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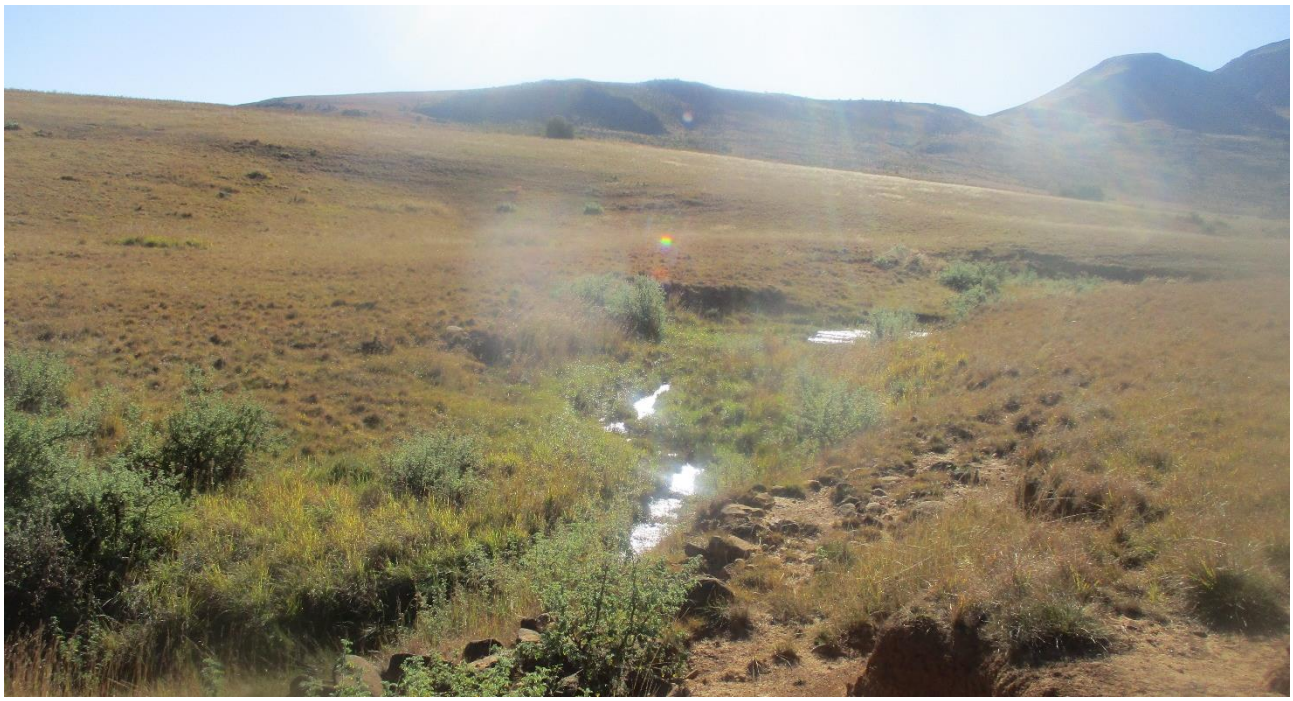
DRAFT: ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr)

EIA REF: 14/12/16/3/3/1/2791

The proposed Construction of Earth Filled Dam for KZN Department of Agriculture and Rural Development, at ERF No. 1069, Kokstad Research Station, Ward 6 of Kokstad Local Municipality within Harry Gwala District

08 August 2023



Prepared for:

KZN Department of Agriculture and Rural Development

agriculture & rural development
Department:
Agriculture and Rural Development
PROVINCE OF KWAZULU-NATAL

Applicant:

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PROJECT TEAM	CLIENT CONTACT PERSON
Phumzile Lembede Dumisani Myeni	Johan Vanrensburg

Overview: Assessment of impacts related to the Proposed Construction of KZN DARD earth filled dam at Kokstad Research Station, in order to ensure the Client's compliance with all relevant environmental legislations.

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QMS - INFORMATION

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QMS-REVISION HISTORY

Revision	Revision Date	Details	Authorized	Name	Position
1	03- 08-2023	DRAFT EMPr	Y	Dumisani Myeni	Study Lead Env. Scientist
2	07-08-2023	DRAFT EMPr	Y	Phumzile Lembede	Principal EAP Env. Scientist

Table of Contents

LIST OF ACRONYMS 1

GLOSSARY OF ITEMS 2

ASSUMPTIONS AND LIMITATIONS 5

1 INTRODUCTION AND BACKGROUND 6

1.1 Project Team 7

1.2 Report Structure 7

2 PURPOSE OF THIS DOCUMENT 11

3 OBJECTIVES OF THE EMPR 11

4 SCOPE OF THE EMPR 12

5 SITE LOCALITY CONTEXT (SITE DESCRIPTION) 13

6 GENERAL PROJECT INFORMATION 20

6.1 Description of Activities 20

6.2 Description of the baseline environment 21

6.3 Activities and aspects causing impacts 23

6.4 Sensitive Areas 24

7 ENVIRONMENTAL STATUTORY FRAMEWORK 24

8 THE DUTIES OF ROLE PLAYERS 31

9 ENVIRONMENTAL CAPACITY BUILDING PLAN 38

9.1 Environmental Training 38

9.2 Induction 38

9.3 Community involvement 38

9.4 Communication strategy 38

10 ENVIRONMENTAL CODE OF CONDUCT 39

10.1 Environmental Rules 39

11 NON-COMPLIANCE 40

12 PRE-CONSTRUCTION 42

12.1 Designing and Project Conceptualisation 42

12.2 Environmental file 46

12.3 Environmental Capacity Building 48

13 CONSTRUCTION PHASE 49

13.1 Construction site camp establishment 49
13.2 Site Access and Movement of Construction Vehicles 51
13.3 Storages, Stockpiling and Material Hauling 54
13.4 Vegetation Clearance 56
13.5 Potential loss of wetland and riparian zone habitat 62
13.6 Surface Water Pollution and Degradation of Watercourses 65
13.7 Groundwater Pollution 76
13.8 Mitigation of the alteration of flow regimes 79
13.9 Stormwater Management 85
13.10 Protection of fauna 88
13.11 Waste management 94
13.12 Mitigation of Impacts on Paleontological, Heritage and/or archaeological sites 96
13.13 Soil Management 102
13.14 Backfilling and site levelling 103
13.15 Air quality 104
13.16 Servicing and re-fuelling and emergency response 106
13.17 Fire prevention and emergency response 108
13.18 Public safety and traffic accommodation 109
13.19 Invasive alien species 110
13.20 Noise 112
14 POST CONSTRUCTION 113
14.1 Site camp decommissioning 113
14.2 Site clean-up and rehabilitation 114
15 OPERATIONAL PHASE 115
15.1 Surface Water Pollution During Operation 115
15.2 Soil erosion and geological degradation 116
15.3 Hydrological Flow Regime During Operation 118
15.4 Degradation of Freshwater (aquatic) Habitat During Operation 119
15.5 Alien Invasive Plant Species During Operation 121
16 MONITORING 123
17 CONCLUSION 123
APPENDICES 124
APPENDIX A. CIVIL DESIGN LAYOUT 125

List of Figures

Figure 1: Locality Map 14
Figure 2: Map Showing Wetlands within 500m buffer 15
Figure 3: Map showing delineated riparian zone for unnamed stream 16
Figure 4: Sensitivity map showing CBAs and ESA within the project reach 17
Figure 5: Map showing a buffer of a protected area near the project area 18
Figure 6: Map showing the vegetation type within the study area....19

List of Tables

Table 1: Environmental Assessment Practitioners 7
Table 2: EMPR Report Structure (Appendix 4 GNR 326) 9
Table 3: Site perimeter co-ordinates 13
Table 4: Identification of potential environmental impact 23
Table 5: Environmental Statutory Framework 25
Table 7: Personnel/Entity roles and responsibilities 32
Table 8: Project Design, Layouts and Conceptualisation 42
Table 9: Contents of environmental file 46
Table 10: Environmental communication and awareness 48
Table 11: Construction site camp establishment 49
Table 12: Access to construction site 51
Table 13: Storages, stockpiling and material hauling 54
Table 14: Vegetation clearance 56
Table 15: Prevention of disturbance to wetland and riparian zone and instream habitat 62
Table 16: Managing Potential Impacts in Surface Water Quality and Degradation of Watercourses 65
Table 17: Mitigation for Groundwater Pollution 76
Table 18: Mitigation of the alteration of flow regime 79
Table 19: Stormwater Management 85
Table 20: Fauna and red data species protection 88
Table 21: Waste Management 94
Table 22: Mitigation on Paleontological, Cultural Heritage and archaeological sites 96
Table 23: Soil management during excavation 102
Table 24: Backfilling and levelling excavated areas 103
Table 25: Air quality management 104
Table 26: Servicing and refuelling 106
Table 27: Fire prevention and emergency response 108
Table 28: Road crossing, pipe jacking and construction vehicle movement 109
Table 29: Control of invasive alien species 110
Table 30: Noise management during construction 112

Table 31: Site clean-up and rehabilitation 114
Table 33: Mitigation of Surface Water Pollution during operation of WWTW and SPS 115
Table 34: Mitigation for erosion during operation 116
Table 35: Mitigation of Impact on Hydrology Flow Regime during operation 118
Table 37: Mitigation of Impacts on Freshwater (aquatic) Habitat During Operations 119
Table 39: Control of Alien Invasive Plant Species During Operation 121

LIST OF ACRONYMS

BAR	Basic Assessment Report
CFP	Chance Finds Procedure
DFFE	Department of Forestry, Fisheries and Environment
DWS	Department of Water and Sanitation
DOT	Department of Transport
EMPr.	Environmental Management Programme
ECO	Environmental Control Officer
EDTEA	Department of Economic Development, Tourism and Environmental Affairs
EIA	Environmental Impact Assessment
HGM	Hydrogeomorphic
MSDS	Material Safety Data Sheet
NEMA	National Environmental Management Act 107 (Act 107 of 1998)
NEMPAA	National Environmental Management: Protected Areas, 2003 (Act 57 of 2003)
I&AP	Interested and Affected Parties
EAP	Environmental Assessment Practitioner
GA	General Authorisation
SCADA	Supervisory Control and Data Acquisition
SCC	Species of Conservation Concern

GLOSSARY OF ITEMS

DEVELOPMENT: the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity, but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

BIODIVERSITY: The variety of life in an area, including the number of different species, the genetic wealth within each species, and the natural areas where they are found.

DEVELOPMENT FOOTPRINT: any evidence of physical alteration because of the undertaking of an activity.

CONTRACTOR: companies and or individual persons appointed on behalf of the client to undertake activities, as well as their sub-contractors and suppliers.

ENVIRONMENTAL CONTROL OFFICER (ECO): an individual nominated through the client to be present on-site to act on behalf of the client in matters concerning the implementation and day to day monitoring of the EMPr and conditions stipulated by the authorities as prescribed in NEMA.

ENVIRONMENT: in terms of the NEMA (as amended), the "environment" means the surroundings within which humans exist and that are made up of: the land, water, and atmosphere of the earth; micro-organisms, plant and animal life; any part or combination of (i) of (ii) and the interrelationships among and between them; the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

ENVIRONMENTAL IMPACT: the change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

HYDROLOGICAL SYSTEM: water bodies and their connectivity to the welfare of an ecosystem.

MITIGATION: the measures designed to avoid reduce or remedy adverse impacts.

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPr): a detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive environmental impacts and limiting or preventing negative environmental impacts are implemented during the lifecycle of the project. This EMPr focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

POLLUTION: NEMA defines pollution to mean any change in the environment caused by the substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people or will have such an effect in the future.

WATER POLLUTION: the National Water Act, 1998 (Act 36 of 1998) defines water pollution to be the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful (a) to the welfare, health or safety of human beings; (b) to any aquatic or non-aquatic organisms; (c) to the resource quality, or (d) to property.

REHABILITATION: rehabilitation is defined as the return of a disturbed area to a state which approximates the state (wherever possible) which it was before the disruption.

WATERCOURSE: can be a) a river or spring; b) a natural channel or depression in which water flows regularly or intermittently; c) a wetland, lake or dam into which, or from which, water flows; and/or d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

WETLAND: the land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

INDIGENOUS VEGETATION: refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.

GENERAL WASTE: waste that does not pose an immediate hazard or threat to health or the environment and includes domestic waste; building and demolition waste; bbusiness waste; and inert waste.

HAZARDOUS WASTE: hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.

ARCHAEOLOGICAL RESOURCES: includes (a) material remains resulting from human activity which are in a state of disuse and are in or on land and which are older than 100 years including artifacts, human and hominid remains and artificial features and structures; (b) rock art, being any form of painting, engraving or other graphic representation on a fixed rock surface or loose rock or stone, which was executed by human agency and which is older than 100 years, including any area within 10m of such representation; wrecks, being any vessel or aircraft, or any part thereof, which was wrecked in South Africa, whether on land, in the internal waters, the territorial waters or in the maritime culture zone of the republic as defined in the Maritimes Zones Act, 1994 (Act 15 of 1994), and any cargo, debris or artifacts found or associated therewith, which is older than 60 years or which SAHRA considers to be worthy of conservation; features, structures and artifacts associated with military history which are older than 75 years and the site on which they are found.

INTERESTED AND AFFECTED PARTY (I&AP): for the purposes of Chapter 5 of the NEMA and in relation to the assessment of the environmental impact of a listed activity or related activity, an interested and affected party contemplated in Section 24(4) (a) (v), and which includes (a) any person, group of persons or organization interested in or affected by such operation or activity; and (b) any organ of state that may have jurisdiction over any aspect of the operation or activity.

ASSUMPTIONS AND LIMITATIONS

Certain assumptions, limitations, and uncertainties are associated with this report. This report is based on information that is currently available and, as a result, the following assumptions and limitations should be noted:

- This report is based on project information provided by the client;
- The description of the baseline environment has been obtained from environmental desktop study and specialist studies;
- The results are based on the outcomes of a single assessment. The risk assessment only included the proposed development and the anticipated activities, no ancillary activities were considered; and
- In determining the significance of impacts, with mitigation, it is assumed that mitigation measures proposed in the report are correctly and effectively implemented and managed throughout the life of the project.

1 INTRODUCTION AND BACKGROUND

Emvelo Quality and Environmental Consultant (PTY) Ltd has been appointed by the KwaZulu Natal Department of Agriculture and Rural Development (KZN DARD) (the Applicant), as the independent Environmental Assessment Practitioner (EAP), to facilitate the Basic Assessment Process required in terms of the National Environmental Management Act ,1998 (Act. No. 107 of 1998) (NEMA) for this application.

The KZN DARD owns and operates the Kokstad Research Station (KRS) which is the one of the department's six research stations serving the major agricultural ecological areas within the province, thereby conducting research on-station, as well as to build expertise and for technology transfer. The KRS operates three research components, namely crop production, animal science and grassland science, with farm services as the support component. The farming activities in this area are concentrated mainly on dairy production and extensive to semi-intensive cattle and sheep production, and crops production.

Currently, the water for KRS farm is abstracted from the nearby spring and stored in the reservoir within the farm. The water from spring is currently not sufficient for agricultural use and consumption, as sometimes the spring dries out during the dry periods, as a result the farm experience sufficient water yield only during wet seasons (summer months). Therefore, in response to the growing urgency to secure adequate and sustainable water supply for the KRS Farm, the KZN DARD proposes the construction of an instream earth filled dam. The proposed in stream earth filled dam will increase the capacity of water supply to KRS farm throughout the year, thus improve capability of research station to conduct its activities for future planned research programmes. Consequently, an environmental impact assessment (EIA) has commenced, assisting the KZN DARD (applicant) in identifying all potential adverse environmental consequences of the project, their extent, significance and to ensure that the environmental management requirements are adequately implemented.

This EMPr has been prepared in compliance with the requirements of the National Environmental Management Act, 1998 (Act No. 107 of 1998) ["NEMA"] and the Appendix 4 of Environmental Impact Assessment ("EIA") Regulations contained in Government Notice (GN) No. R982 of 2014 as promulgated in terms of the NEMA ["EIA Regulations"] as amended up to and including GN 326 in GN 40772 of 07 April 2017.

1.1 Project Team

In accordance with Appendix 4, Section 1(1)(a) of GN No. 326 (7 April 2017), this section provides an overview of Emvelo Consultant and the company's EIA experience, as well as the details and experience of the EAPs that form part of the Emvelo Consultant project team. The CVs are attached as (***Appendix F***) of EIA Report.

Table 1: Environmental Assessment Practitioners

Name	Qualification	Experience (Years)	Duties
Phumzile Lembede	B.Sc. Honours in (Environmental Management), Registered: EAP (EAPASA) & Pr. Sci. Nat. (SACNASP) in the Environmental Science Field of Practice	11	Principal EAP and Environmental Scientist
Dumisani Myeni	B.Sc. Honours in (Environmental Management), Registered: EAP (EAPASA) & Cand. Sci. Nat. (SACNASP) in the Environmental Science Field of Practice	10	Study Lead/EAP and Environmental Scientist

1.2 Report Structure

The Environmental Basic Assessment has been undertaken in accordance with the requirements of sections 24 and 24D of the National Environmental Management Act, 1998 (Act 108 of 1998) ["NEMA"] and the Environmental Impact Assessment ("EIA") Regulations contained in Government Notice (GN) No. R982 of 2014 as promulgated in terms of the NEMA ["EIA Regulations"] as amended up to and including GN R 326 in GN 40772 of 07 April 2017.

