream areas

POST MITIGATION

DURATION	3	<i>The duration of the activity associated with the impact will last 18-5 years.</i>	-10	2
EXTENT	2	<i>The impact only affects the area in which the proposed activity will occur.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No irreplaceable resources will be impacted</i>	Slightly Detrimental	Likely
SIGNIFICANCE	-20	<i>Low Negative</i>		

CONFIDENCE LEVEL

High

Changes in river morphology	
PROJECT PHASE	<i>Operational</i>
DIRECT IMPACT	<i>Changes in River morphology downstream</i>
INDIRECT IMPACT	<i>Alterations in habitat conditions such as depth of riverbank</i>
CUMULATIVE IMPACT	<i>Sediment deposition planes</i>

DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-21	2
EXTENT	3	<i>The impact affects the development area and adjacent properties.</i>		
SEVERITY	-3	<i>The severity of the impact is rated as High negative as the natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.</i>		
IMPACT ON IRREPLACEABLE RESOURCES	0	<i>No Irreplaceable resources will be impacted</i>	Highly detrimental	Likely
SIGNIFICANCE	-42	<i>Moderate-negative</i>		
PROPOSED MITIGATION				
<i>Consider the use of side channels or bypass channels to divert flows during critical periods and minimise the impact of the main channel.</i>				
<i>Implement an adaptive management strategy making adjustments based on monitoring results to address any unforeseen issues or environmental changes.</i>				
<i>River diversion headwork should be properly constructed at the head of the canal to divert the river water towards the canal, so as to ensure a regulated continuous supply of silt-free water.</i>				
POST MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last 0-6 months.</i>	-16	2
EXTENT	3	<i>The impact only affects the area in which the proposed activity will occur.</i>		

SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected</i>		
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted</i>	<i>Moderately detrimental</i>	<i>Likely</i>
SIGNIFICANCE	-32	<i>Low-negative</i>		
CONFIDENCE LEVEL				
<i>Medium</i>				
Changes in water temperature and quality				
PROJECT PHASE	<i>Construction & Operational</i>			
DIRECT IMPACT	<i>Impact on sensitive species</i>			
INDIRECT IMPACT	<i>Changes in aquatic assemblages</i>			
CUMULATIVE	<i>Slightly alternates some water quality parameters further downstream</i>			

IMPACT	
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DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last 18-5 years.</i>	-14	2
EXTENT	3	<i>The impact will affect only the development area.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT IRREPLACEABLE RESOURCES	ON 0	<i>No irreplaceable resources will be impacted</i>	Moderately detrimental	Likely
SIGNIFICANCE	-28	<i>Low Negative</i>		
PROPOSED MITIGATION				
<i>Protecting and preserving natural riparian vegetation along the banks of water bodies can help regulate water temperature and maintain water quality.</i>				
<i>Implementing effective water flow management strategies at weirs can help regulate water temperatures and maintain water quality.</i>				
<i>Implementing comprehensive stormwater run-off treatment systems, such as constructed wetlands, biofiltration systems, and sedimentation basins, can help reduce the influx of pollutants and contaminants that can contribute to changes in water quality and temperature.</i>				
POST MITIGATION				
DURATION	2	<i>The duration of the activity associated with the impact will last 6-18 months.</i>	-4	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>The severity of the impact is rated as Low negative as the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected</i>		
IMPACT IRREPLACEABLE RESOURCES	ON 0	<i>No irreplaceable resources will be impacted</i>	Negligible	Likely
SIGNIFICANCE	-8	<i>Very Low-negative</i>		

CONFIDENCE LEVEL				
Medium				
IMPACT ON SOIL CONTAMINATION				
<i>Ensure that the necessary materials and equipment for dealing with spills and leaks are available on-site, where practicable.</i>				
<i>In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of</i>				
<i>an appropriate absorbent material readily available to absorb, break down, and, where possible, encapsulate a minor hydrocarbon spillage.</i>				
<i>Development of detailed procedures for spill containment and soil clean up.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-7	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	14	very low negative		

