Report No: 113223/12144

WORKING FOR WETLANDS REHABILITATION PROGRAMME, LIMPOPO

REHABILITATION PLAN

PROJECT: MUTALE

A92B

JUNE 2019

Agriculture, Forestry and Fisheries
Environmental Affairs
Water Affairs and Sanitation

Working for Wetlands

EXPANDED PUBLIC WORKS PROGRAMME
Creating opportunities towards human fullfilment

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REHABILITATION PLAN FOR THE MUTALE WETLAND PROJECT, LIMPOPO: PLANNING YEAR 2018/2019
AS PART OF
THE WORKING FOR WETLANDS PROGRAMME
FOR THE
DEPARTMENT OF ENVIRONMENTAL AFFAIRS
DIRECTORATE: WORKING FOR WETLANDS

MAIN REPORT
JUNE 2019

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PROJECT DETAILS

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CLIENT	Working for Wetlands Programme
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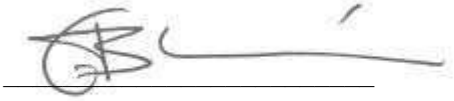

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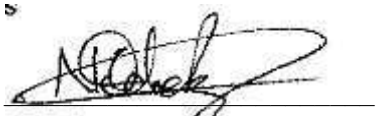

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WORKING FOR WETLANDS: CONTEXT DOCUMENT

1. Introduction

Working for Wetlands (WfWetlands) is a government programme managed by the Natural Resource Management (NRM) Programme of the Department of Environmental Affairs and is a joint initiative with the Departments of Water and Sanitation (DWS), and Agriculture, Forestry and Fisheries (DAFF). In this way the programme is an expression of the overlapping wetland-related mandates of the three parent departments, and besides giving effect to a range of policy objectives, it also honours South Africa's commitments under several international agreements, especially the Ramsar Convention on Wetlands.

The programme is mandated to protect pristine wetlands, promote their wise-use and rehabilitate those that are damaged throughout South Africa, with an emphasis on complying with the principles of the Expanded Public Works Programme (EPWP) and using only local Small, Medium and Micro Enterprises (SMMEs). The EPWP seeks to draw significant numbers of unemployed people into the productive sector of the economy, gaining skills while they work and increasing their capacity to earn an income.

2. Wetlands and their importance

Once considered valueless wastelands that needed to be drained or converted to more useful land use purposes, wetlands are now seen in an entirely different light. Today wetlands are more commonly perceived as natural assets and natural infrastructure able to provide a range of products, functions and services free of charge.

That which actually constitutes a wetland is often not fully understood. Common misconceptions have been that wetlands must be wet, must have a river running through them, or must always be situated in low-lying areas. The definition of a wetland is much broader and more textured: they are characterised more by soil properties and flora than by an abundance of water.

The National Water Act, No. 36 of 1998 defines a wetland as:

> *"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".*

The Ramsar Convention defines wetlands as:

> *"areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m" (Article 1, Ramsar Convention on Wetlands. 1971).*

Wetlands can therefore be seasonal and may experience regular dry spells (sometimes even staying dry for up to several years), or they can be frequently or permanently wet. Wetlands can occur in a variety of locations across the landscape (**Plate A**) and may even occur at the top of a hill, nowhere near a river. A pan, for example, is a wetland which forms in a depression. Wetlands also come in many sizes; they can be as small as a few square metres (e.g. at a low point along the side of a road) or cover a significant portion of a country (e.g. the Okavango Delta).

Plate A: A large, seasonal wetland identifiable by the characteristic flora. This wetland contained no surface water at the time of the photograph

Wetland ecosystems provide a range of ecological and social services which benefit people, society and the economy at large:

- Improving the ecological health of an ecosystem by performing many functions that include flood control, water purification, sediment and nutrient retention and export, recharge of groundwater, as well as acting as vital habitats for diverse plant and animal species.
- Providing ecological infrastructure replacing the need for municipal infrastructure by providing the same or better benefit at a fraction of the cost, for example:
    - The movement of water in the landscape is slowed down by wetlands, which offers the dual benefit of flood control as well as a means of purification.
    - The slow movement of water allows heavier impurities to settle and phreatic vegetation and micro-bacteria the opportunity to remove pollutants and nutrients.
- Functioning as valuable open spaces and create recreational opportunities for people that include hiking along wetlands, fishing, boating, and bird-watching.
- Having cultural and spiritual significance for the communities living nearby. Commercially, products such as reeds and peat are also harvested from wetlands (**Plate B**).

Plate B: Commercial products made by locals from reeds harvested from wetlands

Wetlands are thus considered to be critically important ecosystems as they provide both direct and indirect benefits to the environment and society.

3. Wetland degradation

It has been estimated that originally over 10% of the Republic of South Africa (RSA) was covered by wetlands. However, this figure decreases significantly every year owing to unsustainable land-use practices. It is estimated that more than 50% of South Africa's wetlands have been destroyed through drainage of wetlands for crops and pastures, poorly managed burning regimes, overgrazing, disturbances to wetland soils, vegetation clearing as well as industrial and urban development (including mining activities).

Although wetlands are high-value ecosystems that make up only a small fraction of the country, they rank among the most threatened ecosystems in South Africa. According to a recent Council of Scientific Research (CSIR) study (Nel and Driver, 2012), South Africa's remaining wetlands were identified as the most threatened of all South Africa's ecosystems, with 48% of wetland ecosystem types being critically endangered, 12% endangered and 5% vulnerable. Only 11% of wetland ecosystem types are well protected, with 71% not protected at all.