This Basic Assessment Report (BAR) is compiled with accordance to **Appendix 4** of GNR 326 (EIA Regulation (2014) as amended on 07 April 2017). A summary of the report structure, and

the specific sections that correspond to the applicable regulations, is provided in (***Table 2***) below.

Table 2: EMPR Report Structure (Appendix 4 GNR 326)

EIA Regulation	Description – EIA Regulation (2014) as amended on 07 April 2017	Content in Basic Assessment Report Section
Appendix 4. 1.1(a):	Details of – i. The EAP who prepared the EMPr; and ii. The expertise of the EAP, including a curriculum vitae;	• Cover Page • Section 1.1
Appendix 4. 1.1(b):	Detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	• Section 6
Appendix 4. 1.1(c):	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that [**any areas that**] should be avoided, including buffers;	• Section 5
Appendix 4. 1.1(d):	A description of the impact management [**objectives**] outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including– (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	• Section 12-Section 15
Appendix 4. 1.1(e):	Description of impact Management Outcomes required for completed above (d)	• Section 12-Section 15
Appendix 4. 1.1(f):	a description of proposed impact management actions, identifying the manner in which the impact management [objectives and] outcomes contemplated in paragraph (d) [and (e)] will be achieved, and must, where applicable, include actions to —	• Section 12-Section 15

	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	
Appendix 4. 1.1(g):	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	• Section 12-Section 15
Appendix 4. 1.1(h):	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	• Section 12-Section 15
Appendix 4. 1.1(i)	An indication of the persons who will be responsible for the implementation of the impact management actions;	• Section 8 • Section 12-Section 15
Appendix 4. 1.1(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	• Section 12-Section 15
Appendix 4. 1.1(k):	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	•
Appendix 4. 1.1(l):	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	• Section 12-Section 15 • Section 16
Appendix 4. 1.1(m)	an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	• Section 10 • Section 12.3
Appendix 4. 1.1(n)	Any specific information that may be required by the competent authority.	• N/A

2 PURPOSE OF THIS DOCUMENT

The purpose of this EMPr is to ensure that the environmental impacts of the various phases of the development of the receiving environment are managed, mitigated, and kept to a minimum. The document is binding on the Applicant; all contractors and sub-contractors; and visitors to the site. It must be included as part of any tender, as well as contractual documents between the applicant and any contractors. This will ensure that all environmental impacts are managed for the duration of project cycle. This document requires that responsibility, accountability, and commitment are promoted by the developer, the main contractor, and sub-contractors.

3 OBJECTIVES OF THE EMPR

The objectives of this document are to:

- Encourage good management practices through planning and commitment to environmental issues;
- Define how the management of the environment is reported and performance evaluated;
- Provide rational and practical environmental guidelines to:
    - Minimise disturbance of the natural environment;
    - Prevent or minimise all forms of pollution
    - Protect indigenous flora and fauna;
    - Prevent soil erosion and facilitate re-vegetation of affected areas;
- Comply with all applicable laws, regulations, standards, and guidelines for the protection of the environment;
- Adopt the best practical means available to prevent or minimise adverse environmental impacts;
- Ensure that the construction and operational phases of projects are undertaken within the principles of Integrated Environmental Management;
- Develop waste management practices based on prevention, minimisation, recycling, treatment, or disposal of waste;

- Describe all monitoring procedures required to identify impacts on the environment;
- Train employees and contractors with regards to their environmental obligations;
- Provide a pro-active, feasible and practical working tool to enable the measurement and monitoring of environmental performance on-site; and
- Detail specifications deemed necessary to assist in mitigating the environmental impacts of Project.

4 SCOPE OF THE EMPR

In order to achieve the above objectives, the scope of work must be according to the requirements as stipulated in the Appendix 4 of GNR 326 EIA regulations, Government Notice No. 38282 as amended in 2017. The EIA regulations stipulate the requirements for the content of EMPr.

Therefore, the scope of the EMPr must include the following:

- Definition of environmental management objectives to be realised during the life of the project (i.e., construction, operation, and decommissioning phases);
- Definition of detailed actions needed to achieve these objectives, including how they will be achieved, by whom, by when, with what monitoring/verification, and to what target or performance level.
- Mechanisms must also be provided to address the changes in project implementation, emergencies or unexpected events and associated approval processes;
- Clarification of institutional structures, roles, communication and reporting processes required as part of the implementation of the EMPr;
- Description of the link between EMPr and associated legislated requirements;
- Description of the requirements for monitoring implementation of the EMPr, record keeping, reporting, review, auditing and updating of the EMPr.

5 SITE LOCALITY CONTEXT (SITE DESCRIPTION)

The project will take place within Erf 1069, Portion 0, Kokstad Research Station, Ward 6 of Greater Kokstad Local Municipality (***Figure 1***). The project area is within Quaternary Catchment T32C of Pongola-Mtamvuma Catchment Management Area (P-MCMA).

The (***Table 3-4***) below, provides the Global Positioning System (GPS) co-ordinates for the proposed development site.

Table 3: Site perimeter co-ordinates

Instream Inlet to Earth filled Dam	
Inlet corner	30°30'33.42"S, 29°25'10.66"E
Western Bank of Earth filled Dam	
1st Corner	30°30'33.42"S, 29°25'10.66"E
2nd Corner	30°30'34.39"S, 29°25'10.24"E
3rd Corner	30°30'34.64"S, 29°25'8.20"E
4th Corner	30°30'35.06"S, 29°25'7.47"E
5th Corner	30°30'35.37"S, 29°25'6.00"E
6th Corner	30°30'36.85"S, 29°25'5.93"E
7th Corner	30°30'37.96"S, 29°25'5.11"E
Southern Bank of Earth filled Dam	
1st Point	30°30'37.96"S, 29°25'5.11"E
Middle	30°30'38.55"S, 29°25'9.07"E
End Point	30°30'38.93"S, 29°25'12.41"E
Natural Spillway	30°30'39.73"S, 29°25'12.41"E
Eastern Bank of Earth filled Dam	
Spill Way Corner	30°30'38.93"S, 29°25'12.41"E
Levelled Spillway	30°30'38.20"S, 29°25'11.91"E
Middle	30°30'36.62"S, 29°25'10.23"E
End Point	30°30'33.42"S, 29°25'10.66"E
200m(600mmø) abstraction pipeline	
Abstraction point (Start)	30°30'38.01"S, 29°25'9.62"E
Connection to existing pipeline (End)	30°30'41.81"S, 29°25'15.10"E