CONFIDENCE LEVEL
<i>Medium</i>

PROPOSED MITIGATION MEASURES				
<i>The project operations be kept within the demarcated footprint areas as far as practically possible to minimise edge effects (impacts on areas beyond the construction footprint due to ineffective care and management).</i>				
<i>Unnecessary trafficking and movement over the areas targeted for construction must be avoided, especially heavy machinery.</i>				
<i>Access roads should be inspected and maintained as necessary.</i>				
POST-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-7	2
EXTENT	2	<i>The impact will affect only the development area.</i>		
SEVERITY	-1	<i>Negligible</i>	Negligible	Likely
IMPACT ON IRREPLACEABLE REOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	14	very low negative		
CONFIDENCE LEVEL				

<i>Medium</i>				
IMPACT ON SOIL CONTAMINATION				
PROJECT PHASE	<i>Operational Phase.</i>			
DIRECT IMPACT	<i>Leaching of hydrocarbon chemicals into the soils from maintenance equipment leads to alteration of the soil chemical status as well as contamination of groundwater. Potential hazardous and non-hazardous waste disposal, including waste material spills and refuse deposits into the soil.</i>			
INDIRECT IMPACT	<i>Contamination of soi</i>			
CUMULATIVE IMPACT	<i>Change in the soil chemical status of soil which may impact soil fertility status.</i>			
DIMENSION	RATING	MOTIVATION	CONSEQUENCE	LIKELIHOOD
PRE-MITIGATION				
DURATION	4	<i>The duration of the activity associated with the impact will last more than 5 years.</i>	-16	3
EXTENT	3	<i>The impact affects the development area and adjacent properties due to potential pollution migration.</i>		
SEVERITY	-2	<i>The severity of the impact is rated as Moderate negative as the affected environment is altered, but natural, cultural, and social functions and processes continue albeit in a modified way, and valued, important, sensitive, or vulnerable systems or communities are negatively affected</i>	<i>Moderatelydetrimental</i>	<i>Definite</i>

IMPACT ON IRREPLACEABLE RESOURCES	1	<i>Irreplaceable resources will be impacted.</i>		
SIGNIFICANCE	-48	<i>Moderate negative</i>		
PROPOSED MITIGATION MEASURES				
<i>Ensure proper handling and storage of hazardous chemicals and materials (e.g., fuel, oil, cement, concrete, reagents, etc.) as per their corresponding Safety Data Sheets.</i>				
<i>Maintenance vehicles should be checked for leakages of hydrocarbons before the commencement of maintenance activities.</i>				
<i>Implementing regular site inspections for materials handling and storage.</i>				

6.7 Cumulative Impacts

The NEMA EIA Regulations define cumulative impact as follows: “*In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.*”

Considering this definition, the potential cumulative barrier effect on the Crocodile (West) River has been effectively mitigated through the rehabilitation of existing flow gauging weirs, and designing an alternative for the new Paul Hugo weir, namely a flow measuring gantry, that will not create a barrier for fish and the aquatic environment.

6.8 Decommissioning Phase

Please note that it is not envisaged that the Project will be decommissioned in the near future. However, should this occur, then an impact assessment will need to be undertaken at that stage to confirm the status quo of the receiving environment and potential impacts on these conditions.

6.9 Consequences for Decision Making

6.9.1 Defining the Implications of the Impacts for Decision-Making

In order to provide simplification, it is necessary to recognise that many of the impacts presented above, are in fact a series of changes that result in one overarching consequence. For example increased alien vegetation, destruction of sensitive vegetation and disturbance of floral and faunal habitats, decreased wetland functioning, increased sedimentation and pollution of watercourses are all presented as separate impacts but the consequence of all the impacts is to potentially result in a material reduction of the environmental quality. It is this consequence that is central to the decision-making process.