The remaining wetland systems suffer from severe erosion and sedimentation, undesirable plant species and aquatic fauna infestations, unsustainable exploitation, artificial drainage and damming, and pollution. The continued degradation of wetlands will impact on biodiversity, ecological function, and the provision of ecosystem services with subsequent impacts on livelihoods and economic activity, as well as health and wellbeing of communities. In the absence of functional wetlands, the carbon cycle, the nutrient cycle and the water cycle would be significantly altered, mostly detrimentally.

Wetland conservation and rehabilitation should be at the heart of water management. It is necessary to prioritise South Africa's remaining wetlands such that those that offer valuable ecosystem services and are least impacted by current pressures or threats are offered immediate attention to avoid further loss, conversion or degradation.

4. The Working for Wetlands Programme

South Africa is a dry country, but is endowed with exceptionally rich biodiversity. The nation has a pressing reason to value the water-related services that wetlands provide. It is estimated that by 2025, South Africa will be one of fourteen African countries classified as "*subject to water scarcity*" (UNESCO, 2000). The conservation of wetlands is fundamental to the sustainable management of water quality and quantity, and wetland rehabilitation is therefore essential to conserving water resources in South Africa.

The guiding principles of the National Water Act, No. 36 of 1998, recognise the need to protect water resources. In responding to the challenge of stemming the loss of wetlands and maintaining and enhancing the benefits they provide, government has recognised that, in order to be truly effective, strategies for wetland conservation need to include a combination of proactive measures for maintaining healthy wetlands, together with interventions for rehabilitating those that have been degraded. These objectives are currently being expressed in a coordinated and innovative way through the WfWetlands Programme.

Working for Wetlands pursues its mandate of wetland protection, wise use and rehabilitation in a manner that maximises employment creation, supports small emerging businesses, and transfers skills amongst vulnerable and marginalised groups. In the 15 years since 2004, the WfWetlands Programme has invested over R1.1 billion in wetland rehabilitation and has been involved in approximately 1 500 wetlands, thereby improving or securing the health of over 70 000 hectares of wetland environment. The WfWetlands Programme has created more than 34 000 jobs and over 3.2 million person-days of paid work. Local people are recruited to work and targets for employment specify that the programme's workforce should comprise at least 55% women, 65% youth and 2% people with disabilities.

Wetlands are not easy ecosystems to map at a broad scale as they are numerous, often small and difficult to recognise and delineate on remotely sensed imagery such as satellite photos. The WfWetlands Programme houses the National Wetlands Inventory Project (NWI) which aims to provide clarity on the extent, distribution and condition of South Africa's wetlands. The project clarifies how many and which rivers and wetlands have to be maintained in a natural condition to sustain economic and social development, while still conserving South Africa's freshwater biodiversity.

The National Freshwater Ecosystem Priority Areas (NFEPA) has used the NWI data to produce the most comprehensive national wetland map to date, called the NFEPA Atlas. This atlas enables the planning of wetland rehabilitation on a catchment scale.

Other activities that form part of the WfWetlands Programme include:

- Raising awareness of wetlands among workers, landowners and the general public; and
- Providing adult basic education and training, and technical skills transfer (in line with the emphasis of the EPWP on training, the WfWetlands Programme has provided 225 000 days of training in vocation and life skills).

5. Rehabilitation interventions

The successful rehabilitation of a wetland requires that the cause of damage or degradation is addressed, and that the natural flow patterns of the wetland system are re-established (flow is encouraged to disperse rather than to concentrate). Approximately 800 interventions are implemented every year in the WfWetlands Programme. The key purposes of implementing interventions include:

- Restoration of hydrological integrity (e.g. raising the general water table or redistributing the water across the wetland area);
- Recreation of wetland habitat towards the conservation of biodiversity; and
- Job creation and social upliftment.

Typical activities undertaken within the projects include:

- Plugging artificial drainage channels created by development or historical agricultural practices to drain wetland areas for other land use purposes;
- Constructing structures (gabions, berms, weirs) to divert or redistribute water to more natural flow paths, or to prevent erosion by unnatural flow rates that have resulted from unsustainable land use practices or development; and
- Removing invasive alien or undesirable plant species from wetlands and their immediate catchments (in conjunction with the Working for Water initiative).

Methods of wetland rehabilitation may include hard engineering interventions such as:

- Earth berms or gabion systems to block artificial channels that drain water from or divert polluted water to the wetland;
- Concrete and gabion weirs to act as settling ponds, to reduce flow velocity or to re-disperse water across former wetland areas thereby re-establishing natural flow paths;
- Earth or gabion structure plugs to raise channel floors and reduce water velocity;
- Concrete or gabion structures to stabilise head-cut or other erosion and prevent gullies;
- Concrete and/or reno mattress strips as road crossings to address channels and erosion in wetlands from vehicles; and
- Gabion structures (mattresses, blankets or baskets) to provide a platform for the growth of desired wetland vegetation.

Soft engineering interventions also offer successful rehabilitation methods, and the following are often used together with the hard engineering interventions:

- The use of biodegradable or natural soil retention systems such as eco-logs, Macmat-R plant plugs, grass or hay bales, and brush-packing techniques;
- The re-vegetation of stabilised areas with appropriate wetland and riparian plant species;
- Alien invasive plant clearing, which is an important part of wetland rehabilitation (this is supported by the Working for Water Programme).
- Fencing off of sensitive areas within the wetland to keep grazers out and to allow for the re-establishment of vegetation;
- The removal of undesirable plant and animal species; and
- In some wetlands, it may be possible to involve the community to develop a management plan for wise use within a wetland. This can involve capacity building through educating and training the community members who would monitor the progress. A plan could involve measures such as rotational grazing with long term benefits for rangeland quality.