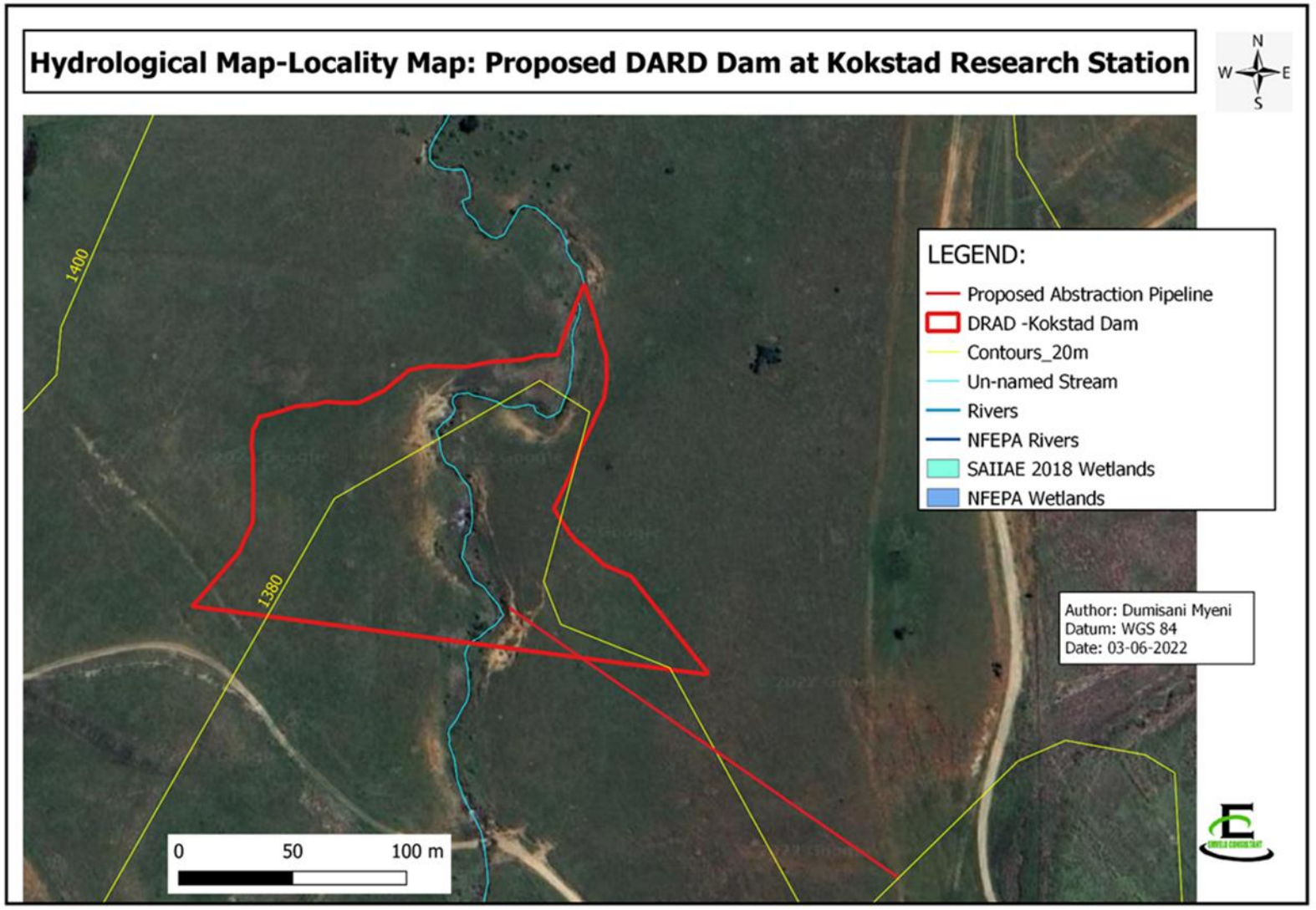

Figure 1: Locality Map

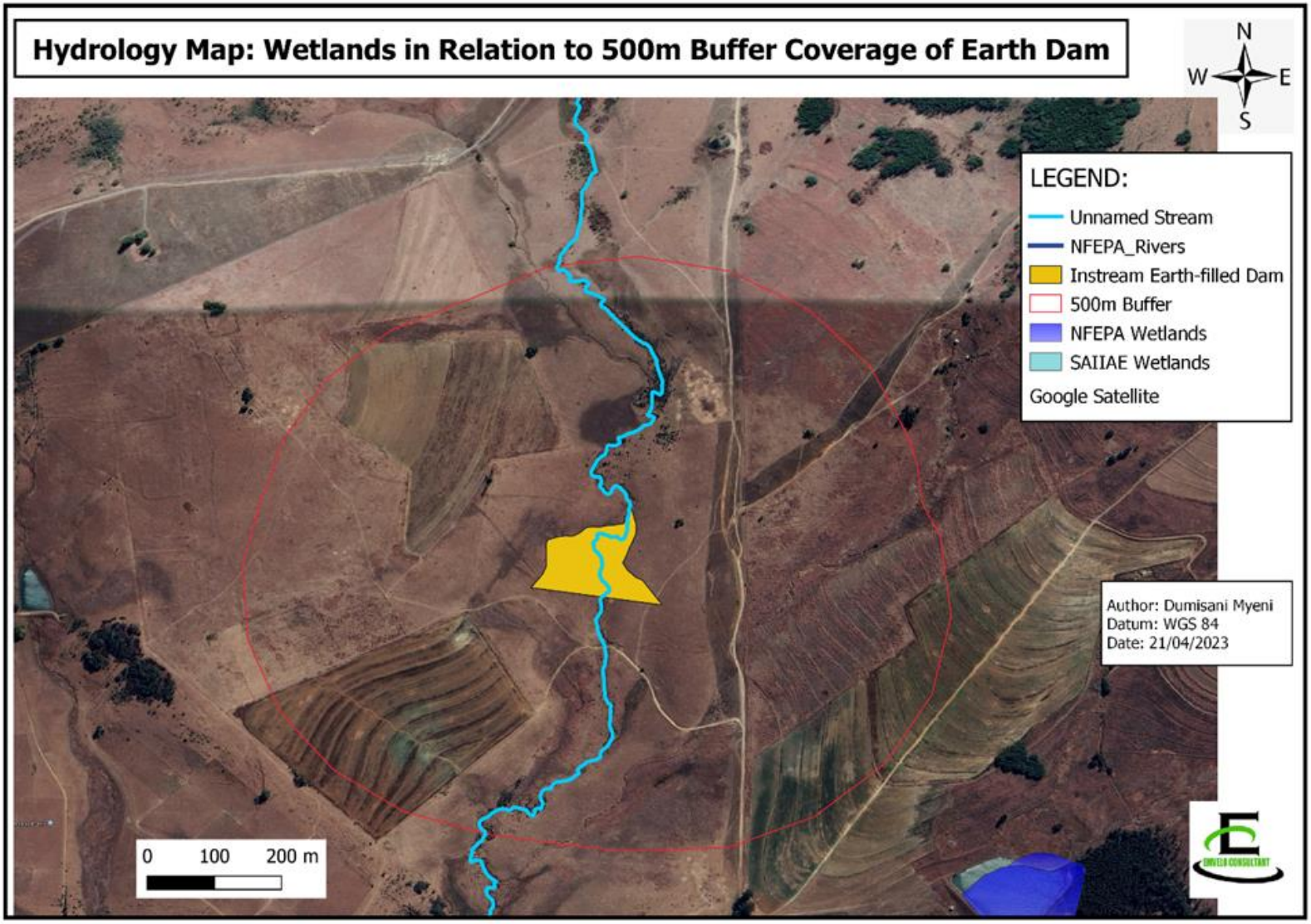

Figure 2: Map Showing Wetlands within 500m buffer

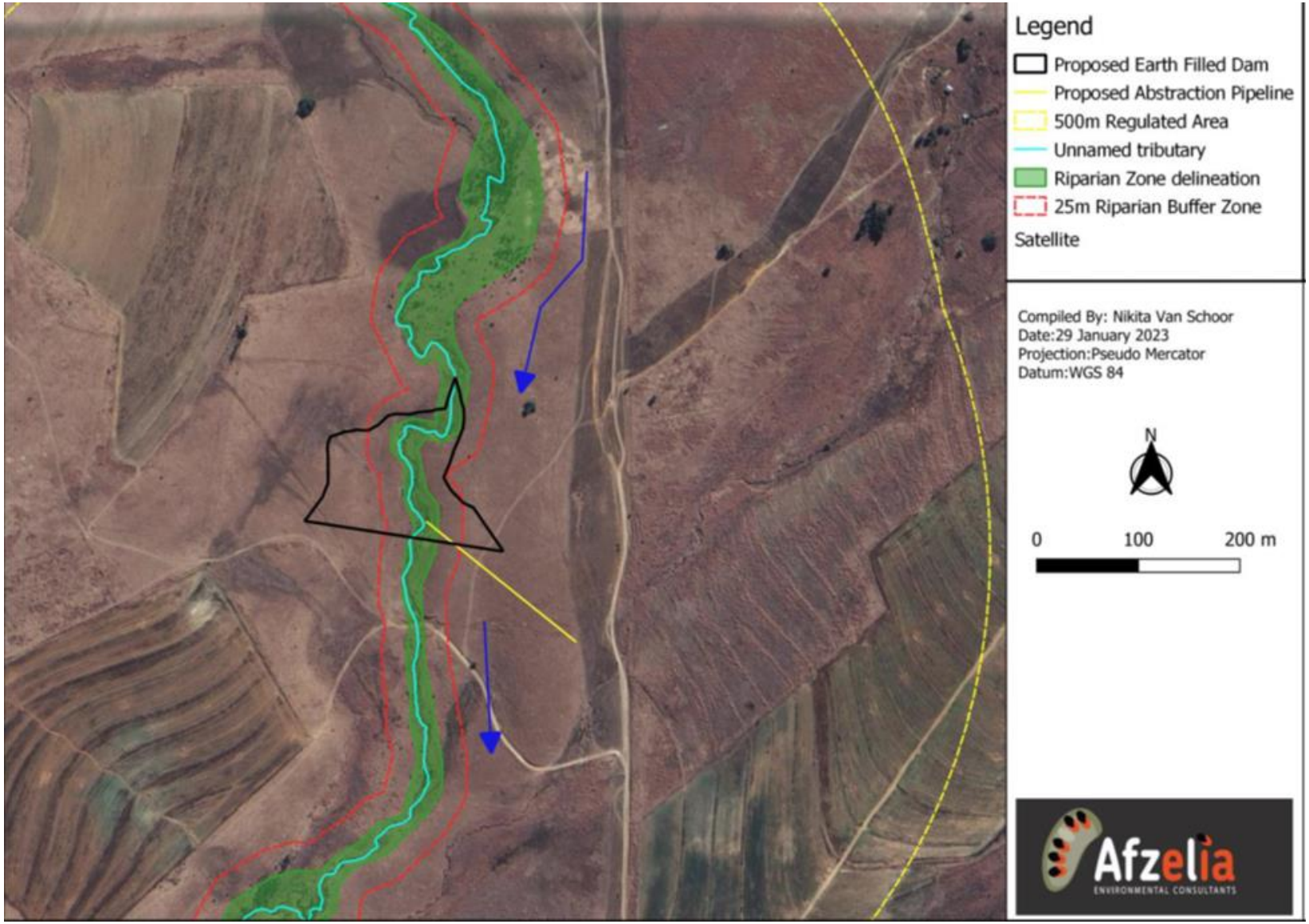

Figure 3: Map showing delineated riparian zone for unnamed stream

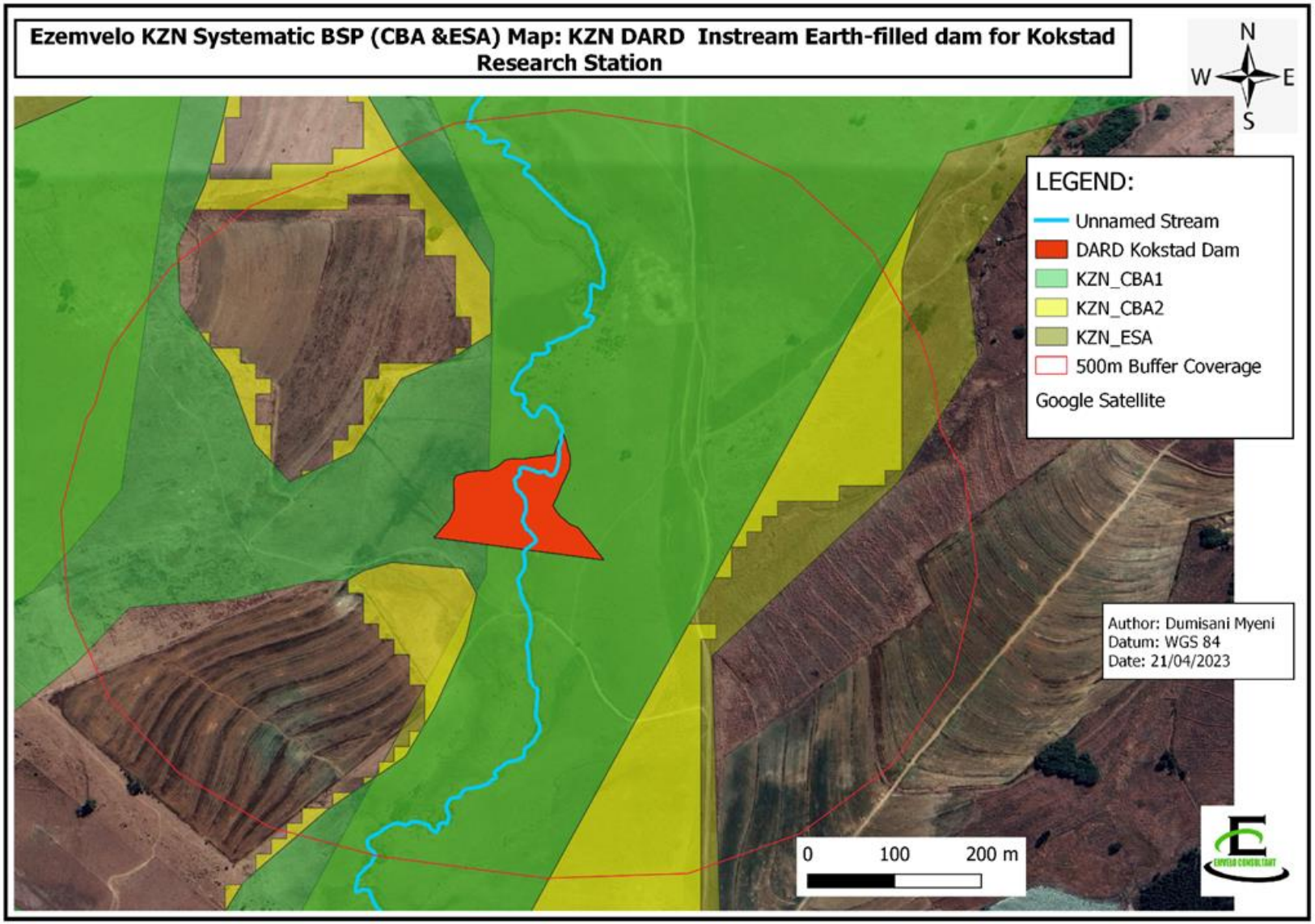

Figure 4: Sensitivity map showing CBAs and ESA within the project reach

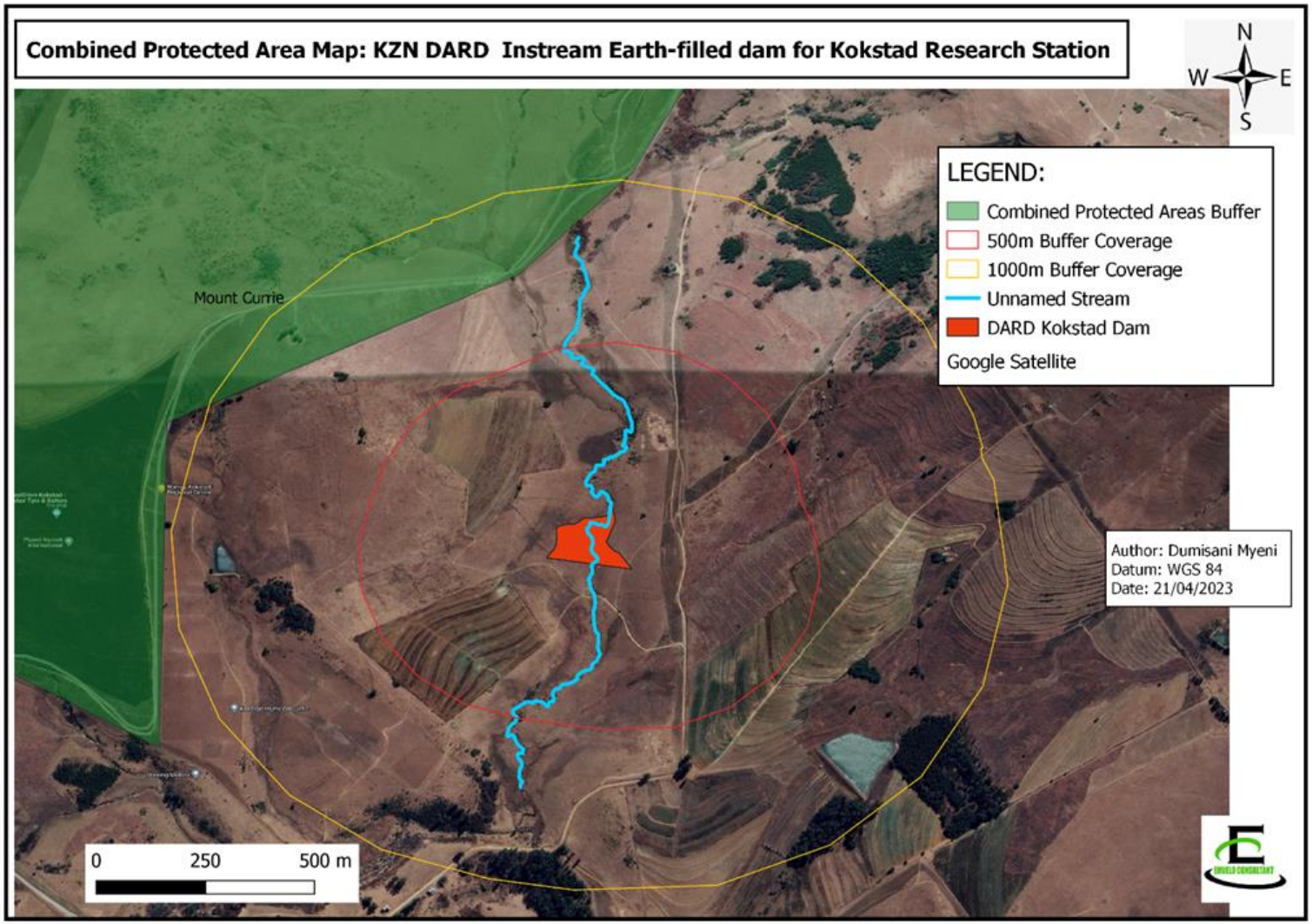

Figure 5: Map showing a buffer of a protected area near the project area

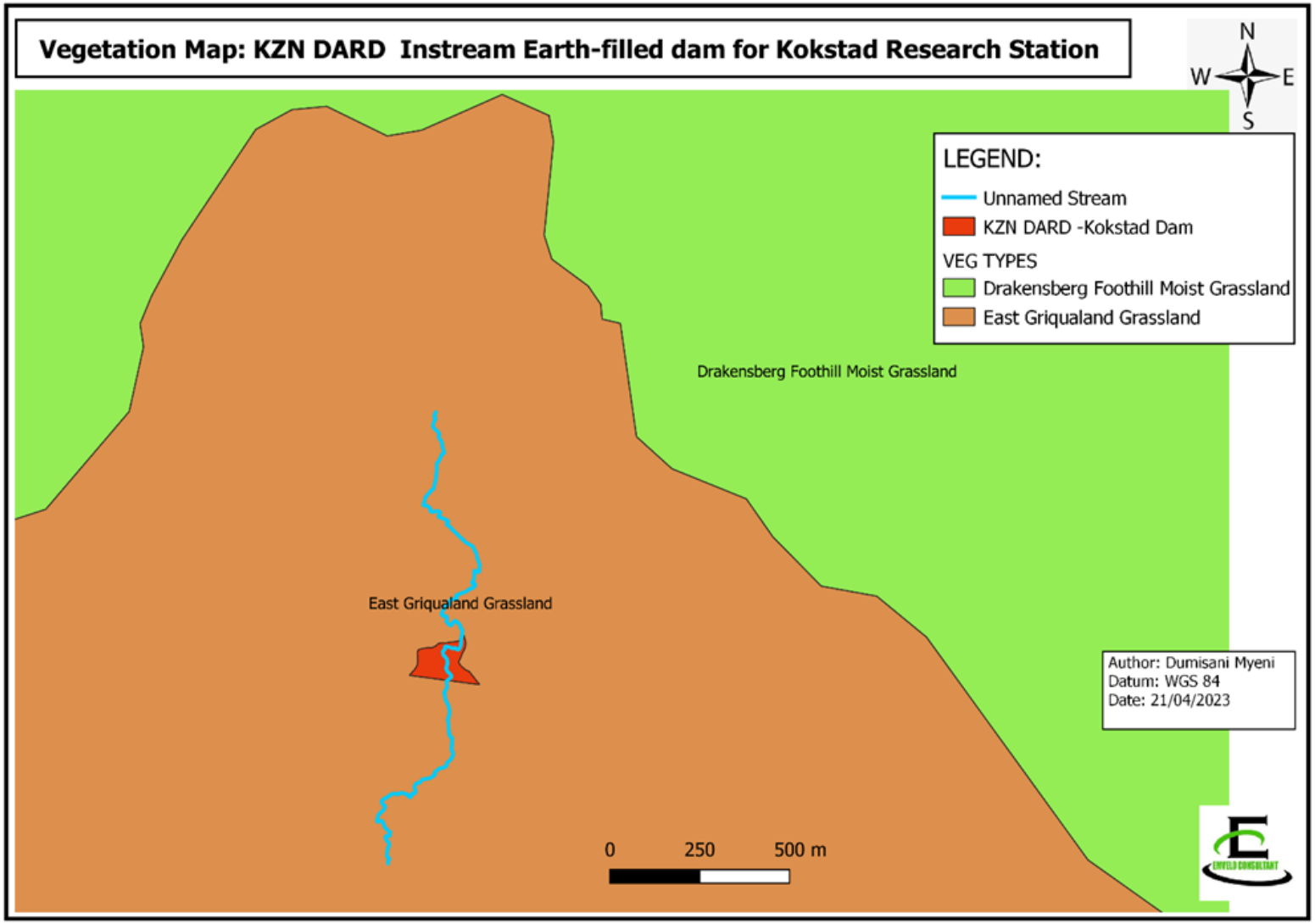

Figure 6: Map showing the vegetation type within the study area

6 GENERAL PROJECT INFORMATION

This general project information outlines the following:

- Proposed construction activities;
- Description of the receiving environment from the site; and
- Identification of potential environmental impacts.

6.1 Description of Activities

The Proposed Construction of Earth Filled Dam for KZN Department of Agriculture and Rural Development, at ERF No. 1069, Kokstad Research Station, Ward 6 of Kokstad Local Municipality within Harry Gwala District, KZN.

The proposed development of the instream earth-filled dam will entail the following features:

- In-channel dam to un-named stream
- Area occupied by a dam is 1.6ha
- Dam capacity is 20 194m^3
- Levelled spillway with 36 width and Freeboard of 1,4 m.
- Distance overland flow is 80m
- Core trench width of 14.1m
- Core Trench Volume of 808. 69m^3
- Base Water Side of 27.18m
- Base Dry Side of 18.62m
- Earth banks height of 8.56m
- Bank Volume of 13 752.43m^3
- Total pitching of 4 746,04m^2 (Pitching of crest, Upstream Stone Pitching, Downstream Stone Pitching).

The project also entails construction of 30m(275mmø) class 12 UPVC abstraction pipeline (dam outlet pipeline), and a 220m (63mm Ø) class 6 HDPE which will join the existing pipeline

which will join the existing pipeline at (30°30'41.82"S, 29°25'15.14"E) coming from raw water reservoir to Kokstad Research Station WTW.

6.2 Description of the baseline environment

Three (3) discrete habitat types were delineated within the assessment area, namely, riparian and instream habitat, and grassland habitat. The grassland provides the grazing filed, hence can be considered agricultural. The riparian habitat is dominated by shrubs such as *Leucosidea sericea* and sedges such as *Cyperus obtusiflorus var. flavissimus*.

The infield watercourse delineation confirmed that no wetlands, fish corridors, or upstream management areas are located within the development buffer zone. The riparian zone has been delineated (***Figure 3***) and is largely surrounded by Leucosidea sericea. This small tree species can grow up to 7m and is often grazed on by cattle and sheep. The trees within the upstream site were relatively small suggesting that they may have been previously grazed upon and therefore are in early stages of growth. Additional vegetation types encountered included grassland species, wetland species and crocosmia species.

The infield investigation within the construction corridor did not observe plant Species of Conservation Concern (SCC) within construction corridor and within the Project Area of Influence (PAOI) outside the constriction corridor. However, the plant species listed as "Specially Protected Indigenous Plants" in terms of Schedule 12 of Natal Nature Conservation Ordinance, No. 15 of 1974 were identified within the study area, namely ALL IRIDACEAE, which includes Kniphofia *linearifolia*. Since this project involves a construction of a dam and all plant species on site would be destroyed, an Ordinary Permit will be required from Ezemvelo KZN Wildlife (EKZNW) to transplant these species outside of the proposed site. A suitable habitat just outside of the development site exists in the Mount Currie Nature Reserve of which these plants can be relocated to.

Alien invasive plant species on the study area were observed to occur in clumps, scattered distributions or as single individuals. Invader and weed species on site must be controlled to prevent further infestation and it is recommended that all individuals of invader and weeds species (especially Category 1b) must be removed and eradicated.

The study area is bisected by an incised water channel and characterised of gentle slopes with some signs of gully erosion. The soils within the proposed dam footprint comprise a mix of moderate to well drained soils with some shallow soils where parent rock is found close to the surface (outcrops). The soil depth is mainly varying from 500mm to 2 300mm with an apedal structure which is easily excavatable. The prominent geological material is characterised of dolerite and dyke group formation. The sign of wetness within the study area indicates the fluctuation of water table.

The field investigation by the Archaeological and Cultural Heritage Specialist and Paleontological Specialist provided that there were no archaeological sites/stone tools, heritage monuments, historical buildings, or graves (Cultural Heritage Resources). The proposed earth filled dam, is mainly covers an area of 1.6ha within the farm. The site is trembled on by the livestock and the location of the instream earth dam is characterised of incised stream banks. However, the region through to historical background and literature, has a rich potential of archaeological sites , as Middle Stone Age artefacts have a wider distribution that extends into and across the Drakensberg including rock shelters with deep Middle Stone Age deposits, found both east and west of the of the study area; The available evidence, as captured in the Amafa Heritage Research and Institute suggests that although there has been no systematic archaeological survey of the area several archaeological sites have been recorded in the general area of Kokstad; Four (4) Middle Stone Age sites occur within the greater Kokstad area and eleven Later Stone Age sites occur within the Kokstad area. None are known to be located close to the study area.

The site is characterised of incised stream with some area considered to have outcrops and boulders. No fossils have been recorded from the site to date. Fossils can be trapped in the Tertiary and Quaternary sands and alluvium but are seldom preserved there. However, the geological structures suggest that the rocks are the wrong type to preserve fossils (soils and dolerite) but the shales and mudstones might preserve fossils. Furthermore, the material to be used for the wall construction is soil, and this does not preserve fossils. Since there is a small chance that fossils from the Normandien Formation may be disturbed a Fossil Chance Find Protocol has been added to this report. Taking account of the defined criteria, the potential impact to fossil heritage is moderate to low.

6.3 Activities and aspects causing impacts

Having mentioned the above site characteristics, the planned activities will result in: Clearance and excavation within the instream habitat, and watercourses for stream crossings and wetland systems; Infilling of concrete encase within instream riverbed at stream crossings; Vegetation clearance within the construction corridors; and WTWW operation sludge handling and treated effluent disposal.

Potential negative impacts that are likely to occur during the construction and operational phases are outlined on (***Table 5***) below.