As such, the approach has been to interrogate the Specialist Studies and identify and describe the collective implications of all the impacts presented. In the process a distinction is then made between the collective implication of the various impacts (e.g. material reduction of environmental quality) and the causes of the implication (e.g. increased alien vegetation, destruction of sensitive vegetation and disturbance of floral and faunal habitats, decreased wetland functioning, increased soil erosion and pollution of watercourses etc.). These implications have then been presented as either potential environmental costs (where the implications are negative) or as potential environmental benefits (where the implications are positive).

6.10 No-Go Alternative

The “No Go” alternative refers to the alternative of not embarking on the Project. This alternative would imply that the current *status quo* of the biophysical and social environment, without the Project, would remain. The identified impacts of the Project during the construction and operational phases will not occur, should the Project not be approved.

Notably, there are no additional alternatives which have been considered in this BA process.

Should the Project not go ahead, the MCWAP2A River Management System will not be able to address the operational approach, infrastructure and the entity that would be responsible for the day-

to-day management and monitoring of water levels and flows from Hartbeespoort Dam, Roodekopjes Dam, and other smaller dams in the Crocodile West River. The RMS as per the EA condition will be in place prior to the commissioning of the authorised transfer scheme.

The benefits associated with the proposed two (2) gauging weirs and one gantry currently outweigh the potential negative impacts associated with the project. As such, the no-go alternative is not preferred by the EAP.

7 RECOMMENDATIONS AND CONCLUSION

The causes of change to the receiving environment, as well as the severity of the changes, due to the proposed two (2) gauging weirs and gantry, were the focus of this report. The purpose of the BA was to provide the competent authority with all relevant information, provide meaning to the assessment of significance made and the resultant consequences of the two (2) gauging weirs and gantry.

In terms of the EIA Regulations, an application of this nature, based on the triggers identified, must undergo a BA process prior the issuing of an EA. The regulations further require that an independent EAP be appointed to conduct said process. As such, GBN-JV was commissioned by the Applicant to undertake the environmental assessment process.

This report thus presents the outcomes of the DBAR process. The assessment of impacts must adhere to the minimum requirements in the EIA Regulations and should take applicable official guidelines into account. The concerns raised by I&APs will be addressed in the assessment of impacts section of the FBAR.

7.1 Environmental Impact Statement

7.1.1 Reason for the proposed two (2) gauging weirs and gantry.

The RMS addresses the operational approach, infrastructure and the entity that would be responsible for the day-to-day management and monitoring of water levels and flows from Hartbeespoort Dam, Roodekopjes Dam, and other smaller dams in the Crocodile West River. The RMS will also consist of infrastructure such as river outlets, gauging stations, etc. that are used for the management and monitoring of river flows. The RMS will, amongst others, consist of computer models and management systems and will utilize information from its associated infrastructure components.

7.1.2 Summary of the Specialist Studies

The two (2) gauging weirs and gantry specialist studies recommendations are summarised below in **Table 24**.

Table 24: Specialist Recommendations

Specialist Assessment	Recommendations of Specialist Reports
Aquatic Biodiversity and Sedimentation Report prepared by M2 Environmental Connections	<p>It was recommended that:</p> <p>The demarcation of the development footprint boundaries be clearly defined before vegetation clearance to prevent encroachment into the surrounding natural areas.</p> <p>Surface water assessments be included within the monitoring programme as it is generally closely interlinked to any sudden changes in aquatic data.</p> <p>Essential the RMS maintain strict control measures regarding the efficient management of releases of water from the upstream dams and water resources. The aquatic results have indicated that although the aquatic ecosystem is currently in a desirable state excessive flow alterations could impact the overall aquatic macro invertebrate population diversity.</p>