6. Programme, projects and phases

In order to manage the **WfWetlands Programme**, wetlands have been grouped into "projects", and each **Wetland Project** encompasses several smaller wetland systems which each are divided into smaller, more manageable and homogenous wetland units. A Wetland Project may be located within one or more quaternary catchments within a Province. The WfWetlands Programme is currently managing 48 Wetland Projects countrywide, and rehabilitation activities range from stabilising degradation to the more ambitious restoration of wetlands to their original conditions.

Each Wetland Project is managed in three phases (as shown in the flow diagram in **Plate C**) over a two-year cycle. The first two phases straddle the first year of the cycle and involve planning, identification, design and authorisation of interventions. The third phase is implementation, which takes place during the second year.

In order to undertake these three phases, a collaborative team has been established as follows. The **Programme Team** currently comprises two subdirectories: a) Implementation and After Care and b) Planning, Monitoring and Evaluation. The Assistant Directors for Wetlands Programmes (ASDs) [1] report to the Implementation and After Care Deputy Director and are responsible for the identification and implementation of projects in their regions. The Programme Team is further supported by a small team that fulfil various roles such as Geographical Information Systems (GIS) and training. Independent Design Engineers and Environmental Assessment Practitioners (EAPs) are appointed to undertake the planning, design and authorisation components of the project. The project team is assisted by a number of wetland specialists who provide scientific insight into the operation of wetlands and bring expert and often local knowledge to the project teams. They are also assisted by the landowners and implementers who have valuable local knowledge of these wetlands.

The first phase is the identification of suitable wetlands which require intervention. The purpose of Phase 1 and the associated reporting is to identify:

- Priority catchments and associated wetlands/ sites within which rehabilitation work needs to be undertaken; and
- Key stakeholders who will provide meaningful input into the planning phases and wetland selection processes, and who will review and comment on the rehabilitation proposals.

Phase 1 commences with a catchment and wetland prioritisation process for every province. The Wetland Specialist responsible for a particular province undertakes a desktop study to determine the most suitable wetlands for the WfWetlands rehabilitation efforts. The involvement of Provincial Wetland Forums and other key stakeholders is a critical component of the wetland identification processes since these stakeholders are representative of diverse groups with shared interests (e.g. from government institutions to amateur ecological enthusiasts). This phase also involves initial communication with local land-owners and other Interested and Affected Parties (I&APs) to gauge the social benefits of the work. Aerial surveys of the areas in question may be undertaken, as well as limited fieldwork investigations or site visits to confirm the inclusion of certain wetland projects or units. Once wetlands have been prioritised and agreed on by the various parties, specific rehabilitation objectives are determined for each wetland following a rapid wetland assessment undertaken by the Wetland Specialist.

Phase 2 requires site visits attended by the fieldwork team comprising a Wetland Specialist, a Design Engineer, an EAP, and an ASD. Other interested stakeholders or authorities, landowners and in some instances the Implementing Agents (IAs) may also attend the site visits. This allows for a highly collaborative approach, as options are discussed by experts from different scientific disciplines, as well as local inhabitants with deep anecdotal knowledge. While on site, rehabilitation opportunities are investigated. The details of the proposed interventions are discussed, some survey work is undertaken by the engineers, and Global Positioning System (GPS) coordinates and digital photographs are taken for record purposes. Furthermore, appropriate dimensions of the locations are recorded in order to design and calculate quantities for the interventions. At the end of the site visit the rehabilitation objectives together with the location layout of the proposed interventions are agreed upon by the project team.

During Phase 2, monitoring systems are put in place to support the continuous evaluation of the interventions. The systems monitor both the environmental and social benefits of the interventions. As part of the Phase 2 site visit, a

[1] Previously referred to as Provincial Coordinators (PCs).

maintenance inventory of any existing interventions that are damaged and/or failing and thus requiring maintenance is compiled by the ASD, in consultation with the Design Engineer.

Based on certain criteria and data measurements (water volumes, flow rates, and soil types); the availability of materials such as rock; labour intensive targets; maintenance requirements etc., the interventions are then designed. Bills of quantity are calculated for the designs and cost estimates made. Maintenance requirements for existing interventions in the assessed wetlands are similarly detailed and the costs calculated. The Design Engineer also reviews and, if necessary, adjusts any previously planned interventions that are included into the historical Rehabilitation Plans.

Phase 2 also comprises a reporting component where Rehabilitation Plans are prepared for each Wetland Project. The Rehabilitation Plans include details of each intervention to be implemented, preliminary construction drawings and all necessary documentation required by applicable legislation. The Rehabilitation Plans are reviewed by various government departments, stakeholders and the general public before a specific subset of interventions are selected for implementation.

Landowner consent is an important component of each phase in each Wetland Project. The flow diagram, **Plate C**, demonstrates the point at which various consent forms must be approved via signature from the directly affected landowner. The ASDs are responsible for undertaking the necessary landowner engagement and for ensuring that the requisite landowner consent forms required as part of Phase 1 and 2 of this project are signed.

Without these signed consent forms the WfWetlands Programme will not be able to implement rehabilitation interventions on the affected property.

Phase 3 requires that certain Environmental Authorisations are obtained before work can commence in the wetlands (please see subsequent sections of this document for detail on Environmental Authorisations). Upon approval of the wetland Rehabilitation Plans by DEA, the work detailed for the project will be implemented within a year with on-going monitoring being undertaken thereafter. The Rehabilitation Plans are considered to be the primary working document for the implementation of the project via the construction/ undertaking of interventions[2] listed in the Plan.