Table 4: Identification of potential environmental impact

#	Proposed construction work activity	Potential negative impact
1	Site camp establishment, parking of construction vehicle, hauling material to site and spoils to suitable site (still to be identified).	Clearance of natural vegetation, pollution and accommodation of traffic (***Bio-physical environmental and Social impact***).
2	Vegetation clearance within the construction corridors.	Clearance of vegetation dominated by by East Griqualand Grassland (*Gs12*). The riparian habitat is dominated by shrubs such as *Leucosidea sericea* and sedges such as *Cyperus obtusiflorus var. flavissimus*. Loss of plant species, *prefoliation* and colonization of A&IP species (***Bio-physical environmental impact***).
3	Excavation of riparian, aquatic/instream habitat, wetland habitat within a construction corridors.	Working on watercourse, impending flow, removal of geological features, clearance of natural aquatic vegetation and pollution to water bodies, loss of animal species (***Bio-physical environmental impact***).
4	Excavation within riparian and instream habitat for instream earth-filled dam construction	Erosion and river incision as a result of excavations within the instream habitat.

		Aquatic habitat transformation (***Bio-physical impacts***). Water pollution (***Bio-physical impacts***).
5	Loss of Heritage and cultural aspects	During clearing of vegetation, excavation and construction activities, heritage resources/artefacts/places that might be buried underground may be affected (***Social Impacts***)
6	Hauling of material to site, including removal of spoil to suitable site (still to be identified).	Public safety, accommodation of traffic, and dust (***Social Impact***).

The potential impact as a result of the proposed development of KZN DARD Kokstad Research Station Instream Earth-filled Dam will be mitigated by carefully employing the following preferred alternatives: are '*Site Layout, Design, Technology, Site Location Alternatives*' that will meet the stated need for and purpose of the project, by providing proper mitigation measures.

6.4 Sensitive Areas

The construction of the instream earth-filled dam will involve the excavation within instream and riparian habitat. any construction within the watercourse is considered environmental sensitive, as this could result in riparian incision, banks inundation, stream flow reduction, and downstream pollution, if proper mitigation measures and good construction practice are not adhered to.

Potential impacts to vegetation could result from the vegetation clearance of 1.6ha for construction of KZN DARD Earth-filled Dam which will involve the clearance of vegetation at the riparian habitat and the CBAs.

7 ENVIRONMENTAL STATUTORY FRAMEWORK

The NEMA is the primary South African legislation governing the requirements for Environmental Impact Assessments. In the context of the proposed development/operation the provisions of NEMA, and the associated EIA Regulations. Apart from this EIA triggers,

this project also triggers Section 21(c); Section 21 (i); Section 21 (f) and Section 21 (g) of National Water Act National Water Act (Act No. 36 of 1998). Consequently, the Water Use License Application is underway, due to proposed and anticipated alterations to the wetland characteristics and impeding or diverting flows; due to the nature of handling sewage; and discharging treated effluent into a watercourse.

The EMPr, which forms an integral part of the contract documents, informs the contractor as to his/her duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by the construction activities associated with project.

The contractor must note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation (NEMA, Section 28, "Duty of Care"), the EA conditions, and in terms of the additional conditions to the general conditions of the contract that pertain to this project. In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter will prevail.

Additionally, in terms of NEMA (second amendment), a developer may be guilty of an environmental contravention and liable for a penalty of up to R10m or a 10-year prison term (or both) when listed activities are undertaken without an EA or the project does not comply to the conditions of the environmental authorisation (EA).

It is expected that the contractor is conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which may be applicable to the contract. Some of the environmental legislation applicable to this type of project include, but are not limited to, the following in (***Table 5***) below:

Table 5: Environmental Statutory Framework

Legislation	Relevance
Constitution of the	➢ Chapter 2 – Bill of Rights. ➢ Section 24 – Environmental Rights/ Health Or Well-Being / Depletion Of Natural Resources

Legislation	Relevance
Republic of South Africa, (No. 108 of 1996)	➢ Section 32: Access to Information ➢ Section 33: Administrative Decisions ➢ Section 38: Locus Standi ➢ Section 68: Authority for Provincial Legislation
National Environmental Management Act (NEMA) (No. 107 of 1998)	➢ Section 2: Principles in Environmental Management ➢ Section 24: Environmental Authorisations and/or Norms and Standards (EA) (➢ Section 24G: Rectification Application ➢ Section 24J: Implementation Guidelines ➢ Section 24L: Alignment of Environmental Authorisations, including Integrated Environmental Authorisations) ➢ Section 24N: Environmental Management Programmes, Rehabilitation of Disturbed Areas and Closure Plan ➢ Section 24P: Financial Provision for Remediation of environmental damage ➢ Section 24Q: Monitoring and Performance Assessment (Environmental Audit) on EMPr's ➢ Section 24S: Management of Residue Stockpiles and Residue Deposits ➢ Section 24M: Exemption from Application of Certain Provisions of The Act ➢ Section 28: Duty of Care and Remediation of Environmental Damage ➢ Section 28: Soil Pollution ➢ Section 29: Protection of Workers on Refusal to Undertake Work ➢ Section 30: Emergency Incident Causing Danger to Public or Environment ➢ Section 30A: Emergency Situation - Request for Directive to undertake listed activity without EA ➢ Section 31: Access to Environmental Information and Protection of Workers ➢ Section 32: Enforcement of Environmental Laws ➢ Section 34: Liabilities in Criminal Offences Under Environmental Laws ➢ Section 39: Control over products which could harm the environment ➢ Section 43: Appeals (Ch 9, Sec 43) ➢ Section 44 and 47: Regulations ➢ Section 47A: Regulations, Legal Documents and Steps Not In Compliance With Procedural Requirements ➢ Section 47B: Consultation with other Departments ➢ Section 47C: Extension of Time Periods ➢ Section 47D: Delivery of Documents ➢ Section 49A and 49B: Offences and Penalties
GN No. 326 (7 April 2017)	➢ Purpose - regulate the procedure and criteria as contemplated in Chapter 5 of NEMA relating to the preparation, evaluation, submission, processing, and consideration of, and decision on, applications for environmental authorisations for the commencement of activities, subjected to and EIA, in order to avoid or mitigate detrimental impacts on the environment, and to optimise positive environmental impacts, and for matters pertaining thereto.

Legislation	Relevance
➢ Purpose – to identify activities that would require environmental authorizations prior to commencement of that activity and to identify competent authorities in terms of sections 24(2) and 24C of NEMA. ➢ The investigation, assessment, and communication of the potential impact of activities must follow the procedure as prescribed in regulations 19 and 20 of the EIA Regulations published in terms of section 24(5) of the Act. However, according to Regulation 15(3) of GN No. 327, Scoping and an Environmental Impact Report (S&EIR) must be applied to an application, if the application is for two or more activities as part of the same development for which S&EIR must already be applied in respect of any of the activities. ➢ Activities that are relevant to this application are: **Listing Notice 1, Listed Activity 19 & 27; Listing Notice 3, Listed Activity 12 & 14.**	
National Water Act (Act No. 36 of 1998)	➢ Chapter 3 – Protection of water resources. ➢ Section 19 – Prevention and remedying effects of pollution. ➢ Section 20 – Control of emergency incidents. ➢ Chapter 4 – Water use (***Section 21C, Section 21i; and Section 21g***) ➢ Authority – Department of Water and Sanitation (DWS).
NEMA 1998 - GN R982 of 4 December 2014 - Environmental Impact Assessment Regulations, 2014	➢ Regulation 1 and 2: Interpretation, Purpose and Commencement of Regulations) ➢ Regulation 3: Timeframes) ➢ Regulation 4: Decision on Applicant and Notification to I&AP's ➢ Regulation 5 and 6: General Requirements for Applications ➢ Regulation 7, 8 and 9: Consultations between Competent Authority and other relevant State Departments ➢ Regulation 10 and 11: Competent Authority - Right of access to information ➢ Regulation 12, 13 and 14: EAP's and Specialists' Appointments and Conditions ➢ Regulation 15: Assessment Process to be followed ➢ Regulation 16, 17 and 18: Requirements applicable to the EA Application ➢ Regulation 19 and 20: Basic Assessment Report submitted to Competent Authority ➢ Regulation 21, 22, 23 and 24: S&EIR submission to Competent Authority ➢ Regulation 25 and 26: Issue and Content of an Environmental Authorisation ➢ Regulation 31, 32 and 33: Amendment of Environmental Authorisation ➢ Regulation 34: Audits on EA's, EMPr's and Closure Plans ➢ Regulation 36 and 37: Amendments to an EMPr and Closure Plan ➢ Regulation 38: Suspension and Withdrawal of Environmental Authorisation ➢ Regulation 39, 40, 41, 42, 43 and 44: Public Participation ➢ Regulation 45, 46 and 47: General Matters ➢ Regulation 48: Offences
National Environmental	➢ NEM: AQA (Act No.39 of 2004). ➢ Air quality management ➢ Section 32 – Dust control. ➢ Section 34 – Noise control.

Legislation	Relevance
Management Air Quality Act (Act No. 39 of 2004)	➢ Authority – Harry Gwala District Municipality
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	➢ Section 43-48: Biodiversity Management Plans (Ecosystems, Indigenous Species or Migratory Species) ➢ Section 51-55: Threatened or Protected Ecosystems and Threatening Processes ➢ Section 56-58: Threatened or Protected Species ➢ Section 64-67 and 69: Alien Species Posing a potential threat to Biodiversity ➢ Section 70 and 77: Invasive Species posing a potential threat to Biodiversity (➢ Section 101 and 102: Offences and Penalties Authority – DFFE.
Occupational Health & Safety Act (Act No. 85 of 1993)	➢ Provisions for Occupational Health & Safety Regulation 9A and 14: Hazardous Chemicals Substances ➢ Regulation 10 and 15: Disposal of HCS Waste ➢ Authority – Department of Labour.
National Heritage Resources Act (Act No. 25 of 1999)	➢ Section 34 – protection of structures older than 60 years. ➢ Section 35 – protection of heritage resources. ➢ Section 36 – protection of graves and burial grounds. Section 51: Offences and Penalties ➢ Authority – Provincial Heritage Agency: Amafa Institute Heritage Agency
National Road Traffic Act 1996 (Act No. 96 of 1996)	➢ Section 51: Waste on Or Near National Road ➢ Authority – KZN Department of Transport and community safety
Environment Conservation Act (Act 73 Of 1989)	Section 29: Offences and Penalties Section 31A: Damage to Environment
Promotion of Access to Information Act, 2000 (Act No 2 of 2000)	➢ Section 11 and 12: Access to Records of Public Bodies ➢ Section 50: Access to Record of Private Bodies ➢ Section 51: Publication and Availability of Certain Records ➢ Section 70: Mandatory Disclosure by Public/Private Bodies
Water Services Act, 1997 (Act No. 108 of 1997)	➢ Section 3:Right of Access to Basic Water Supply and Sanitation ➢ Section 9: National Standards on Provision or Water Services ➢ Section 11: Duty to Provide Access to Water Services ➢ Section 12-18: Water Services Development Plans ➢ Section 27: Monitoring of Water Services Provided

Legislation	Relevance
	➢ Section 77: Transferability of Servitudes
Hazardous Substances Act, 1973 (Act No. 15 of 1973)	➢ Section 2-3: Grouped Hazardous Substances ➢ Group I – Hazardous Substances (GN R 452 Of 25 March 1977 and GN 801 Of 31 July 2009) ➢ Group II Hazardous Substances (GN R1382 Of 12 August 1994) ➢ Group III Hazardous Substances (GN R1302 Of 14 June 1991) ➢ Group IV Hazardous Substances (GN R247 of 26 February 1993) ➢ Section 18 and 19: Offences and Penalties
Fertilisers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act No. 36 of 1947)	➢ Section 3 and 7: Pest Control Operators, and use of fertilizers, farm feeds, agricultural, stock remedies and sterilising plants ➢ Section 7: Sale of fertilizers, farm feeds, agricultural remedies, and stock remedies ➢ Section 7BIS: Prohibition on acquisition, disposal, sale or use of certain fertilizers, farm feeds, agricultural remedies, and stock remedies ➢ GN R181 of 7 February 2003 - Regulation Relating to the Prohibition of the Sale, Acquisition, Disposal or Use of Agricultural Remedies ➢ Containers And Labels of Agricultural and Stock Remedies
	➢ GN 98 of 11 February 2011 - Pest Control Operator Regulations
National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)	➢ Section 7-9: National Norms and Standards, Provincial Norms and Standards and Waste Service Standards ➢ Section 14 and 15: Priority Waste ➢ Section 16: Duty on Waste Holder to Implement Reasonable Measures ➢ Section 17: Reduction, Re-Use, Recycling and Recovery of Waste ➢ Section 43-59: Waste Management Licences for Listed Waste Activities or Compliance to Norms and Standards ➢ Section 21 and 22: Storage of Waste ➢ Section 23 and 24: Waste Collection needs to be Authorised by the Municipality ➢ Section 25: Waste Transportation ➢ Section 26: Unauthorised Disposal of Waste and Protection of Environment ➢ Section 25: Protection of Environment at Private Land ➢ Section 35-41: Contaminated Land ➢ Section 67 and 68: Offences and Penalties ➢ Regulation 4: Waste Classification ➢ Regulation 5: Safety Data Sheets for Hazardous Waste ➢ Regulation 6: General Obligations on Waste Generators, Transporters And Managers ➢ Regulation 7: Waste Treatment ➢ Regulations 8: Waste Assessment - Waste Disposal to Landfill - Obligations on Generators and Managers

Legislation	Relevance
	➢ Regulation 9:Waste Management Activities that do not require a Waste Management Licence ➢ Regulation 10: Records on Waste Generation and Management
Advertising on Roads and Ribbon Development Act, 1940 (Act No. 21 of 1940)	➢ Section 8: Articles Or Materials On Or Near Public Roads
Health Act, 1977 (Act No. 63 of 1977)	➢ Section 20: Waste Being a Threat to Human Health
Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	➢ Section 5: Prohibition on the Spreading of Weeds ➢ Section 8 and 9: Soil Conservation Schemes ➢ Regulation 8: Managing the Flow Pattern of Run-off Water ➢ Regulation 12: Burning of Veld, Prevention and Control of Veld Fires ➢ Regulation 15: Weeds and Invader Plants
National Forests Act, 1998 (Act No. 84 of 1998)	➢ Section 7: Indigenous trees ➢ Section 12-15: Protected Trees (All Areas) ➢ Section 16: Registration in Title Deeds ➢ Section 61-64: Offences and Penalties
National Veld and Forest Fire Act, 1998 (Act No. 101 of 1998)	➢ Section 9 and 10: Fire Danger Rating ➢ Section 17-19 and 34: Firebreaks ➢ Section 24 and 25: Offences and Penalties
National Environmental Management: Protected Areas Act, 2003 (Act No 57 of 2003)	➢ Section 18 and 19: Special Nature Reserves ➢ Section 23-26: Nature Reserves ➢ Section 28 and 29: Protected Environments ➢ Section 37: Management of Protected Areas ➢ Section 38-42: Management Plans in Protected Areas ➢ Section 43: Monitoring performance of Protected Areas ➢ Section 45-47: Access to Protected Areas ➢ Section 48: Restricted activities in Protected Areas ➢ Regulation 49: Regulation or Restriction of Activities in Protected Areas ➢ Section 89: Offences and Penalties

8 THE DUTIES OF ROLE PLAYERS

A number of role players will be responsible for ensuring that environmental practices described for this report are implemented through each of the various phases of the project life cycle (construction, operations and maintenance, decommissioning). Formal responsibilities are necessary to ensure that all environmental procedures and actions are executed. Specific responsibilities of the Project Proponent, Project Manager/Project Principal Agent, Site Manager/Engineer, and Contractor/Operator are detailed below.