Specialist Assessment	Recommendations of Specialist Reports
	<p>While construction takes place at the applicable weir structures the mitigation measures be implemented in order to improve aquatic ecosystem sustainability.</p>
<p>Heritage and Palaeontological Impact Assessment by CES</p>	<p>The larger landscape around the project area indicates a rich heritage horizon encompassing Iron Age Farmer and Colonial / Historical Period archaeology primarily related to farming, rural expansion and warfare of the past century. The following observations are made for the proposed MCWAP-2A RMS Project:</p> <ul style="list-style-type: none"> - Large portions of the project area and the baseline environment along the Crocodile River have been affected by historical and recent farming, as well as the construction of existing weirs and water pump facilities which possibly sterilized the landscape of prehistorical archaeological and other remnants. As no archaeological sites were located during the site assessment no apparent impact on the archaeological landscape is foreseen during the preconstruction, construction and operation phases of the project. However, since cultural (archaeological) layers are usually superficial, subsoil layers and that makes them easily vulnerable to destruction, the likelihood for encountering previously undetected cultural heritage or archaeological material sites as the land clearing process commences, or during construction of infrastructure should be considered. Site monitoring by an informed ECO will be required throughout the construction phase of the project in order to avoid the destruction of previously undetected heritage sites. - Considering the localised nature of heritage remains, the general monitoring of the development progress by an ECO or by the heritage specialist is recommended for all stages of the project. Should any subsurface palaeontological, archaeological or historical material, or burials be exposed during construction activities, all activities should be suspended and the archaeological specialist should be notified immediately. <p>In addition to these site-specific recommendations, careful cognizance should be taken of the following:</p> <ul style="list-style-type: none"> - As Palaeontological remains occur where bedrock has been exposed, all geological features should be regarded as sensitive. - Water sources such as drainage lines, fountains and pans would often have attracted human activity in the past. As Stone Age material occur in the larger landscape, such resources should be regarded as potentially sensitive in terms of possible subsurface deposits.
<p>Environmental Ambient Noise Assessment prepared by Rayten Engineering Solutions</p>	<p>The proposed activities have potential to raise the noise levels. These noises will be disturbing at times, but the noise levels can be reduced with mitigation. Even with mitigation measures in place, the projected noise levels may impact on the quality of living for the closest surrounding receptors.</p> <p>The noise impacts (after mitigation) are expected to have a LOW significance at all three weir sites.</p> <p>Mitigation measures were identified and proposed that may reduce the significance of the noise impact. As there are potential noise-sensitive receptors living within a close parameter from the activities, there will always be a risk of a noise impact.</p> <p>With the correct implementation of mitigation measures and ongoing communication with the community, the development of the proposed gauging weirs is acceptable from a noise impact perspective.</p>

Specialist Assessment	Recommendations of Specialist Reports
<p>Terrestrial Biodiversity Assessment prepared by M2 Environmental Connections</p>	<p>the proposed weir upgrades if correctly mitigated will have low impacts that are spatially restricted to the areas surrounding the weirs themselves. No floral species of concern were identified and the faunal species which will be impacted will only be displaced during the construction phase of the project, and will likely return once construction is completed. Therefore, from a terrestrial biodiversity point of view, inclusive of fauna and flora elements, no fatal flaws were identified and the project in question should be allowed to continue, and as such be granted authorisation.</p> <ul style="list-style-type: none"> • It is recommended that vegetation clearance (which should be selective by nature) and construction activities be scheduled outside of the breeding season in the late winter/dry months, to minimise impacts of erosion, sedimentation and soil compaction; as well as the displacement of breeding faunal species. • Effective small scale Alien Invasive Awareness and Management Programmes should be established for each weir. This plan should be updated and continue for the duration of the project; • Following construction, the site must be cleared of all possible polluting materials and all temporary structures must be removed and responsibly disposed of. All laydown areas and camps must be rehabilitated to their previous functional state, whether this is natural (sow natural grasses) or agricultural. • Where vegetation is to be removed this must be done conservatively with only necessary ear-marked vegetation to be removed. • Care must be taken to prevent, monitor, mitigate and rehabilitate the effects on erosion on the sites. • Appointment of a suitably qualified ECO to oversee and enforce all issues of environmental concern.
<p>Agricultural Impact Assessment prepared by Nsovo Environmental Consulting</p>	<p>It is anticipated that the proposed Mokolo Crocodile Water Augmentation Project (MCWAP-2A) will have a minimal impact on the identified soils and agricultural capability since the footprint of infrastructure disturbance, which impedes agriculture, constitutes only a negligible portion of available land surface area, allowing agricultural activities to continue unhindered and thus future cultivation is not anticipated to be hindered by the proposed development. This is because the access roads are located along the existing road, and the surface infrastructure is in areas that are not currently cultivated and are associated with the 1:100-year flood line of the Crocodile River. However, edge effects can be anticipated, which can encroach on the cultivated lands if not managed properly, as the proposed surface infrastructure is in proximity to the cultivated lands. Cumulative impacts are also related to an increase in the surface footprint. These impacts can be reduced by keeping the footprint minimised where possible and strictly following the integrated mitigation measures outlined in the document.</p> <p>The screening tool analysis was conducted, which presented the findings as the impact on agricultural resources being of a very high sensitivity in terms of agricultural potential. The outcomes of the field verification results largely supported the screening tool due to the favourable soil and climate characteristics for commercialised agriculture.</p>