It is typically at this point in the process when the final construction drawings are issued to the IAs. Seventeen IAs are currently employed in the WfWetlands Programme and are responsible for employing contractors and their teams (workers) to construct the interventions detailed in each of the Rehabilitation Plans. For all interventions that are based on engineering designs (typically hard engineered interventions), the Design Engineer is required to visit the site before construction commences to ensure that the original design is still appropriate in the dynamic and ever-changing wetland system. The Design Engineer will assist the IAs in pegging and setting-out interventions. The setting-out activities often coincide with the Phase 1 activities for the next planning cycle. Phase 3 concludes with the construction of the interventions, but there is an on-going monitoring and auditing process that ensures the quality of interventions, the rectification of any problems, and the feedback to the design team regarding lessons learnt.

[2] This could include soft options such as alien clearing or eco-logs, as well as hard structures for example weirs.

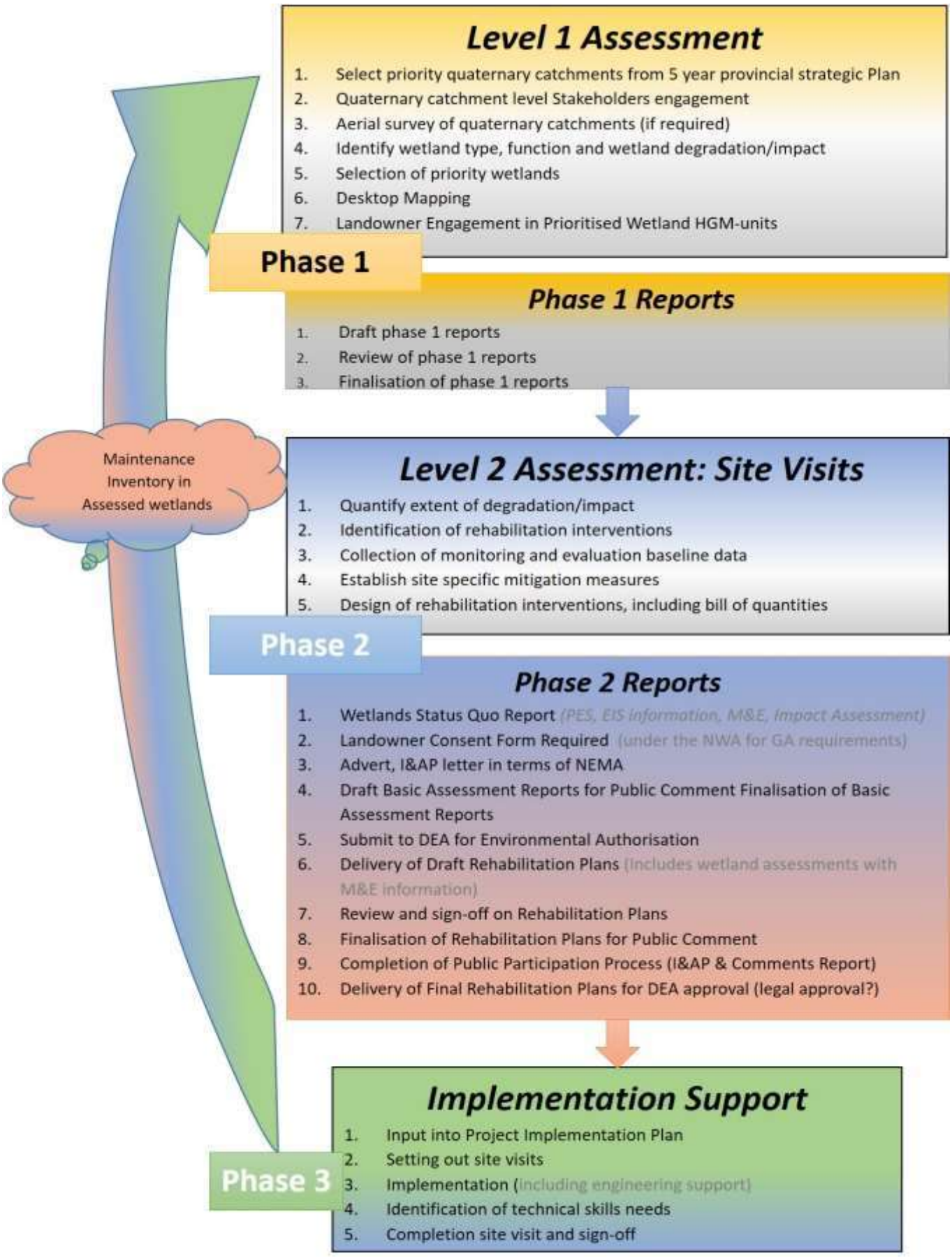

Plate C: The Working for Wetlands planning process (Phase 1 to Phase 3)

Rehabilitation work within floodplain systems

Based on lessons learnt and project team discussions held during the National Prioritisation workshop in November 2010 the WfWetlands Programme took an in-principle decision regarding work within floodplain systems.

Recognising the ecosystem services provided by floodplain wetlands and the extent to which they have been transformed, WfWetlands do not intend to stop undertaking rehabilitation work in floodplains entirely. Instead, WfWetlands propose to adopt an approach to the rehabilitation of floodplain areas that takes into account the following guiding principles:

a) As a general rule, avoid constructing hard interventions within an active floodplain channel; and rather
b) Explore rehabilitation opportunities on the floodplain surface using smaller (possibly more) softer engineering options outside of the main channel.

When rehabilitation within a floodplain setting is being contemplated, it will be necessary to allocate additional planning resources, including the necessary specialist expertise towards ensuring an adequate understanding of the system and appropriate design of the interventions.

7. Environmental legislation

One of the core purposes of the WfWetlands Programme is the preservation of South Africa's valuable wetland systems through rehabilitation and restoration.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment, including damage to wetland systems. The following legislation is of relevance:

- The National Environmental Management Act, No. 107 of 1998 (NEMA), as amended
- The National Water Act, No.36 of 1998 (NWA)
- The National Heritage Resources Act, No. 25 of 1999 (NHRA)

Development proposals within or near any wetland system are subject to thorough bio-physical and socio-economic assessment as mandatory processes of related legislation. These processes are required to prevent degradation of the environment and to ensure sustainable and environmentally conscientious development.