Table 6: Personnel/Entity roles and responsibilities

#	Responsible persons/entity	Roles and responsivities
1	Applicant/ Project proponent	The project proponent (KZN DARD) is the holder of the Environmental Authorisation (EA) and is responsible for the implementation of the conditions of the authorization as well as the management measures contained in the approved EMPr (this report). In terms of NEMA, Section 28 (1) the construction of the pipelines and the associated infrastructure and the issuing of the EA implies that harm to the environment is authorised by law. Additionally, due to the need in the community for this essential service, such impacts cannot reasonably be avoided or stopped. Notwithstanding, proponent is required to minimise and rectify such pollution or degradation of the environment. All liabilities associated with the land will lie with the registered landowner. The holder is ultimately liable for the potential impact of the activities that are undertaken and is tasked with effective management of these impacts. The holder of the environmental authorization is responsible for; • Ensuring that all conditions of the EA, in conjunction with EMPr and CEMP are complied with; • Appointment of an Environmental Control Officer (ECO) for monitoring of implementation and compliance of the EA conditions in conjunction with EMPr and CEMP during the construction phase; • Assessment of all activities requiring special attention as specified and /or requested by the Project Principal Agent (PPA) or Project Manager (PM) and/or ECO for the duration of the contract; • Ensuring that the Contractor conducts all activities in a manner that minimizes disturbance to the directly affected residents and public in general, as advised by the PPA and/ or ECO; and • To order the Contractor, through the PPA, to suspend any or all works on-site if the Contractor or his subcontractor/supplier fails to comply with the any environmental specifications, the EA and the EMPr.
2	Project Principal Agent /Project Manager	The Project Principal Agent (PPA) has overall responsibility for environmental management on site which includes the implementation of the EMPr. Therefore, the PPA roles and responsibilities include the:

#	Responsible persons/entity	Roles and responsivities
		• Overall responsibility for the implementation of the EA in conjunction with EMPr and CEMP; • The appointment of an ECO that will monitor the implementation of the EMPr; • Assessment of all activities requiring special attention as specified and /or requested by the Engineer (ENG) and/or ECO for the duration of the contract; and ensures that the Contractor conducts all activities in a manner that minimizes disturbance to the directly affected residents and public in general, as advised by the ENG and/ or ECO. • Ensuring that the Site Manager and the Contractor/Operator are aware of all specifications, legal constraints, standards, and procedures pertaining to the project specifically with regard to the environment; • Ensuring that all stipulations within the EA in conjunction with EMPr and CEMP are communicated and adhered to by Site Manager and the Contractor/Operator; • Assessing the Contractor's environmental performance in consultation with the ECO, and communicating directly with the Contractors on environmental issues observed on site; • Liaising with the Contractor on the matters concerning the environment, and issuing of the non-conformance notifications to Contractors in consultation with the ECO; • Arranging information meetings for and consulting with I&AP's about the impending construction activities; • Maintaining a register of complaints and queries by members of the public at the site office. This register is to be forwarded to the ECO on a monthly basis; • Ensuring the documentation of the state of the site prior to the commencement of construction activities, in conjunction with the Contractor; • Preventing actions that will harm or may cause harm to the environment, and take steps to prevent pollution of the site;

#	Responsible persons/entity	Roles and responsivities
	Project Principal Agent /Project Manager (Continued….)	• Reviewing and approving construction methods where necessary; and • Instructing the Contractor to suspend any or all works on-site if the Contractor or his subcontractor/supplier fails to comply with the conditions of the EA in conjunction with EMPr and environmental specifications.
3	Environmental Control Officer	The Environmental Control Officer (ECO) appointed by the PPA (on behalf of KZN DARD) has the responsibility for ensuring compliance of the EA in conjunction with EMPr and CEMP and undertaking regular monitoring of the site. The ECO is responsible for conducting the environmental audits, during the construction phase of the project, according to the provisions EA in conjunction with EMPr and CEMP. The following are the duties of the ECO: • To understand the background of the project and ensure the implementation of the EA conditions and the EMPr; • To monitor the implementation of the EA conditions and the EMPr; • To advise the PPA about the interpretation, implementation, and enforcement of the EA and EMPr and other relevant environment-related matters; • To brief the Contractor about the requirements of the EA, EMPr, Environmental Specifications as applicable; • To monitor and report to the PPA on the performance of the Contractor and the project in terms of environmental compliance; • To be fully conversant with all related environmental legislation and ensure compliance; • To ensure that all the environmental requirements contained within the EMPr are adhered to;

#	Responsible persons/entity	Roles and responsivities
	Environmental Control Officer (Continued….)	• To report all non-compliances with the EA and EMPr to the relevant authority, after consultation with the PPA; • To regularly liaise with the Site Manager on matters relating to the environment; and • To compile monthly reports as to the implementation of the EMPr which must include a percentage compliance status to the EA and EMPr conditions.
4	Contractor	The Contractor shall comply with the requirements of the EA and EMPr and abide by the PPA's/PM's and ECO 's instructions regarding the implementation of the EMPr. The contractor shall: • Comply with all applicable legislation; • Be conversant with the requirements of the EA and the EMPr and ensure 100% compliance to all conditions therein; • Induct and educate all staff, including sub-contractors, about the requirements of the EA and EMPr; • Ensure that sub-contractors/suppliers who are utilised within the context of the contract comply with the environmental requirements of the EA and EMPr. The Contractor will be held responsible for non-compliance on their behalf; • Supply the method statement for all activities requiring special attention as specified and/or requested by the Engineer or ECO during the duration of the Contract; • Inform and educate their employees about the environmental risks of their work and the manner in which their tasks must be performed in order to avoid causing significant pollution or degradation of the environment (environmental training); and retain records of such training undertaken

#	Responsible persons/entity	Roles and responsivities
	Contractor (Continued….)	• Bear the costs of any damages/ compensation resulting from non-adherence to the EA and EMPr or written site instructions; • Conduct all activities in a manner that minimizes the disturbance to directly affected residents and the public in general, and foreseeable impacts on the environment; and • Ensures that the PPA is timeously informed of any foreseeable activities that will require input from the ECO.
5	Contractor's SHE Officer	The Contractor will appoint a Safety, Health and Environmental (SHE) Officer before commencement of any work on site, whose role is to ensure implementation of the requirements of the EA conditions in conjunction with EMPr, and CEMP. The contractor's SHE Officer must have relevant environmental qualifications and experience required for the project. The Contractor's SHE Officer will liaise with the ECO appointed by PPA. It will be the responsibility of the Contractor's SHE Officer to ensure that all work is conducted according to the approved Environmental Method Statements and that the roles and responsibilities as set out in this document are fulfilled. The Contractor's SHE Officer will liaise with the ECO appointed by developer or the PPA. The Contractor's SHE Officer's tasks will include: • Be fully conversant with the EA conditions, EMPr and CEMP, and other relevant environmental requirements, and ensure 100% compliance to all conditions therein; • Compile Method Statements together with the Principal Contractor that will specify how potential environmental impacts in line with the requirements of the EA, EMPr and CEMP will be managed, and where relevant environmental best practice and how they will practically ensure that the objectives set up by this document is achieved;

#	Responsible persons/entity	Roles and responsivities
	Contractor's SHE Officer (Continued….)	• Convey the contents of this EMPr to the construction site staff and discuss the contents in detail with the Contractor by means of conducting ongoing Environmental Awareness and Training of the Contractor's site personnel through the means of toolbox talks and other means of communication; • Undertake daily and weekly inspections of the work area(s) as per schedule or authorised through written instruction by PPA or ECO; • Ensure conformance/compliance to the EMPr, licenses, and permits and approved Environmental Method Statements; • Monitor and verify that negative environmental impacts are kept to a minimum, as far as possible; • Report any non-compliance or remedial measures that need to be applied to the ECO and PPA, in line with the requirements of the EMPr; • Order the removal from the construction site of any person(s) and/or equipment in contravention of the specifications of the EA and EMPr; • Maintain an environmental management file and all relevant documentation and records related to environmental management; • Present a report at each site meeting which will document all incidents that have occurred during the period before the site meeting.

9 ENVIRONMENTAL CAPACITY BUILDING PLAN

The environmental capacity building plan includes the schedules records of environmental training, induction, community involvement, and communication strategy.

9.1 Environmental Training

The project team will be briefed on environmental aspects associated with the project, the compliance to environmental standards, licences and permits, the EA and the EMPr.

9.2 Induction

The All staff and labourers will be required to attend a site environmental induction session, conducted in their preferred language. The site environmental aspects will be discussed during the induction session.

9.3 Community involvement

The affected and adjacent households must be informed about the construction activities, at least 7 days prior to commencement of the activities. Such I&APs must be also informed about the condition of the receiving environment and encouraged to report any environmental non-compliance by the Contractor to the PPA, subsequently the ECO.

9.4 Communication strategy

The environmental communication strategy will be developed, so that the project team and all relevant I&APs will follow a documented communication procedure. The PPA will be responsible for the communication throughout the project.

Emergency and incident reporting structures will be designed to handle any emergencies or incidents that might arise at the construction site and surroundings. The community strategy must include a designated disaster management team and community representatives. Emergency contact numbers and procedures will be communicated with the employees and community.

10 ENVIRONMENTAL CODE OF CONDUCT

The One of the objectives of the EMPr is to ensure that all the workers, contractors, sub-contractors, and construction staff on this project, have an understanding of the basic and relevant environmental issues and the potential impacts of on-site activities. This Environmental Code of Conduct provides the basic rules that must be strictly adhered to. It is the responsibility of the ECO to ensure that each contractor, sub-contractor, and workers understands and adheres to the Code of Conduct.

All persons are obliged to abide by the Code of Conduct. Therefore, ignorance, negligence, recklessness, or a general lack of commitment will be complying to the Code of Conduct.

10.1 Environmental Rules

The environmental rules apply to all personnel on site to:

- Prevent pollution;
- Prevent littering;
- Dispose all waste in the correct waste containers provided;
- Use the toilet facilities provided and not utilise the natural environment for their ablutions;
- Immediately report to the supervisor when a spillage occurs or becomes aware of a hazardous substance spillage from a vehicle, equipment, machinery or container;
- Not enter any property with the landowner or occupier's permission;
- Not dig, excavate or the erect any permanent or semi-permanent structure of any kind that is not in the scope of this project;
- Not excavate at proximity of grave sites, without the PPA's consent. All excavation must at least be 30m away from grave sites;
- Not climb over or through any fence or enter private and neighbouring properties;
- Maintain the character and visual quality of the area;
- Never deface, draw, add graffiti or cut lettering or any other markings on trees, rocks or buildings in the area;

- Collect all litter lying around and dispose correctly;
- Be familiar with basic fire-fighting procedures;
- Be aware of the locations of all fire-fighting equipment;
- Not to establish any fires allowed outside the confines of the construction camp;
- Not burn any waste;
- Care for plants and animals;
- Not injure, poach or kill any wildlife;
- Never damage, chop down or remove any tree or shrub (unless part of the scope of the project and the necessary permits/licences are in place);
- Refuse to perform any work if, in good faith and reasonably believe, at the time of the refusal that the performance of the work would result in an imminent and serious threat to the environment.

11 NON-COMPLIANCE

The application of a penalty clause to the Contractor will apply for incidents of non-compliance to the EA and EMPr, once the necessary investigations have been completed. The penalty imposed will be per incident and will be deducted from the Contractor's monthly payment certificate.

A non-compliance notice will be issued to the responsible contractor by the ECO via the Proponent's Project Manager. The non-compliance notices will be issued in writing, a copy filed in the generic EMPr file and will, as a minimum include the following:

- Time, location and date of the non-compliance;
- Name of the contractor responsible;
- Nature and description of the non-compliance;
- Root cause of the incident;
- Recommended / required corrective action to remedy/fix the incident;
- Recommended actions to prevent a recurrence of the incident; and

- Date by which the corrective and preventative actions will be completed.

The contractor shall act immediately when a notice of non-compliance is received and remedy/fix the non-compliance (where practical). Complaints received regarding activities on the development site pertaining to the environment shall be recorded in a dedicated incident register and the response noted with the date and action taken. The ECO must be made aware of any such complaints. Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause shall be reported to the relevant Competent Authority (CA).

The contractor is deemed to be in non-compliance with the EA and the EMPr, *inter alia*, if there is a deviation from any environmental condition, environmental requirement, license or permit condition, or whose actions may cause an environmental impact.

12 PRE-CONSTRUCTION

12.1 Designing and Project Conceptualisation

Table 7: Project Design, Layouts and Conceptualisation

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The site layout for the earth-filled dam construction must clearly illustrate the proposed construction footprint and clearly delineate the servitude for the construction corridor. • The site layout plan must clearly delineate the servitude for the instream earth-filled dam construction corridor. • A site layout plan must be compiled indicating the limits of disturbance associated with the construction of KZN DARD Instream Earth-filled Dam in	Engineer	Site Delineation	Design/Planning Phase, and re-routing	PPA Approval	Design/Planning Phase	Construction Corridors are delineated Buffer Inductions clearly illustrated in site layouts

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
relation to the identified sensitive areas (i.e., unnamed stream and riparian zone). No-go areas and any stormwater infrastructure must be indicated on this plan. • The design must incorporate a 15m buffer determination along the project site (earth-filled dam and abstraction pipeline) and						
• A detailed method statement for working within the watercourse must be compiled by the contractor prior to the commencement of the project. This method statement must be approved by the aquatic ecologist or ECO.	Contractor	Construction Method Statement	Planning Phase	ECO	*Adhoc* Basis	Method Statement in line with EA Conditions.

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Conceptual riparian zone rehabilitation and monitoring plan with a focus on erosion and alien vegetation management, be compiled prior construction and implemented.	Contractor	Contractual Terms of Reference	Planning	PPA & ECO Approval	Once	Riparian zone rehabilitation and monitoring plan
• Since this project involves a construction of a dam and all plant species on site would be destroyed plant species listed as "Specially Protected Indigenous Plants" in terms of Schedule 12 of Natal Nature Conservation Ordinance, No. 15 of 1974 were identified within the study area, namely ALL IRIDACEAE, which includes *Kniphofia linearifolia*. An Ordinary Permit will be required from Ezemvelo KZN Wildlife (EKZNW) to transplant these	Contractor	Permit and Relocation Plan	Planning	PPA & ECO Approval	Once	Permit and Relocation Plan

Impact Management Outcome: All Engineer design the project output in a such a way that avoid and mitigate potential impacts associated with construction activities.						
Impact Management Actions	**Implementation**			**Auditing/ Approval**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
species outside of the proposed site. A suitable habitat just outside of the development site exists in the Mount Currie Nature Reserve of which these plants can be relocated to. • ECO must be appointed to oversee construction activities and enforce the conditions of the EA and permits for environmental legal compliance.						
• The Develop the engineering designs to prevent or minimize alteration of flow regime within the vicinity of the instream dam. • Designing the dam with adequate spillway capacity, outlet works, and sediment bypass or flushing facilities to control the sediment deposition and release.	Designer	Best Practice Dam and Spillway Design	Design	PPA and Social Facilitator	*Adhoc* Basis	Design Approved by DWS

12.2 Environmental file

Table 8: Contents of environmental file

Impact Management Outcome: All relevant environmental documents and records are easily accessible to facilitate compliance to the EA and EMPr						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
Content of Environmental File must include but not limited to these docs: • Environmental Authorization • Relevant environmental permits and licences • Site Access Certificate (PTO) • Site Closure Inspection Form • Site layout plan • Waste Disposal Certificates • Environmental Site Rules / Environmental Awareness Toolbox Talk • Environmental training schedule • All audit reports and daily site inspection reports • Complaints Incident Register • EMPr, CEMP, PES as supplied by PPA, and EMP by Contractor	ECO & PM	Make use of EA and other authorisation conditions. Have a lever arch file, divided for the different docs and clearly labelled.	Project Implementation. Pre-construction	ECO	Monthly	In line with EA, EMPr, CEMP, WULA and other environmental permits and licences

Impact Management Outcome: All relevant environmental documents and records are easily accessible to facilitate compliance to the EA and EMPr						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Signed Declaration of Understanding • Other Environmental Standards required for this project • Contractor's information • Contractor's Environmental Method Statements • Contractor Environmental Policy • Contractor Organogram • Appointment of Contractor' SHE Officer and Declaration of Understanding (Including CV) • Schedule of Contractor' Plants and Equipment • MSDS and Hazardous Substance Register • Emergency Contact Register						

12.3 Environmental Capacity Building

Table 9: Environmental communication and awareness

Impact Management Outcome: All workers are aware of environmental impacts, understand their individual responsibilities in terms of this EMPr and are able to minimize the negative environmental impacts of the project						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The project team must receive environmental training on the environmental legislation, EA and EMPr conditions;	ECO & PM	Through scheduled sessions or as part of contract meeting	Pre-Construction/Initial contracts meeting	ECO	Once	Minutes/ Attendance Registers
• All staff and construction labourers must receive environmental training on the EA and EMPr conditions;	ECO, SHE Officer & CM	Through scheduled sessions	Prior to site establishment, and when required	ECO	Monthly	Attendance Registers
• All visitors to undergo environmental induction training.	CM & SHE Officer	Through Site Environmental Rules	Duration of a project	ECO	Monthly	Attendance Registers
• The Contractor to maintain effective communication with all relevant I&APs.	CM & SHE Officer	Information Posters & Suggestion scheme	Duration of a project	ECO	Monthly	Information poster at site office& work areas. Communication Records

13 CONSTRUCTION PHASE

13.1 Construction site camp establishment

Table 10: Construction site camp establishment

Impact Management Outcome: Site camps have zero to minimal environmental impacts for the duration of the project						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Establish the site camp on existing disturbed areas and not in environmental sensitive areas. • Site camp must be established at least 100m away from the watercourse. • Buffer sensitive area and declare them a no-go zone. Restrict encroachment of site camp activities to sensitive area. • All laydown, stacking and storage areas, etc. must be restricted to within the project area and must preferably be situated within	PM, CM & ECO	Client or Local authorities to designate the area for site camp. PM, CM & ECO prior site visit. Buffer and demarcate a no-go areas	Prior to site establishment.	ECO	Once	Permission to Occupy (PTO) Letter, and photographs of prior to site establishment. Buffer Demarcation and Schedule fines

areas of low sensitivity (already disturbed areas). • Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.						
• The construction site camp must have: Site office, and demarcated site amenities		Site Layout Plan	During site establishment	ECO	Monthly	All amenities are demarcated
• Strip topsoil together with grass / groundcover from all areas where temporary structures are located, and stockpile topsoil. Use topsoil for site rehabilitation	PM, CM & SHE Officer	Rehabilitation Plan	During site establishment	ECO	Monthly	Images and adherence to rehabilitation plan.
• Portable toilets must be provided onsite and serviced, with a minimum ratio 1:15 for both male and females and be place not less than 100m away from watercourses, on a relatively flat surface area. • Serviced by approved service provider with the relevant service level agreement letter (SLA) with WWTW facilities	PM, CM and SHE Officer	Provision of toilets close to working areas during the project.	Duration of a project	ECO	Monthly	Images, Service Certificates