Specialist Assessment	Recommendations of Specialist Reports
	<p>From a soil, land use and land capability point of view the proposed development can be considered provided that the integrated mitigation measures are implemented accordingly, to minimise the potential loss of these valuable soils.</p>
<p>Surface Water by Environmental Assurance</p>	<p>The potential impacts associated with the proposed rehabilitation construction phase relate to habitat loss, change in water quality, disruption of aquatic and terrestrial ecosystems, loss of natural vegetation, change in natural flow and sedimentation and erosion. The mitigation measures determined throughout the impact assessment relate to habitat restoration, stormwater management plans, adequate flow management plans, implementation of erosion control measures, ecological assessments and waste management plans.</p>
<p>Air Quality by Environmental Assurance</p>	<p>It is recommended that air quality management measures recommended herein be implemented during the construction and operational phases to ensure the lowest possible impacts on the surrounding environment from proposed weirs occur on the surrounding natural and anthropogenic environments.</p> <p>A dustfall monitoring network has been established prior to the construction. The initiation of the dustfall network prior to construction would give an indication of baseline conditions and should be the target dustfall during construction and operational phases through the application of effective mitigation measures. During and after the construction phase management, it will be the responsibility of the Environmental Management team to conduct the dust fallout monitoring.</p>
<p>Civil Aviation Compliance Statement by Delta Built Environment Consultants</p>	<p>The DFFE Screening Tool was employed to assess the sensitivity of the sites concerning the civil aviation theme. The Beestekraal Weir exhibited a high sensitivity, whereas the Atlanta and Paul Hugo sites showed a medium sensitivity.</p> <p>The assessment found the proposed construction of weirs will have no impact on the civil aviation infrastructure. The proposed structures are situated a significant distance away from the aerodromes and have a height ranging from 1 to 3.5 m above ground level, which is below the elevation of the runways and their associated obstacle-free zones.</p>
<p>Defence Compliance Statement by MDTE</p>	<p>The three proposed weir sites were determined and verified to be of low sensitivity, as it relates to defence installations. This assessment considered whether the proposed developments are likely to impact on these types of systems that would interfere with and degrade any performance aspect of the military radar infrastructure. However, the proposed weir development (upgrade and newly constructed) will not impact any defence aspects. This site sensitivity verification is based on distance and line of sight from any defence infrastructure and on the height of the proposed development, which would be less than three meters and within a river basin.</p> <p>Greater distance or interrupted line of sight suggests low sensitivity in terms of the defence theme, as shown graphically in this report. The proposed developments are located more than 6 km from the nearest private airfield, and is not within close proximity of any defence installations of concern and is out of the line of sight of any private airfields. The proposed development does not comprise structures of excessive height or having other characteristics that may affect radar systems. The three proposed weirs are unlikely to impact on any military radar installations.</p> <p>This was determined through a screening tool, site visit and based on existing databases, and confirms the sensitivity allocated on the</p>

Specialist Assessment	Recommendations of Specialist Reports
	Environmental Theme Screening Tool. Based on the above, in terms of GN 320, no further requirements are applicable i.e. a Compliance Statement is not required.