The WfWetlands Programme requires that both hard and soft interventions are implemented in the wetland system, and it is the activities associated with the construction of these interventions that triggers requirements for various authorisations, licenses or permits. However, it is important to note that the very objective of the WfWetlands Programme is to improve both environmental and social circumstances. The WfWetlands Programme gives effect to a range of policy objectives of environmental legislation, and also honours South Africa's commitments under several international agreements, especially the Ramsar Convention on Wetlands.

Memorandum of Understanding for Working for Wetlands Programme

A Memorandum of Understanding (MoU) has been entered into between DEA, DAFF and DWS for the WfWetlands Programme. Through co-operative governance and partnerships, this MoU aims to streamline the authorisation processes required by the National Environmental Management Act (Act 107 of 1998), the National Water Act (Act 36 of 1998), and the National Heritage Resources Act (Act 25 of 1999) to facilitate efficient processing of applications for authorisation of wetland rehabilitation activities.

Table A: List of applicable legislation

Title of legislation, policy or guideline	Administering authority	Date
The Constitution of South Africa, Act No.108 of 1996	National Government	1996
National Environmental Management Act, No.107 of 1998	Department of Environmental Affairs	1998
The National Water Act, No. 36 of 1998	Department of Water and Sanitation	1998
Conservation of Agricultural Resources Act, No. 43 of 1983	Department of Agriculture, Forestry & Fisheries	1983
National Heritage Resources Act, No. 25 of 1999	National Heritage Resources Agency	1999
World Heritage Conventions Act, No. 49 of 1999	Department of Environmental Affairs	1999
The National Environmental Management: Biodiversity Act, No. 10 of 2004	Department of Environmental Affairs	2004
National Environmental Management: Protected Areas Act, No. 57 of 2003	Department of Environmental Affairs	2003
The Mountain Catchments Areas Act, No. 63 of 1970	Department of Water and Sanitation	1970
EIA Guideline Series, in particular: • Guideline 5 – Companion to the NEMA EIA Regulations, 2010 (DEA, October 2012) • Guideline 7 – Public Participation in the EIA process, 2012 (DEA, October 2012) • Guideline 9 - Guideline on Need and Desirability, 2010 (DEA, October 2014)	Department of Environmental Affairs	2012 - 2014
International Conventions, in particular: • The Ramsar Convention • Convention on Biological Diversity • United Nations Conventions to Combat Desertification • New Partnership for Africa's Development (NEPAD) • The World Summit on Sustainable Development (WSSD)	International Conventions	N/A

Of particular relevance in **Table A** is the following legislation and the WfWetlands Programme has put systems in place to achieve compliance:

- The National Environmental Management Act, No. 107 of 1998 (NEMA), as amended
    - In terms of the 2014 Environmental Impact Assessment Regulations pursuant to the NEMA, certain activities that may have a detrimental impact on the environment (termed Listed Activities) require an Environmental Authorisation (EA) from the DEA. The implementation of interventions will trigger NEMA Listing Notices 1 and 3 (GN R983 and GN R985, as amended, respectively). In order to meet the requirements of these Regulations, it is necessary to undertake a Basic Assessment (BA) Process and apply for an EA. This was previously undertaken on an annual basis per Province for each individual wetland unit. However as of 2014, applications were submitted (per Province) for wetland systems, allowing WfWetlands to undertake planning in subsequent years within these wetlands without having to undertake a BA process. The rehabilitation plans still however require approval from the competent authority (i.e. DEA).
    - **Basic Assessment Reports** (BARs) will be prepared for each Province where work is proposed by the WfWetlands Programme. These BARs will present all Wetland Projects that are proposed in a particular province, together with information regarding the quaternary catchments and the wetlands that have been prioritised for the next few planning cycles (anywhere from one to three planning cycles depending on the information gained through the Catchment Prioritisation Process). The EAs will be inclusive of all Listed Activities that may be triggered and will essentially authorise any typical wetland rehabilitation activities required during the WfWetlands Programme implementation phase. Note that certain Listed

Activities have been excluded from the Basic Assessment as they fall under the ambit of a 'maintenance management plan' in the form of the Rehabilitation Plan for each project and are therefore subject to exclusion. The impacts thereof have however been considered within the respective Rehabilitation Plans.

- A condition of the EA's is that **Rehabilitation Plans** will be prepared every year after sufficient field work has been undertaken in the wetlands that have an EA. These Rehabilitation Plans will be made available to registered Interested and Affected Parties (I&APs) before being submitted to DEA for approval. The Rehabilitation Plans will describe the combination and number of interventions selected to meet the rehabilitation objectives for each Wetland Project, as well as an indication of the approximate location and approximate dimensions (including footprint) of each intervention.

- The National Water Act, No.36 of 1998 (NWA)
  - In terms of Section 39 of the NWA, a General authorisation[3] (GA) has been granted for certain activities that are listed under the NWA that usually require a Water Use License; as long as these activities are undertaken for wetland rehabilitation. These activities include '*impeding or diverting the flow of water in a watercourse*[4]' and '*altering the bed, banks, course or characteristics of a watercourse*[5]' where they are specifically undertaken for the purposes of rehabilitating[6] a wetland for conservation purposes. The WfWetlands Programme is required to register the 'water use' in terms of the GA.