13.2 Site Access and Movement of Construction Vehicles

Table 11: Access to construction site

Impact Management Outcome: Access to sites have zero to minimal environmental impacts for the duration of the project.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Where, possible use the existing access routes to pipeline route, and construction areas. • The material hauling route must be demarcated. • Construction staff must only use authorized paths and roads. • Construction vehicles must not traverse wetlands and other sensitive environment	CM & SHE Officer	Delineate all access routes. Permission of access Roads within residential areas.	Construction Phase	ECO	Monthly	Approval for use of access roads Visible signage delineating construction access routes (Temporary road signs).
• No temporary access road must be constructed without enquiry and authorisation with the Department of Environmental Affairs.	CM & SHE Officer	Consultation with EDTEA	Construction Phase	ECO	Monthly	Proof of Consultation/Response letter for newly developed access roads
• Access road must be communicated to all staff members and delivery personnel	CM & SHE Officer	Site Rules and Delivery advise	Construction Phase	ECO	Monthly	Site Rules for access

Impact Management Outcome: Access to sites have zero to minimal environmental impacts for the duration of the project.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
and must have adequate signage delineating the routes entrance and exits. • Implement rules to be applied to all drivers including the delivery personnel.						
• Construct approved vehicle turning areas, avoiding selecting of ecological sensitive areas as turning point, and erect relevant road safety signage at strategic points for accommodation of traffic. Also, have turning area routes approved by the PPA, OHS Agent &ECO.	CM & SHE Officer	Site Rules and Delivery advise	Construction Phase	ECO	Monthly	Site Rules for access
• No construction trucks, trucks transporting material and equipment will be allowed to pass through the residential areas where there are restrictions in	CM & SHE Officer	Site Rules and Delivery advise	Construction Phase	ECO	Monthly	Site Rules for access

Impact Management Outcome: Access to sites have zero to minimal environmental impacts for the duration of the project.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
terms of the axle load restrictions on the road.						
• Rehabilitate the access road upon completion of the construction period. • The access road within the pipeline servitude must be up kept for use by the maintenance vehicle, or future pipeline upgrades.	CM	Rehabilitation Plan	Construction	ECO	Monthly	Adherence to rehabilitation plan.
• Temporary access roads must have stormwater system to prevent the ponding of water during heavy rains and be progressively monitored and rehabilitated after heavy rains.	CM	Stormwater Management Plan	Construction	ECO	Monthly	No stagnant water within the access routes/cleared areas. Adherence to rehabilitation plan.
• Visual inspections for the occurrence of erosion within access routes must be undertaken every second week during the construction phase.	CM &SHE Officer	Checklist	Construction	ECO	Monthly	Checklist in place

13.3 Storages, Stockpiling and Material Hauling

Table 12: Storages, stockpiling and material hauling

Impact Management Outcome: All The storage, stockpiling and transportation of all hazardous materials will be managed to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Store hazardous materials in a secure storage and have MSDS. • Hazardous material must be stored in secure tight containers on liquid tight flooring to prevent seepage into the ground.	CM & SHE Officer	Restricted access to hazardous materials	Construction Phase	ECO	Monthly	Photographs, MSDS and Hazardous Chemical Substances (HCS) list
• Stockpiles and storage yards must be demarcated in areas already disturbed or where they will cause minimal disturbance. • Waste storage must be stored so as to prevent leakages or being blown away, preferably undercover to prevent runoff from rains • Clearly indicate which activities are to take place in which areas within the site e.g. the mixing of	ECO, SHE Officer & CM	Checklist for storage and stockpiling. Demarcate areas and limit these activities to single sites only.	Construction Phase	ECO	Monthly	Photographs and checklists

Impact Management Outcome: All The storage, stockpiling and transportation of all hazardous materials will be managed to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
cement, stockpiling of materials etc. Limit these activities to single sites only.						
• All bulk material must be stored on site camp and move to sites only when required. • All fine products must be covered during transportation and storage • Stockpile must not exceed 2m in height and be store in a relatively flat surface at least 32m away from watercourse. • During wind periods stockpiles must be covered or where necessary be watered	CM & SHE Officer	Checklist for Material Onsite. Just In Time (JIT) for production method. Dust suppression	Construction Phase	ECO	Monthly	Checklists, incident register and photographs Evidence of Dust Suppression

13.4 Vegetation Clearance

Table 13: Vegetation clearance

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The project boundary must be demarcated and vegetation clearing as well as topsoil removal must be limited to the site only. • Vegetation clearance for construction of the instream earth-filled dam must be limited to demarcated footprint. A 15m buffer along the project site must be considered, and no development and stockpiling should take place outside 15 buffers of the site. • The servitude must include the trench, one-way running track, topsoil stockpile corridor and subsoil stockpile corridor. All areas of watercourses outside	CM & SHE Officer	Install buffers through visible pegging with construction barricades to restrict development from encroaching the sensitive environment.	Construction Phase	ECO	Monthly	Barricades nets or pegs in place for buffer where there is sensitive environment

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
this servitude must be considered no-go areas. • Surrounding areas with indigenous vegetation should under no circumstances be fragmented or disturbed further or used as an area for ruble and stockpiles. • All laydown, storage areas, site camps etc. must be restricted to within the project area and should preferably be situated within areas of low sensitivity (already disturbed areas, such as within Kokstad Research Station complex). • The demarcations are to remain until construction and rehabilitation is complete.						

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project. • Only the approved existing access road must be used, and vehicles must not traverse virgin land.						
• A walk-down survey be undertaken prior to the start of the construction activities in order to survey the area in detail for any Red Data Listed species. • Establish buffer to section with plant SCC and declare it a no-go area. • Plant species listed as "Specially Protected Indigenous Plants" in terms of Schedule 12 of Natal Nature Conservation Ordinance,	PM, CM & SHE Officer	Site Screening by ecologist Buffer through visible pegging Plant Rescue and Relocation	Construction Phase	ECO	*Ad hoc*/ Oncoff	Plant Rescue and Relocation records such photographs, checklists etc. Buffer in place

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
No. 15 of 1974 were identified within the study area, namely ALL IRIDACEAE, which includes Kniphofia linearifolia. An Ordinary Permit will be required from Ezemvelo KZN Wildlife (EKZNW) to transplant these species outside of the proposed site. A suitable habitat just outside of the development site exists in the Mount Currie Nature Reserve of which these plants can be relocated to. • If possible, the plant SCCs must not be removed, or disturbed. Where there is no choice, relocate plant SCC to undisturbed areas within project locality, such as Mount Currie Nature Reserve.						

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• If removal of plant SCC is needed, approval must be obtained from the ECO, before any disturbance or removal be relocated, by a specialized Botanist.						
• Strip topsoil together with grass / groundcover, and stockpile topsoil, separately to sub-soil along the pipeline route for later rehabilitation. • Natural features such as trees or grasslands should not be removed from the dam margins in order to provide submerged habitats in the form of roots and overhanging vegetation for the aquatic biota. • Vegetation clearance in the construction phase is to be removed in a phased approach,	CM & SHE Officer	Toolbox Talks Construction Method Statement	Construction Phase	ECO	Monthly	Records of the toolbox talks/ Rehabilitation Plan

Impact Management Outcome: The removal and/or disturbance of natural vegetation will be kept to a minimum to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
as and when it becomes necessary as vegetation harbours fauna. • Undertake progressive rehabilitation: Areas cleared of vegetation must be revegetated/ land scaped, immediately after the infrastructure in that portion has been installed. Do not wait for the project to be completed or contractor leaving the site.						
• All laydown, storage areas, site camps etc. must be restricted to within the project area and should preferably be situated within areas of low sensitivity (already disturbed areas).	CM & SHE Officer	Site rules Demarcation and cordoning of laydown areas	Construction Phase	ECO	Monthly	Laydown areas clearly demarcated

13.5 Potential loss of wetland and riparian zone habitat

Table 14: Prevention of disturbance to wetland and riparian zone and instream habitat

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• All work to be done within the riparian and habitats must be carried out during low flow conditions, and dry periods. • It is recommended that construction of the dam and pipeline commence during the dry season so as to limit the amount of sediment which may run off into the tributary.	PM & CM	Prepare for increased flows by scheduling work according to the weather forecast and to be adequately prepared for unexpectedly large runoff from a sudden storm.	Construction Phase	ECO	Monthly	Work scheduled according to forecast projection No siltation and banks incision
• An ecologist must conduct a walk through prior to vegetation clearing and a permit must be obtained to remove any TOPS.	PM, CM & SHE Officer	Site Screening by ecologist Buffer through visible pegging Plant Rescue and Relocation	Construction Phase	ECO	*Ad hoc*/ Once off	Plant Rescue and Relocation records such photographs, checklists etc. Buffer in place

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The vegetation clearance and earthworks must be limited to project area as demarcated by the layouts • The project site servitude must be clearly demarcated to avoid unnecessary large-scale disturbances to adjacent areas. • Vegetation clearance for construction of the instream earth-filled dam must be limited to demarcated footprint. A 15m buffer along the project site must be considered, and no development and stockpiling should take place outside 15 buffers of the site. • Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.	CM & SHE Officer	Pegging of 15m buffer servitude along the construction corridor	Construction Phase	ECO	Monthly	15m buffer servitude along the construction corridor in visible.

Impact Management Outcome: Zero to minimal negative environmental impacts on wetland, riparian, and instream habitat.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Natural features such as trees or grasslands should not be removed from the dam margins in order to provide submerged habitats in the form of roots and overhanging vegetation for the aquatic biota. • Vegetation at riparian zones adjacent the vicinity of the instream earth-filled dam must remain intact where possible, to limit high surface flows and mobilisation of sediments.						
• Site Site camp must be located outside the riparian and at least 100m away from the watercourse at relatively flat area. Most preferable the site camp must be established with Kokstad Research Station complex.	CM & SHE Officer	Site Camp Layout & Identification of Location	Construction Phase	ECO	Monthly	Demarcation and Buffer for sensitive receptors

13.6 Surface Water Pollution and Degradation of Watercourses

Table 15: Managing Potential Impacts in Surface Water Quality and Degradation of Watercourses

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• All work to be done within the riparian, instream habitats, and wetlands must be carried out during low flow conditions, and dry periods. • It is prudent however to be prepared for increased flows by scheduling work according to the weather forecast and to be adequately prepared for unexpectedly large runoff from a sudden storm. • It is highly recommended that construction of the dam and pipeline commence during the dry season so as to limit the amount of sediment which may run off into the tributary.	PM, CM & SHE Officer	Method Statement for working within watercourse. Prepare for increased flows by scheduling work according to the weather forecast and to be adequately prepared for unexpectedly large runoff from a sudden storm.	Construction Phase	ECO	Monthly	Work scheduled according to forecast projection No signs of banks incision and high level of turbidity

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• All All clearance and excavations within the riparian and instream habitat for the purpose of construction of the instream earth-filled dam must be limited to areas as demarcated and approved by the project plans. • Vegetation clearance for construction of the instream earth-filled dam must be limited to demarcated footprint. A 15m buffer along the dam footprint must be considered, and no development and stockpiling must take place outside 15 buffer of the dam footprint. • All stockpiles must be established outside the buffer of all watercourses and on relatively flat ground at least 32m away	CM & SHE Officer	Install buffers to restrict development from encroaching onto sensitive environments, through visible pegging Schedule Fines	Construction Phase			Buffer through Visible pegging Schedule fines in place

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
from the watercourse within a relatively flat areas.						
• No construction machinery must be operated direct into the instream habitat, except where cofferdam is in place. The use of heavy machinery (excavator) within the watercourse must be closely supervised. If possible, the excavator must only be positioned as far as possible away from the water edge, as it stretches the bucket to excavate the instream habitat. • A one-way running track must be established across the riverbed for the excavators to move along. The running track must be shielded by a coffer dam and be	CM & SHE Officer	Method Statement for working within watercourse. Coffer Dams Construction Method Statement Construction Method Statement	Construction Phase	ECO	Monthly	Coffer dam in place. Monitoring Plan.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
constructed of a rock base overlain by coarse aggregate. • The use of heavy machinery (excavator) within the flowing river must be avoided as far as practically possible. The excavator be only position as far as possible within a riparian/riverbanks.						
• In the case that coffer dams are used to divert flow for construction purposes, these structures must be temporary in nature and be removed from the river immediately after the required construction has been completed. • No construction of an artificial channel outside of the watercourse habitats for water diversion purposes will be permitted. Therefore, the de-	CM & SHE Officer	Monitoring plan must be developed in order to quantify the impact on the watercourses.	Construction Phase	ECO	Monthly	Coffer dam structure intact. Monitoring Plan. Surface Water Quality Monthly Results.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
watering process from the coffer dams should involve piping the water directly to the active channel downstream of the site as, or if, required. • A dewatering site must be identified in conjunction with the ECO and must be on flat ground away from the edge of the stream channel and preferably in a well vegetated area. • Water diversion must be temporary and re- directed flow must not be diverted towards any stream banks that could cause erosion and siltation. • Pumped water must be discharged into a silt trap/hay-bale trap adequately sized to deal with the expected volumes. Outflow from this trap should be						

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
via sheet flow and energy dissipation measures may be required. • In the case that coffer dams are used to divert flow for construction purposes, these structures must be temporary in nature and be removed from the river immediately after the required construction has been completed.						
• Excavator must be parked 32m away from the watercourse and only parked on the designated bunded areas and dip trays must be placed under the machinery, when not used to capture any possible hazardous substance leaks. • It is required that Construction Machinery not to be left along the riverbanks at after shift but to be	CM & SHE Officer	Environmental Site rules. Construction Method Statement	Construction Phase	ECO	Monthly	Delineated Parking Areas for excavator. Dip tray in place

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
parked at site camp within a delineated parking area						
• All watercourses must be protected from direct and indirect spills, and debris from entering into watercourse. • No disposal of any substance, such as concrete cement, oil or bitumen, within the watercourses is permitted.	CM & SHE Officer	Monitoring Plan. Spill contaminant procedures	Construction Phase	ECO	*Ad hoc* basis	Monitoring Plan. Coffer dam. Water quality test results as per scheduled activities
• Material excavated from the trench must be stored away from river and away from the proposed dewatering areas. To avoid mixing, the excavated trench material must be placed on a geotextile. • All stockpiles must be established outside the buffer of all watercourses and on relatively						

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
flat ground at least 32m away from the watercourse. • Material excavated from the trench must be stored away from river and away from the proposed dewatering areas. To avoid mixing, excavated trench material must be placed on a geotextile. • Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation.						
• The Contractor shall protect all areas susceptible to erosion and shall take measures, to the approval of the PPA. • After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded.	CM & SHE Officer	Monitoring Plan. Storm water management plan. Construction Method Statement	Construction Phase	ECO	Monthly	Checklists, Measurement of Downstream Turbidity (water quality) and *in-sutu* run-off.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Prevent pollutants from entering drainage lines in amounts that exceed the systems' natural ability to assimilate the pollutants and provide the desired functions.						
• Should the outcrop is intercepted within the vicinity of the instream dam, the excavator will access the river to clear boulders etc and where required a hydraulic breaker will be used to break any bedrock encountered. • Rock blasting will never be allowed within the watercourse.	CM	Construction Method Statement	Construction	ECO	Monthly	Best Construction Practice. Adherence to Construction Method statement
• The contractor must monitor the effect of construction on downstream, sediment loads when flow is occurring. • The monitoring program shall include sampling in the water upstream and downstream of the	CM &SHE	Monitoring Plan Schedule activities to take place at low flow condition and dry period.	Construction Phase	ECO	Monthly	Water Quality Monitoring. No downstream sediment loads/ turbidity under controlled.