7.1.3 Summary of Impact

The two (2) flow gauging weirs and gantry's residual risk after the mitigation was rated and are summarised in **Table 25**.

Table 25: Summary of all impacts

	Beestekraal Gauging Weir	Atlanta Gauging Weir	Paul Hugo Gantry
In-Stream Vegetation & Sediment Clearance	Moderate negative	Moderate negative	Moderate negative
Habitat Destruction Due to Raising of Weir & Subsequent Flooding	Moderate negative	Moderate negative	Moderate negative

There are no additional / new impacts than those previously assessed. It has been illustrated that with the implementation of the mitigation measures and ensuring compliance with the CEMPr during construction, that all identified impacts can be mitigated to acceptable levels, except for instream vegetation and sediment clearing, and potential habitat destruction due to the raising of the existing flow gauging weirs.

7.2 The EAP's Recommendations

The findings of the detailed impact assessment undertaken indicate that the raising / rehabilitation of the two existing flow gauging weirs and the proposed construction of a gantry have an acceptable impact and can be mitigated to **low negative** significance for all identified impacts, except for instream vegetation and sediment clearing, and potential habitat destruction due to the raising of the existing flow gauging weirs. The moderate negative impacts are not considered fatally flawed considering the realisation of the project benefits. Refer to **Figure 14**.

Considering the implications for decision making summarised above, it still remains the opinion of the EAP that no additional impacts than those previously assessed for the authorised alignment were identified.

The EAP, therefore, recommends that the competent authority grant a positive EA. The following recommended conditions should be considered for inclusion in the EA:

- The CEMPr is a legally binding document and the mitigation measures stipulated within the document and BAR must be implemented by the appointed contractor;
- An independent ECO must be appointed to oversee the implementation of the CEMPr during all development phases of the project; and
- The moderate negative residual impacts receive special attention in ensuring the residual negative impacts on instream habitat is limited.

List of Annexures

- Annexure A: SIP 19b letter Mokolo Crocodile River
- Annexure B: Existing Environmental Authorisation
- Annexure B1: DFFE EA first issue
 - Annexure B2: DFFE EA second issue
 - Annexure B3: DMRE EA 23 BP
 - Annexure B4: DMRE EA 7 BP
- Annexure C: Public Participation Process
- Annexure C1 : DFFE Competent Authority Consultation
 - Annexure C2 : Database
 - Annexure C3 : Advertisements
 - Annexure C4 : Site Notices
 - Annexure C5 : Notification Letters
- Annexure D: Specialist Studies
- Annexure D1: Aquatic Biodiversity and Sedimentation Report prepared by M2 Environmental Connections
 - Annexure D2: Heritage and Palaeontological Impact Assessment by CES
 - Annexure D3: Environmental Ambient Noise Assessment prepared by Rayten Engineering Solutions
 - Annexure D4: Terrestrial Biodiversity Assessment prepared by M2 Environmental Connections
 - Annexure D5: Agricultural Impact Assessment prepared by Nsovo Environmental Consulting
 - Annexure D6: Surface Water by Environmental Assurance
 - Annexure D7: Air Quality by Environmental Assurance
 - Annexure D8: Civil Aviation Compliance Statement by Delta Built Environment Consultants
 - Annexure D9: Defence Compliance Statement by MDTE
- Annexure E: Environmental Management Programme
- Annexure F: EAPs CVs