- The National Heritage Resources Act, No. 25 of 1999 (NHRA)
  - In terms of Section 38 of the NHRA; any person who intends to undertake a development as categorised in the NHRA must at the very earliest stages of initiating the development notify the responsible heritage resources authority, namely the South African Heritage Resources Agency (SAHRA) or the relevant provincial heritage agency. These agencies would in turn indicate whether or not a full Heritage Impact Assessment (HIA) would need to be undertaken. Should a permit be required for the damaging or removal of specific heritage resources, a separate application will be submitted to SAHRA or the relevant provincial heritage agency for the approval of such an activity. WfWetlands has engaged with SAHRA regarding the wetland planning process and has committed to achieving full compliance with the heritage act over the next few years.

[3]Government Notice No. 1198, 18 December 2009

[4]Section 21(c) of the NWA, No. 36 of 1998

[5]Section 21(i) of the NWA, No. 36 of 1998

[6]Defined in the NWA as "*the process of reinstating natural ecological driving forces within part of the whole of a degraded watercourse to recover former or desired ecosystem structure, function, biotic composition and associated ecosystem services*".

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i. CONTEXT OF THE INFORMATION CONTAINED IN THIS REHABILITATION PLAN

Approach to the NEMA Environmental Process

The legislation protecting the environment in South Africa was not written with the intention of preventing wetland rehabilitation efforts, but rather at curtailing development in sensitive environments. It is important to remember that the Working for Wetlands (WfWetlands) Programme is not a development proposal, and although this programme technically requires authorisations, licenses and permits, such rehabilitation projects were never meant to be sent through legislative processes aimed at preventing negative environmental impact.

In terms of the environmental management principles of the National Environmental Management Act, No. 107 of 1998 (NEMA), as amended, certain activities that may have a detrimental impact on the environment (termed Listed Activities) require Environmental Authorisation (EA) from DEA. The WfWetlands Programme will require that interventions be implemented and/or constructed in the wetland systems to ultimately restore some of the more natural wetland functions that have been lost to unsustainable land use practices or development. The implementation of interventions will trigger Listing Notices 1 and 3 (GN R 983 and GN R 985, as amended, respectively).

In order to meet the requirements of the Regulations pursuant to NEMA, it was necessary to undertake a Basic Assessment Process as outlined in Part 2 and Appendix 1 of GN R 982. Basic Assessment Report (BARs) were prepared and these reports presented all Wetland Projects for each Province, together with information regarding the quaternary catchments and the wetlands that were prioritised for the next few planning cycles (anywhere from one to three planning cycles depending on the information gained through the Catchment Prioritisation Process).

The EA that has been applied for will be inclusive of all Listed Activities that may be triggered whilst implementing the wetland rehabilitation interventions. Essentially this EA would authorise any typical wetland rehabilitation activities on condition that the specific intervention proposals are submitted in a Rehabilitation Plan to DEA for approval.

The Rehabilitation Plans for each Wetland Project will be prepared annually after sufficient field work and stakeholder consultation has been undertaken in the wetlands that have an EA. These Rehabilitation Plans will be submitted to DEA for approval as a condition of the EA for the respective Provincial BAR.

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iii. ABBREVIATIONS

ASD	Assistant Director: Wetlands Programmes[7]
BAR	Basic Assessment Report
BGIS	Biodiversity Geographical Information System
BMP	Best Management Practice
CARA	Conservation of Agricultural Resources Act
CEMP	Construction Environmental Management Programme
CPP	Catchment Prioritisation Process
CSIR	Council for Scientific and Industrial Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation in terms of the NEMA
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EMP	Environmental Management Programme
EPWP	Expanded Public Works Programme
GA	General authorisation in terms of the NWA
GIS	Geographical Information System
GPS	Global Positioning System
HGM	Hydrogeomorphic [unit]
HIA	Heritage Impact Assessment
IA	Implementing Agent
I&APs	Interested and Affected Parties
IDP	Integrated Development Plans
M&E	Monitoring and Evaluation
MAP	Mean Annual Precipitation
MoU	Memorandum of Understanding
NEMA	National Environmental Management Act (Act 107 of 1998)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act
NRM	Natural Resource Management Programmes
NWA	National Water Act (Act 36 of 1998)
NWI	National Wetlands Inventory
PET	Potential Evapotranspiration
PIP	Project Implementation Plan
PPP	Public Participation Process
RSA	Republic of South Africa
SANParks	South African National Parks
SAHRA	South African Heritage Resources Agency
SMME	Small, Medium and Micro Enterprises
UNESCO	United Nations Educational, Scientific and Cultural Organization
WfWetlands	Working for Wetlands

[7] Previously referred to as the Provincial Coordinator (PC).

iv. GLOSSARY OF TERMS

Bedrock: The solid rock that underlies unconsolidated material, such as soil, sand, clay, or gravel (Cowden and Kotze, 2008).

Basic Assessment Report (BAR): A report as required in terms of the 2014 EIA Regulations, of the National Environmental Management Act, No. 107 of 1998 (NEMA), that describes the proposed activities and their potential impacts.

Best Management Practice (BMP): Procedures and guidelines to ensure the effective and appropriate implementation of wetland rehabilitation by WfWetlands implementers. Such practices are informed by applied research.

Biophysical: The biological and physical components of the environment (Cowden and Kotze, 2008).

Catchment: All the land area from mountaintop to seashore which is drained by a single river and its tributaries. Each catchment in South Africa has been subdivided into secondary catchments, which in turn have been divided into tertiary catchments. Finally, all tertiary catchments have been divided into interconnected quaternary catchments. Total of 1946 quaternary catchments have been identified for South Africa. These subdivided catchments provide the main basis on which catchments are subdivided for integrated catchment planning and management (Cowden and Kotze, 2008).