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
works during the period when construction in the stream is taking place. • Sampling times shall be selected to correspond with any periods of higher sediment load.						Work conducted within low flow condition.
• Disturbed watercourse habitat must be rehabilitated as soon as construction in an area is complete or near complete and not left until the end of the project to be rehabilitated. • Rehabilitate all watercourses in accordance with DWS approved Rehabilitation and Maintenance Plan	CM &SHE	Rehabilitation Plan Stormwater Management Plan	Construction	ECO	Monthly	Progressive Rehabilitation Plan, and Stormwater Management plan
• Potential stormwater run-off from hard surfaces requires careful attention to ensure that the nearby watercourse is not negatively impacted by	CM &SHE	Rehabilitation Plan Stormwater Management Plan	Construction	ECO	Monthly	Progressive Rehabilitation Plan, and Stormwater Management plan

Impact Management Outcome: Zero to minimal negative environmental impacts on watercourses.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
sedimentation and run-off carrying oil, grease, hydrocarbons and/or harmful chemicals. • Excavation must minimise the transport of sediment.						
• No water is to be abstracted from the local rivers and streams without license or authorisation. • The water to be used during construction will use metered water supplied by the Kokstad Research Station with the provision of existing water within the project locality. The water use will include water for construction, consumption, equipment cleaning and hygiene as well as dust suppression where required.	CM &SHE	Water allocation and Site Rules	Construction Phase	ECO	Monthly	Water allocation and Service Agreement Letter

13.7 Groundwater Pollution

Table 16: Mitigation for Groundwater Pollution

Impact Management Outcome: Zero to minimal impact as a result from hazardous substances having the potential to enter the soil and groundwater.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Suitable storage facilities for handling and storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used; must be provided to prevent the migration of spillage into the ground and possible ingress into the groundwater regime. • Hazardous storage and refuelling areas must be bunded prior to their use on site during the construction period following the appropriate SANS codes. The bund wall should be high enough to contain at least 110% of any stored volume. The surface of the bunded surface should be graded to the centre so that spillage may	CM &SHE	Bunded Surface for Storages & Locked	Construction Phase	ECO	Monthly	Bunded Cage

Impact Management Outcome: Zero to minimal impact as a result from hazardous substances having the potential to enter the soil and groundwater.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
be collected and satisfactorily disposed of.						
• Machinery must be parked on the designated bunded areas and dip trays must be placed under the machinery showing some signs of leak, when not used to capture any possible oil leaks. • Vehicle maintenance must not take place on site unless a specific bunded area is constructed for such a purpose.	CM &SHE	Parking demarcation	Construction Phase	ECO	Monthly	Dip Trays in place where there are signs of leaks Spill Kits in Place
• Implement protocols and emergency responses for accidental leakages or release of contaminants into environment. • All necessary equipment for dealing with spills of fuels/chemicals must be available at the site. Spills must be cleaned up immediately and contaminated	CM &SHE	Spill Contaminant Procedures	Construction Phase	ECO	Monthly	Spill Kits Incident Report

Impact Management Outcome: Zero to minimal impact as a result from hazardous substances having the potential to enter the soil and groundwater.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
soil/material disposed of appropriately at a registered site. Portable clean-up kits must be available on site to undertake immediate clean-up, should a spill occur.						
• Contaminated water containing fuel, oil or other hazardous substances must never be released into the environment. It must be disposed of at a registered hazardous landfill site.	CM &SHE	Spill Contaminant Procedures	Construction Phase	ECO	Monthly	Spill Kits Incident Report
• Cement mixing must be done on impervious surface (concrete or shatter board)	CM &SHE	Site Rules	Construction Phase	ECO	Monthly	Shatter Boards for mixing on

13.8 Mitigation of the alteration of flow regimes

Table 17: Mitigation of the alteration of flow regime

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Pre-development site hydrology (i.e., runoff, infiltration, interception, evapotranspiration, groundwater recharge, and stream baseflow) must be preserved as far as possible. • If it is necessary that the flows require diversion in order for the work to be carried out, the flows must be returned to their original pathways and velocities post establishment.	CM & SHE Officer	Construction Method Statement	Construction Phase	ECO	Monthly	No siltation and impounding within a working area
• All Excavation at riparian zones must not be undertaken during wet (rainy) periods or peak flow periods. The activities within watercourse must only be undertaken during agreed working times and permitted	CM & SHE Officer	Site Rules/Toolbox Talks Construction Method Statement Weather projections	Construction Phase	ECO	Monthly	Site Rules/Toolbox Talks Construction Method Statement Weather projections

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
weather conditions. If heavy rains are expected, the clearing and excavation activities must be put on hold. In this regard, the contractor must be aware of weather forecasts. It is recommended to undertake majority of the construction activities during the drier months. • After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded.						
• Construct and maintain earth berm to prevent flooding and sedimentation during construction.	CM & SHE Officer	Construction Method Statement along erosion susceptive areas	Construction Phase	ECO	Monthly	Earth berm on erosion susceptive areas
• To only use temporary cofferdams to divert flow for construction purposes. Only during low flow conditions.	CM & SHE Officer	Construction Method Statement	Construction Phase	ECO	Monthly	No alteration of flow regime (No upstream impoundment) ,

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The use of silt fences or hay bales to isolate the construction area from the water body in situations where the flow velocities and volumes are low. • Minimise influence on downstream flow regime when diverting and impeding flow (cofferdams, earth berms etc). Use suitable stabilisation structures to prevent. • Temporary pumping sump must be designed to achieve optimum hydraulic performance.						Best construction practice, and adherence to construction method statement
• No construction of an artificial channel outside of the watercourse habitats for water diversion purposes will be permitted. Therefore, the de-watering process from the coffer dams should involve piping the	CM & SHE Officer	Construction Method Statement	Construction Phase	ECO	Monthly	Best construction practice, and adherence to construction method statement

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
water directly to the active channel downstream of the site as, or if, required. • If it is necessary that the flows require diversion in order for the work to be carried out, the flows must be returned to their original pathways and velocities post establishment. • Minimise impervious surfaces and maximise infiltration by maintaining vegetation as far as possible to convey and hold surface runoff and provide for a slow release into the receiving environment.						
• Stormwater management measures must be implemented in order to minimise diverted flows as the result of rains and prevent the siltation and sedimentation of	CM& SHE Officer	Stormwater management plan *In-sutu* Stormwater systems	Construction Phase	ECO	Monthly	Checklists for storm water management, Adherence to stormwater management plan

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
nearby watercourse also minimise the impacts of the disturbed areas. • Stone pitching or gabions will be required to prevent further incision in areas where the banks of channels are incised, and these banks must be stabilised to prevent further gully erosion. • A rock mattress must be created at the downstream outlet of the flume pipe to reduce erosion at this point to the satisfaction of the ECO. • Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation. • Reno mattresses or gabions may be required to prevent further incision in areas where the banks						

Impact Management Outcome: Zero to minimal impact as a result of soil removal and/ infilling or deposition within a watercourse.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
of channels are incised and these banks must be stabilised for the pipeline.						
• Excavations must not be left open for an extended period, and must not be undertaken until such time that all required materials are available on-site, to facilitate immediate laying of the construction of subsurface infrastructure; • Stockpiles must not be more than 2m in height, and stored 32m away from the watercourse.	CM	The use of Just in Time (JiT) production model Stormwater management plan Construction Method Statement	Construction Phase	ECO	Monthly	Adherence to, Construction Method statement, Excavation checklists.

13.9 Stormwater Management

Table 18: Stormwater Management

Impact Management Outcome: Zero to minimal impact as a result of run-off and surface water ponding due to vegetation clearance and excavation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• The design of the storm water system must make provision for erosion protection. • To mitigate against banks incision the appropriate erosion control measures that include a combination of stone pitching, gabion baskets and mattresses, energy dissipaters and grass lined drains are essential. • Within the areas of the proposed development, it is considered essential to effectively control and dispose of storm water and runoff, as uncontrolled runoff can cause damage to adjacent properties and can erode and destabilize fill embankments.	PM & CM	Construction Method Statement	Construction Phase	ECO	Monthly	No alteration of flow regime (No upstream impoundment) , Best construction practice, and adherence to construction method statement

Impact Management Outcome: Zero to minimal impact as a result of run-off and surface water ponding due to vegetation clearance and excavation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Stormwater management measures must be implemented in order to minimise diverted flows as the result of rains and prevent the siltation and sedimentation of nearby watercourse also minimise the impacts of the disturbed areas. • The Stormwater drainage system must be linked environmental requirements so as to avoid any legal issues (i.e. any activity triggering the NEMA No. 107 of 1998 EIA Regulation of 2014, as amended on 07 April 2017 amended, and Section 21 of the NWA No 36 of 1998, WULA).	CM& SHE Officer	Stormwater management plan *In-sutu* Stormwater systems	Construction Phase	ECO	Monthly	Checklists for storm water management, Adherence to stormwater management plan
• All excavation at riparian must not be undertaken during wet (rainy) periods or peak flow condition.	CM & SHE Officer	Site rules	Construction Phase	ECO	Monthly	Site rules, no signs of banks incision by erosion.

Impact Management Outcome: Zero to minimal impact as a result of run-off and surface water ponding due to vegetation clearance and excavation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Sediment barriers must be installed in areas sensitive to erosion to prevent stream siltation. • After every rainfall event, the contractor must check the site for erosion damage and immediately repair any damage recorded.	CM &SHE Officer	Record rain and take photographs. Progressively repair any sign of bank incision.	Construction Phase	ECO	Monthly	Rain records and site photographs
• Exposed soils must be vegetated as soon as possible in order to impede surface runoff and inhibit erosion of the surface soils. • Stone pitching or gabions will be required to prevent further incision in areas where the banks of channels are incised, and these banks must be stabilised to prevent further gully erosion.	CM &SHE Officer	Rehabilitation (Progressive Rehabilitation)	Construction Phase & Operational Phase	ECO	Monthly	No evidence of run-off and bare soils

13.10 Protection of fauna

Table 19: Fauna and red data species protection

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• If possible, the clearance of vegetation should commence during non-breeding season of fauna species (i.e., winter). • The construction corridors must be surveyed for potential habitats such as burrowing and roasting sites, prior to site clearance in order to delineate and buffer the areas, where not possible to relocate them. • An ecologist must conduct a walk through prior to vegetation clearing to relocate Fauna SCC. A suitable habitat just outside of the development site exists in the Mount Currie Nature Reserve of which these animal species can be relocated to.	CM &SHE Officer	Pre-site walkout and relocation of fauna species Construction corridor demarcation	Construction Phase	ECO	Monthly	Construction corridor demarcation

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• During site preparation, special care must be taken during the clearing of the works area in order to minimize damage or disturbance of roosting and nesting sites. • The construction corridor must be surveyed prior clearance to locate animal species who mighty be foraging, roasting or nestling within the construction corridor. • The construction corridors must be surveyed for potential habitats such as burrowing and roasting sites, prior to site clearance in order to delineate and buffer the areas, where not possible to locate them. • The project area must be surveyed for potential animal SCC prior to construction in order	CM &SHE Officer	Pre-site walkout and relocation of fauna species Construction corridor demarcation	Construction Phase	ECO	Monthly	Construction corridor demarcation

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
to locate, capture and relocate any animal SCC.						
• Install buffers to restrict development from encroaching into sensitive environments. • Install buffers through visible pegging with construction barricades to restrict development from encroaching the sensitive environment. • Construction activities must be limited to the designated development footprint.	CM &SHE Officer	Buffer Demarcation	Construction Phase	ECO	Monthly	Visible Pegging and Barricades
• Avoid habitat fragmentation and allow for fauna migration corridors. • Walkways must be constructed allowing for animals to escape from the pipeline trenches, with an aid of a Herpetologist/Ecologist.	CM &SHE Officer	Walkways within trenches	Construction Phase	ECO	Monthly	Trenches have walkways

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• If any herpetological species are encountered or exposed during the construction phase, these must be removed and relocated to natural areas in the vicinity. This remedial action requires the employment of a herpetologist and or ecologist to oversee the removal of any herpetofauna during the initial ground clearing phase of construction (i.e., initial ground-breaking by earthmoving equipment). It is advisable that the earthworks be confined to the dry season, when there is likely to be less faunal movement.						
• During construction special care must be taken to avoid prevent migration of species which are endemic to the project area or a loss of animal species currently	CM & SHE Officer	Pre-site walkout and relocation of fauna species	Construction Phase	ECO	Monthly	Construction corridor demarcation

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
found on site, animals with limited mobility are often the first to be affected by habitat fragmentation due to the effects on population viability as reptiles, bird species, small mammals, and invertebrates may be disintegrated into distinct populations.		Construction corridor demarcation				
• Aquatic species must be protected during construction. Inspect for aquatic species existence before temporary construction of coffer dams for dewatering and concrete pouring. Should any species be found it must be moved to further areas onsite. • Wetland fauna (e.g., birds, snakes, frogs, small mammals) that are encountered during the	CM & SHE Officer	Survey and monitoring plan	Construction Phase	ECO	Monthly	Buffer determination in place. No limitation to aquatic species movement.

Impact Management Outcome: Zero to minimal negative environmental impacts on all fauna and red data species.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
construction phase must be relocated to other parts of the wetland under the guidance of the EO or ECO.						
• The Contractor must ensure that the work site is kept clean, tidy and free of rubbish at all times, to prevent attracting animals.	SHE Officer & CM	Waste management	Construction Phase	ECO	Monthly	Photographs, receipts (registers), checklists. Site Rules
• No faunal species are to be disturbed, trapped, hunted or killed.	SHE Officer & CM	Site rules	Construction Phase	ECO	Monthly	Environmental Rules Attendance Register.

13.11 Waste management

Table 20: Waste Management

Impact management Outcome: All general and hazardous waste will be managed to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
General waste management: • Have sufficient bins for waste disposal. Refuse must be removed regularly to licensed landfill sites; disposal certificates need to be kept in the Environmental File. Waste that is produced must be kept on-site and managed to prevent nuisance such as litter and dust.	CM & SHE Officer	Integrated Waste Management approach: segregation of waste into separate bins	Construction Phase	ECO	Monthly	Photographs, way-bills, receipts, checklists. Site Rules.
Hazardous waste: • Hazardous waste must be stored in a secured waste receptacle. • All material contaminated with oils or hazardous material must be disposed of as hazardous waste. Waste bins need to be emptied/collected weekly by	SHE Officer & CM	Hazardous Waste Management	Construction Phase	ECO	Monthly	Waste manifest, (disposal certificates), Registers, Checklist, and Photographs.

Impact management Outcome: All general and hazardous waste will be managed to ensure zero to minimal negative environmental impacts.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
contractors and waste manifest signed by the site manager. • Hazardous waste must be disposed of at a licensed facility and all records of waste manifest & disposal certificates needs to be kept in the Environmental File.						
Health Care (medical) Waste • Have separate "one-way" waste bins to dispose of medical waste. Do not mix medical waste with any other waste. Waste bins must be clearly marked and stored in safe place. • Waste bins need to be emptied/collected regularly by contractors and waybills signed by the site manager. Medical waste must be disposed at the designated landfill site.	SHE Officer & CM	Health Care Waste Management Plan	Construction Phase	ECO	Monthly	Waste manifest, disposal certificates, Registers, Checklist, and Photographs.

13.12 Mitigation of Impacts on Paleontological, Heritage and/or archaeological sites

Table 21: Mitigation on Paleontological, Cultural Heritage and archaeological sites

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Excavation for instream earth-filled dam the at riparian zone must only be limited to development area as approved by project plans • A 15m buffer along the project site must be considered, and no development and stockpiling should take place outside 15 buffer of the site. • Any contractor found working within No-Go areas must be fined as per fining schedule/system setup for the project.	CM	Demarcation of construction corridor through visible pegging Fining schedule	Construction Phase	ECO	Monthly	Clear Demarcation of construction corridor
• Regular Archaeological Watching Briefs must be carried out during construction in case any chance findings are made.	PM, ECO, CM, SHE Officer & Heritage Practitioner	Site rules Archaeological Watching Briefs	Construction Phase	ECO	Monthly	Checklist, reports and photographs.

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• A Chance Finds Procedure (CFP) must be implemented where possible heritage finds are uncovered/ discovered: • Should any artefact or heritage resource be encountered, the contractor is advised to stop the operation immediately, report to the ECO who must refer the matter to the KZN Amafa and Research Institute. • a heritage practitioner / archaeologist must be engaged in the event that any possible heritage resources or artefacts are identified.						
Chance Find Procedures for Heritage Artefact • All construction activity in the vicinity of the accidental find/feature/site must cease	CM/SHE Officer	Heritage CF Procedure through induction training	Construction	ECO	Monthly	Proof of register. Adherence to all requirements for CF Protocol

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
immediately to avoid further damage to the site. • Briefly note the type of archaeological materials you think you've encountered, its location, and if possible, the depth below surface of the find. • Report your discovery to your supervisor or if they are unavailable, report to the project ECO who will provide further instructions. • If the supervisor is not available, notify the ECO immediately. The ECO will then report the find to the Manager who will promptly notify the project archaeologist and Amafa/SAHRA. • Delineate the discovered find/ feature/ site and provide a 25m	CM/SHE Officer	Heritage CF Procedure through induction training	Construction	ECO	Monthly	Proof of register. Adherence to all requirements for CF Protocol

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
buffer zone from all sides of the find						
Chance Find Protocol for Palaeontology only required if fossils are seen on the surface and when excavations commence: • When excavations begin the rocks and discard must be given a cursory inspection by the environmental officer or designated person. Any fossiliferous material (plants, insects, bone or coal) should be put aside in a suitably protected place. This way the project activities will not be interrupted. • Photographs of similar fossils must be provided to the developer to assist in recognizing the fossil plants, vertebrates, invertebrates or trace fossils in the shales and	CM/SHE Officer	Palo CF Procedure through induction training/Toolbox Talks	Construction	ECO	Monthly	Proof of register. Adherence to all requirements for CF Protocol

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
mudstones. This information will be built into the EMP's training and awareness plan and procedures. • Photographs of the putative fossils can be sent to the palaeontologist for a preliminary assessment. • If there is any possible fossil material found by the developer/environmental officer then the qualified palaeontologist sub-contracted for this project, should visit the site to inspect the selected material and check the dumps where feasible. • Fossil plants or vertebrates that are considered to be of good quality or scientific interest by the palaeontologist must be removed, catalogued and housed in a						

Impact Management Outcome: Zero to minimal negative environmental impacts on heritage resources, especially graves						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
suitable institution where they can be made available for further study. Before the fossils are removed from the site an AMAFA or SAHRA permit must be obtained. Annual reports must be submitted to AMAFA and SAHRA as required by the relevant permits.. • If no good fossil material is recovered, then no site inspections by the palaeontologist will be necessary. A final report by the palaeontologist must be sent to AMAFA and SAHRA once the project has been completed and only if there are fossils. • If no fossils are found and the excavations have finished, then no further monitoring is required.						

13.13 Soil Management

Table 22: Soil management during excavation

Impact Management Outcome: Soil conservation and prevention of soil erosion						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Prior to commencing with earthworks, the topsoil must be stripped and stockpiled separately from subsoil, if necessary. And must be kept for use during rehabilitation of disturbed areas	CM, SHE Officer	Site rules. Rehabilitation Plan.	Construction Phase	ECO	Monthly	Checklist and photographs
• Excavated material including topsoil must be stockpiled in stockpiles not exceeding 2m in height, in ideally flat area 32m away from the watercourse.	CM & SHE Officer	Checklist and site rules	Construction Phase	ECO	Monthly	Checklist and photographs.
• If at risk of being eroded, all stockpiles must be secured with sandbags around the base of the soil stockpile. And regularly be monitored to be kept free of weeds and invasive alien plants.	CM & SHE Officer	Site Rules, and Checklist	Construction Phase	ECO	Monthly	Checklist, and Photographs.