Environmental Assessment Practitioner (EAP): The individual responsible for the planning, management and coordination of the environmental impact assessments, strategic environmental assessments, environmental management plans and/or other appropriate environmental instruments introduced through regulations of NEMA.

Ecosystem Services or 'eco services': The services such as sediment trapping or water supply, supplied by an ecosystem (in this case a wetland ecosystem).

Environmental Impact Assessment (EIA): A study of the environmental consequences of a proposed course of action via the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental Management Programme (EMPr): A detailed plan of action to organise and co-ordinate environmental mitigation, rehabilitation and monitoring during the implementation and maintenance of interventions identified under the WfWetlands Programme such that positive impacts are enhanced and negative impacts are avoided/minimised.

Interested and Affected Parties (I&APs): People and organizations that have interest(s) in the proposed activities, also referred to as stakeholders.

Environmental Impact: An environmental change caused by some human act.

Implementer: The person or organisation responsible for the construction of WfWetlands rehabilitation interventions.

Intervention: A method of wetland rehabilitation that aims to address the objectives of the particular wetland system, namely to restore the hydrological integrity of the system and support associated biodiversity. It can be in the form of a hard (structures made of hard materials which are fixed (e.g. a concrete weir) or soft intervention (e.g. re-vegetation), and are often used to support one another.

Mitigation: Actions to reduce the impact of a particular activity.

Maintenance: The replacement, repair or the reconstruction of an existing structure within the same footprint, in the same location, having the same capacity and performing the same function as the previous structure ('like for like').

Public Participation Process (PPP): A process of involving the public in order to identify issues and concerns, and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to: a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific project matters.

Project: An area of WfWetlands intervention generally defined by a quaternary catchment or similar management unit such as a national park in which a single implementer operates.

Quaternary Catchment: "A fourth order catchment in a hierarchal classification system in which a primary catchment is the major unit" and that is also the "principal water management unit in South Africa" (DWS, 2011).

Rehabilitation: In the context of wetlands, refers to re-instating the driving ecological forces (including hydrological, geomorphological and biological processes) that underlie a wetland, so as to improve the wetland's health and the ecological services that it delivers.

Significant impact: An impact that by its magnitude, duration, intensity or probability of occurrence may have a notable effect on one or more aspects of the environment.

Wetland: "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 in normal circumstances supports or would support vegetation typically adapted to life in saturated soils." (National Water Act, 36 of 1998) **and** "Land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants living there" (Cowden and Kotze, 2008).

v. ASSUMPTIONS AND LIMITATIONS

In compiling this report, the following has been assumed:

- The information provided in this report is based on site visits that have been undertaken by the project team (Environmental Assessment Practitioner (EAP), Engineer, Wetland Specialist, the Assistant Directors for Wetlands Programmes (ASD)) and their subsequent input into the Reporting, which includes intervention design drawings, the wetland status quo report, in addition to input from the ASD. It is understood that this information is sufficient for the authorisation processes and associated Phase 3 (Implementation phase). This data and relevant information has informed the findings and conclusions of this report.
- Information contained in this Report will be used during Phase 3 to guide and inform the Implementing Agents on design and construction specifications as part of Phase 3. Implementing Agents will thus use this Rehabilitation Plan and the information contained herein when constructing all interventions, the designs of which have been included in this Report.
- The ASDs will be undertaking the landowner engagement and have obtained the requisite landowner consent forms required as part of Phase 1 and 2 of this project.
- The WfWetlands Programme has provided all relevant information and documentation required to compile this Rehabilitation Plan.
- Rehabilitation activities should not be carried out until the Wetland Rehabilitation Plan has been approved by DEA and formally signed off by WfWetlands.
- The implementation of this Rehabilitation Plan must take into account all relevant provisions of Working for Wetlands Best Management Practices (BMPs), the generic Environmental Management Programme (EMP), as well as specific recommendations of the Basic Assessments and the requirements of the Environmental Authorisation (EA) for the all stages of the project.
- The requirement to spend at least 42% on wages out of the project budget has been taken into consideration by the project team during the planning process for wetland rehabilitation.
- Where appropriate interventions have not been implemented previously or included in the 2009 - 2018 Project Implementation Plans (PIPs), these have been reviewed and where necessary re-designed for inclusion into the 2018/19 Rehabilitation Plan. This wetland Rehabilitation Plan therefore supersedes all previous plans for this project and only interventions from this plan should be included in the 2019/20 PIP.
- Should it be necessary to exclude interventions from the Rehabilitation Plan, the prioritisation of interventions across the project should strictly be followed.

vi. GAPS IN KNOWLEDGE

- The information in this Report is based on existing available information and input from the ASD, the specialist wetland specialists, the Engineer, the EAP as well as comments from Interested and Affected Parties (I&APs). Until this Report has been finalised and signed off by WfWetlands, the content of the Report should be considered as preliminary.
- Designs for the rehabilitation interventions have been developed for site conditions as at the time of the planning site visits. Should site conditions change before the designs are implemented, changes to the design and the positions thereof may be necessary. In this case, project implementers may require the assistance of a professional engineer.
- The cost of construction at each project location will vary due to factors such as the local cost and availability of material, transport distances etc. The unit costs have been agreed with the ASDs based on their knowledge of past projects and therefore include an allowance for escalation.
- The labour-intensive targets identified in this project are based on assumed productivity rates for various components of the construction process. This will vary in practise and will require regular monitoring to ensure that labour targets are attained.

Aurecon South Africa (Pty) Ltd (Aurecon) acknowledges the authorship of any information contained in this document from previous planning years, to the previous provider: Land Resources International (LRI).