13.14 Backfilling and site levelling

Table 23: Backfilling and levelling excavated areas

Impact Management Outcome: Soil conservation and prevention of soil erosion						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Removed soil is to be used to backfill trenches. • Where *in-sutu* material is not suitable for infilling, the infill material must be obtained from approved borrow pits. • Excess topsoil is to be spread evenly over the area in a manner that blends in with the natural topography.	CM & SHE Officer	Site Rules, Checklist, and Rehabilitation Plan	Construction Phase	ECO	Monthly	Checklist and photographs. Checklist, Waybills and photographs.
• Excess sand and soil resulting from levelling activities of the work area must be stored in low heaps (less than 2m in height) either on the access road or already disturbed area.	CM & SHE Officer	Checklist	Construction Phase	ECO	Monthly	Checklist and photographs.

13.15 Air quality

Table 24: Air quality management

Impact Management Outcome: Air pollution is minimized through the application of dust prevention measures and good vehicle maintenance						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Control all dust emanating from site due to project activities. • Minimise or avoid dust generating activities during high winds. • Minimising vegetation clearance, implement clearing in stages, at the areas demarcated for project and apply dust suppression actions when required to stabilise cleared soil. • Surrounding neighbours must be informed if excessive dust will be generated. • Soil stockpile be wetted for dust suppression.	CM & SHE Officer	Dust suppression.	Construction Phase	ECO	Monthly	Checklist and photographs. No complaint
• Control dust emanating from stockpiles, construction access roads, site construction activities, and from movement of construction vehicles.	CM & SHE Officer	Dust suppression, Stockpile checklist, and regular cleaning of construction vehicles.	Construction Phase	ECO	Monthly	Checklist and photographs. Zero complaints

Impact Management Outcome: Air pollution is minimized through the application of dust prevention measures and good vehicle maintenance						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible Person**	**Frequency**	**Proof of compliance**
• Minimize emissions resulting from construction activities.	CM	Servicing construction vehicles to meet emission requirement.	Construction Phase	ECO	Monthly	Checklist Zero complaints
• All fine products must be covered during transportation.	CM & SHE Officer	Site Rules and Checklist	Construction Phase	ECO	Monthly	Checklist and photographs.
• Prevent air pollution by avoiding or minimizing the lighting of fires No open fires at construction sites. Cooking must be done at designated areas under controlled conditions to avoid spreading of fires.	CM & SHE Officer	Site Rules	Construction Phase	ECO	Monthly	Photographs. Zero complaints

13.16 Servicing and re-fuelling and emergency response

Table 25: Servicing and refuelling

Management Impact Outcome: Avoid or minimise soil, surface water, and groundwater contamination						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Suitable storage facilities for handling and storage of oils, paints, grease, fuels, chemicals, and any hazardous materials to be used; must be provided to prevent the migration of spillage into the ground and possible ingress into the groundwater regime. • Hazardous storage and refuelling areas must be bunded prior to their use on site during the construction period following the appropriate SANS codes. The bund wall should be high enough to contain at least 110% of any stored volume. The surface of the bunded surface should be graded to the centre so that spillage may be collected and satisfactorily disposed of.	CM & SHE Officer	Spill Contaminant Procedures Site Rules	Construction Phase	ECO	Monthly	Bunded Cage

• Designate a bunded area for servicing of vehicles at the construction site camp • Use a dip tray in case of emergency repairs outside the workshop area. • Check vehicles regularly for fuel and oil leaks and repair immediately.	CM & SHE Officer	Checklist Portable Spill Clean-up Kits	Construction Phase	ECO	Monthly	Checklist, Photographs Zero incidents
• Refuel vehicles only by means of a pump and in a bunded area created for refueling.	CM & SHE Officer	Site Rules, Spill kits Checklist	Construction Phase	ECO	Monthly	Photographs Checklists
• Implement protocols and emergency responses for accidental leakages or release of contaminants into environment. • In case of oil spillages on site, clean spills immediately using appropriate spill kits. Treat and dispose contaminated soil and materials used as hazardous waste	PM, CM & SHE Officer	Spill Contaminant Procedure	Construction Phase	ECO	Monthly	Incident Register Checklist Photographs.

13.17 Fire prevention and emergency response

Table 26: Fire prevention and emergency response

Management Impact Outcome: Prevention and control of fires and the spread of fires						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• The Contractor must take all the necessary precautions to ensure that fires are not started as a result of activities on site. • The Contractor must ensure that there is adequate fire-fighting equipment at the fuel stores. • No open fires for heating or cooking will be permitted on site, unless otherwise agreed and then only designated areas, under controlled conditions.	CM & SHE Officer	Site Rules, Checklist and Emergency Preparedness Plan	Construction Phase	ECO	Monthly	Checklist, Photographs, Zero Incidents
• Smoking must be prohibited in the vicinity of flammable substances	CM & SHE Officer	Site Rules and Designated Smoking Areas	Construction Phase	ECO	Monthly	Photographs Checklists
• The workforce must be regularly made aware of fire prevention and basic firefighting measures.	SHE Officer	Emergency Preparedness Plan	Construction Phase	ECO	Monthly	Induction Register
• Emergency procedure must in place, and communicated to all persons onsite	SHE Officer	Induction, toolbox talks, simulation excise/drill	Construction Phase	ECO	Monthly	Register

13.18 Public safety and traffic accommodation

Table 27: Road crossing, pipe jacking and construction vehicle movement

Management Impact Outcome: Management of traffic during construction to minimise disruptions and safety risks to all road users.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Prevent motor vehicle incidents to the general public, at construction vehicle turning point from main road to site and from site to main road.	PM, CM & SHE Officer	Temporary traffic signs at strategic points from both side of the traffic. Flagmen during turning of large haulers.	Construction Period	ECO	Monthly	Photographs, Zero incidents
• Establish the temporary speed limit at an approach to construction vehicle turning point. To be adhered to make sign visible to all motorist	CM & SHE Officer	Temporary traffic sign with speed limit.	Construction Period	ECO	Monthly	Photographs, Zero incidents
• Temporary signing, traffic control signals, delineators, message boards, used for traffic accommodation in the work zone shall be visible by motorists and pedestrians.	CM & SHE Officer	Adhere to safety standards	Construction Period	ECO	Monthly	Checklist, Photographs

13.19 Invasive alien species

Table 28: Control of invasive alien species

Management Impact Outcome: Prevent the spread of invasive alien plants						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• All invasive alien plants must be removed from areas under construction. • The control and eradication of a listed invasive species must be carried out by means of methods that are appropriate for the species concerned and the environment in which it occurs. • Prevent the spread of invasive alien plants by avoiding excessive vegetation clearing and leaving areas open	CM & SHE Officer	Alien removal plan	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs
• Alien plant management is an on-going process, and it may require repeated control efforts in order to significantly reduce the abundance of a species. Repeated control usually results in rapid decline once seed banks become depleted.	CM & SHE Officer	Alien removal plan	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs

Management Impact Outcome: Prevent the spread of invasive alien plants						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Manual methods such as cutting, weeding out, hoeing, or pulling out by hand of alien invasive plants are recommended.	PM, CM & SHE Officer	Alien removal plan	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs
• Soil stockpiles must not be kept for extended periods as alien invasive plants will germinate and grow on such stockpiles.	PM, CM & SHE Officer	Checklist, JIT Method and Rehabilitation plan	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs
• Prevent the transportation of alien invasive plants from borrow pits to other areas • Minimise movement of topsoil from one area to another to prevent the spread of alien invasive plants.	PM, CM & SHE Officer	Approved borrow pits		ECO	Monthly	Registers and checklist
• Always thrive to use mechanical methods for removal of alien invasive plants	PM, CM & SHE Officer	Clearing methods	Construction and rehabilitation phase	ECO	Monthly	Checklist, photographs

13.20 Noise

Table 29: Noise management during construction

Management Impact outcome: To minimise or prevent unacceptable noise levels during construction activities and at certain times of the day or week.						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• In recognition of the inherently noisy and temporary nature of construction activities, specify standard construction hours during which the usual fixed noise limits do not apply. • Avoid shouting or loud conversations especially in the early or late hours of the day.	CM	Shift must be between (07h00-17h00)	Ongoing	ECO	Monthly	Zero complaints Time sheets
• Minimise noise from construction activities to avoid impacts on human health and well-being • If certain construction activities require work outside the stipulated hours, all adjacent landowners must be informed prior to commencement of such activities.	CM	Commencing of any particularly noisy part of the activity must be after 09h00, and not on Sundays.	During site establishment and ongoing	ECO	Monthly	Zero complaints Filling records.
• Minimise noise emanating from construction vehicles and equipment.	CM	All equipment, vehicles, equipped with sound mufflers if necessary.	Construction phase	ECO	Monthly	Zero complaints,

14 POST CONSTRUCTION

14.1 Site camp decommissioning

Management Impact outcome: Remediate/rehabilitate any negative environmental impacts at the site						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Remove all structures from site camp. All temporary structures, materials, waste, and facilities used for construction activities are removed upon completion of the project.	CM & SHE Officer	Site Close-out Report Rehabilitation plan	During site camp decommissioning	ECO	Upon completion of the project	Close-out report Checklist, photographs
• Use stockpiled topsoil to rehabilitate the construction site camp. • Fully rehabilitate all disturbed areas and ensure erosion measures are in place. • Only local indigenous plants must be considered for re-vegetation of the site. Such plants are able to establish themselves easily	CM & SHE Officer	Checklist	Once, During site camp decommissioning	ECO	Upon completion of the project	Checklist, photographs

14.2 Site clean-up and rehabilitation

Table 30: Site clean-up and rehabilitation

Management Impact Outcome: Site restoration to approximate original state						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• The Contractor must ensure that all temporary structures, materials, waste, and facilities used for construction activities are removed upon completion of the project. • All waste must be disposed of responsibly, following five-step hierarchy of waste management • Fully rehabilitate all disturbed areas and protect ensure erosion controls are in place, where necessary • Only local indigenous plants must be considered for re-vegetation of the site. Such plants are able to establish themselves easily • Before placing topsoil, all visible weeds from the placement area and from the topsoil must be removed	PM, CM & SHE Officer	Rehabilitation plan	During site camp decommissioning	ECO	Upon completion of the project	Checklist, photographs

15 OPERATIONAL PHASE

15.1 Surface Water Pollution During Operation

Table 31: Mitigation of Surface Water Pollution during operation of WWTW and SPS

Management Impact Outcome: Mitigation of surface water contamination during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Monthly water quality monitoring must be conducted for the first 6 months of the dam operation. • Efforts must be made to prevent fertilizer runoff into the watercourse through effective irrigation management. • Livestock are prohibited from grazing within the riparian zone of the watercourse to prevent animal waste runoff into the watercourse. • A management action plan must be set in place to deal with any significant deterioration in water quality. • The dam water quality must be in accordance with approved TWQR.	Proponent/Facility Manager	Management Action Plan Operational Plan TWQR	Operation	ECO	Ad hoc	Contingency Plan Riverine rehabilitation and monitoring plan

15.2 Soil erosion and geological degradation

Table 32: Mitigation for erosion during operation

Management Impact Outcome: Mitigation of erosion during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Construct storm water system and make provision for erosion protection. • Concrete lined upslope interception drains must be installed. • Installation of gabion baskets and mattresses, energy dissipaters and stone pitching • The disturbed watercourse habitat and rehabilitated areas must be monitored for potential erosion and scouring. This must initially take place immediately after construction, thereafter quarterly for two years and thereafter annually. • Conducting regular inspections and monitoring of the dam to detect any signs of seepage, such as wet spots, sinkholes, cracks within	Proponent/ Facility Manager	Stormwater Management Plan Proper design and construction of stone pitching. Rehabilitation Plan	Operation	ECO	*Ad hoc*	Stormwater Management System Rehabilitation Plan

Management Impact Outcome: Mitigation of erosion during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
stone pitching, or changes in water level or quality. • Adequate maintenance measures need to be implemented immediately when pipeline issues and failures are identified.						
• Stormwater management through regular inspection for evidence of sediment and debris build-up during wet season. • Follow the best practices and guidelines for spillway maintenance to ensure a reliable and safe operation of an impounding reservoir. • Managing the reservoir level and operation to avoid rapid fluctuations or overtopping that can increase seepage pressure and flow.	Proponent/ Facility Manager	Desilting Maintenance Plan	Operation	ECO	*Ad hoc*	Desilting Maintenance Plan

15.3 Hydrological Flow Regime During Operation

Table 33: Mitigation of Impact on Hydrology Flow Regime during operation

Management Impact Outcome: Mitigation of impact on hydrology flow regime during maintenance of site to meet its intended purpose during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Spillway design for the correct timing of water released from the dam in order to simulate natural seasonal variability. This will ensure that ecosystem services are maintained downstream. • Regular inspection for evidence of sediment and debris build-up during wet season and dry season, alternatively after heavy rainfall.	Proponent/Facility Manager	Best Practice Design Inspection for build-up siltation and inundation	Operation	ECO	*Ad hoc*	Inspection for build-up siltation and inundation
• Flow rates must be monitored to determine any excessive deviation from the natural state. If flow rates are drastically reduced, additional hydrological studies will be required such as an analysis of ecological/environmental water requirements, water balance as well as a hydrological yield analysis.	Proponent/Facility Manager	Hydrological Monitoring	Operation	ECO	*Ad hoc*	Hydrological Monitoring Inspection for build-up siltation and inundation

15.4 Degradation of Freshwater (aquatic) Habitat During Operation

Table 34: Mitigation of Impacts on Freshwater (aquatic) Habitat During Operations

Management Impact Outcome: Zero to minimal negative environmental impacts on aquatic habitat during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Rehabilitate all watercourses in accordance with DWS approved Rehabilitation and Maintenance Plan • Natural features such as trees or grasslands should not be removed from the dam margins in order to provide submerged habitats in the form of roots and overhanging vegetation for the aquatic biota.	Proponent/ Facility Manager	Implement Rehabilitation and Maintenance Plan	Operation	ECO	*Ad hoc*	Riverine rehabilitation
• Monitoring the sediment load and distribution in the dam basin and downstream channel using sediment sampling, bathymetric surveys, and remote sensing techniques.	Proponent/ Facility Manager	Hydrological Monitoring Desilting			*Ad hoc*	Hydrological Monitoring Desilting
• The introduction of invasive alien fish species such as *Micropterus salmoides* (Largemouth Bass) and *Cyprinus carpio* (Common Carp)	Proponent/Facility Manager	Aquatic biomonitoring	Operation	ECO	*Ad hoc*	Aquatic biomonitoring

Management Impact Outcome: Zero to minimal negative environmental impacts on aquatic habitat during operation						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
for recreational fishing purposes must not take place within the dam. Flood events can potentially result in these invasive species being transported to larger, more important, river systems.						

15.5 Alien Invasive Plant Species During Operation

Table 35: Control of Alien Invasive Plant Species During Operation

Management Impact Outcome: Prevent the spread of invasive alien plants						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• In terms of management, alien invasive plant control must be practiced on an on-going basis in line with the requirements of Section 2(2) and Section 3 (2) the National Environmental Management: Biodiversity Act (NEM:BA), which obligates the landowner/developer to control IAPs on their property. • The methods employed to control and eradicate a listed invasive species must also be directed at the new growth, propagating material and re-growth of such invasive species in order to prevent such species from producing offspring, forming seed, regenerating or re-establishing itself in any manner.	Proponent/Facility Manager	Establish and maintain an IAPs management programme.	Operation	ECO	*Ad hoc*	Checklists and Programme in place, and adhered to.

Management Impact Outcome: Prevent the spread of invasive alien plants						
Impact Management Actions	**Implementation**			**Auditing**		
	Responsible Person	**Method of Implementation**	**Implementation Period**	**Responsible person**	**Frequency**	**Proof of compliance**
• Where chemical treatment methods are used, the contractor must ensure the utilisation of watercourse friendly herbicides.						
• A conceptual riverine rehabilitation and monitoring plan with a focus on erosion and alien vegetation management should be compiled for the site.	Proponent/Facility Manager	Rehabilitation Plan	Operation	ECO	*Ad hoc*	Checklists Programme in place

16 MONITORING

Monitoring will be undertaken to determine whether construction activities are impacting on the environment and that the EMPr is being implemented. Therefore, the preparation of a monitoring plan as part of an EMPr will ensure that the monitoring is conducted effectively and consistently and will deliver reliable, good quality data. Monitoring, in the broad sense, can also include visual evidence as well as a complaint register.

Monitoring will be an ongoing process to ensure that non-conformity is corrected, and necessary steps are taken timeously, to prevent further environmental degradation.

17 CONCLUSION

The application of the measures outlined in this Environmental Management Programme (EMPr) must ensure that the operation will have a minimal impact on the environment. If the measures outlined are not strictly adhered to, the contractor or responsible party can be charged and fined in terms of applicable legislation, and the project stopped. This EMPr will, therefore, administer and manage all activities on the project site and the actions of all the employees and agents of the Contractor. This EMPr specifies the minimum environmental requirements to be implemented by the applicant as per the scope of works of the EMPr, in order to minimize and manage the potential environmental impacts and ensure sound environmental management practices are adhered to. It is essential that the EMPr requirements are carefully studied, understood, implemented, and adhered to at all the time by all relevant parties on this project.

This EMPr has been developed to set out actions to be taken and standards to be met in order to avoid, control, reduce or remediate adverse (negative) environmental impacts of the pipeline and associated infrastructure and to ensure compliance to:

- The Environmental Assessment findings and recommendations;
- Legislation obligations;
- Permit requirements (e.g., plant or heritage permits); and
- License conditions (e.g., EA or Water Use License)

APPENDICES

APPENDIX A. CIVIL DESIGN LAYOUT