This Report must be read in conjunction with:

- 2009 Wetland Rehabilitation Plan, Mutale; A91H and A92B,
- 2011 Phase 2 Final Rehabilitation Plan, Mutale: A92B and A91H

vii. DISCLAIMER

- This Rehabilitation Plan is for the Mutale Wetland Project in the Limpopo Province. The plan is to be used to implement the interventions identified as necessary to rehabilitate the Nyahlawe, wetland, and is to be approved by the DEA as part of the conditions of EA.
- The intervention points and wetland boundary polygons provided in this report are based on the shapefiles that have been provided by the wetland specialist. The datasets included in the Phase 1 Reports have been updated by the Wetland Specialists and verified by the ASDs. All reasonable efforts have therefore been made to ensure that the data is accurate. However Aurecon does not accept responsibility for any remaining inaccuracies in the spatial data provided to us, which may be reflected in this report.
- Aurecon accepts responsibility for the engineering design to the extent that this is based on available information. The available information is limited to what could be interpreted during a single site visit of no longer than a few hours. No geotechnical, topographical, geomorphologic and other engineering related surveys have been undertaken to inform the design. This is non-standard engineering practice and therefore Aurecon is indemnified by the Client and does not accept responsibility for the associated risk of failure from the above limitations or any damages that may occur.
- This Rehabilitation Plan must not be amended without prior consultation and approval from DEA, the responsible EAP, Engineer, ASD and the WfWetlands Deputy Director for Planning, Monitoring and Evaluation.
- All changes to site instructions and/or construction drawings after the commencement of interventions must be motivated using the standard change request form supplemented with additional information as necessary.
- Aurecon is indemnified against any associated damages and accepts no liability associated with the construction and implementation of engineering interventions due to Aurecon being instructed to have limited contact with the implementer during the construction phase resulting in our inability to diligently supervise and assess any progress.
- The Client confirms that by accepting these drawings or reports, he acknowledges and accepts the abovementioned limitation of Aurecon's liability.

viii. DISTRIBUTION LIST

NAME	TITLE	FOR ACTION	FOR INFORMATION	RECEIVED PRIOR TO RELEASE
PROPONENT				
Dr Farai Tererai	Deputy Director: Planning, Monitoring and Evaluation	✓		✓
Dr Piet-Louis Grundling	Deputy Director: Project Implementation	✓		✓
Mr Collin Silima	Assistant Director: Wetlands Programmes	✓		✓
NATIONAL STAKEHOLDERS				
Refer to **Appendix G**			✓(E-copy of Rehab Plan)	
PROVINCIAL STAKEHOLDERS & I&APs				
Refer to **Appendix H**			✓(E-mail notification)	
LANDOWNERS				
Refer to **Appendix E**			✓(E-copy of Rehab Plan)	

1 INTRODUCTION

1.1 Document outline

This document comprises the Rehabilitation Plan for the Mutale Wetland Project identified as part of the Working for Wetlands Programme (WfWetlands). The Rehabilitation Plan is the primary working document for the implementation (construction/undertaking) of planned interventions in 2018/19, which are necessary to meet the wetland rehabilitation objectives that have been determined in earlier phases of the WfWetlands Programme. The Mutale Rehabilitation Plan focus on the Nyahlawe wetland system.

The outline of this document is as follows:

- **Chapter 1:** This introductory section provides an outline of the document structure as well as contextualising the document within the legal environmental authorisation processes.
- **Chapter 2**: This section on project context provides a brief summary of the WfWetlands Programme, including the typical rehabilitation methods and intervention options used to date.
- **Chapter 3:** This section discusses the general methodologies for selecting and prioritising wetlands, through to designing interventions and developing the Rehabilitation Plan.
- **Chapter 4:** Chapter 4 focus on the Nyahlawe wetland system within the Mutale wetland project area and includes a description of the wetland, motivation for its selection, a summary of the problems identified within the wetland, and an outline of the main rehabilitation objectives. A table of proposed interventions is provided, as well as baseline data needed for future monitoring of the interventions.

Reports on the current status of the wetland is included in **Appendix A** and should be consulted for the detailed findings of the site investigations. The General Construction Notes are included as **Appendix B** and describe construction methods for various interventions. The specific Interventions and Design Drawings (as well as site specific mitigation measures) are included as **Appendix C** of this report in the form of an Intervention Booklet. The Environmental Authorisation (EA) is available in **Appendix D**, and the Landowner Agreements in **Appendix E. Appendix F** contains a copy of the authorised Environmental Management Programme. **Appendices G and H** provide the national and Provincial Stakeholder databases.

1.2 Environmental Authorisation

The Nyahlawe wetland system received Environmental Authorisation (EA)[8] on 22 August 2018 in terms of the Environmental Impact Assessment (EIA) Regulations (GN R982 of 4 December 2014, as amended) of the National Environmental Management Act (Act 107 of 1998), as amended (NEMA).

This Rehabilitation Plan is developed in terms of Condition 32 of the EA and requires that the Rehabilitation Plan be circulated to Registered Interested and Affected Parties (I&APs) and directly affected landowners for comment before being submitted to the DEA for approval. The work detailed for the project will be implemented within a year of obtaining the necessary approval for the Rehabilitation Plan, and on-going monitoring of the interventions will be undertaken from thereafter.

[8] DEA Ref. No.: 14/12/16/3/3/1/1893

2 PROJECT CONTEXT

2.1 Working for Wetlands programme overview

The WfWetlands Programme is a government programme (similar to Working for Water, Working on Fire and Working for Ecosystems) managed under the Natural Resource Management (NRM) Programmes of the Department of Environmental Affairs (DEA) and is a joint initiative with the Departments of Water and Sanitation (DWS), and Agriculture and Forestry and Fisheries (DAFF). It forms part of the Expanded Public Works Programme (EPWP).

The vision of the WfWetlands Programme is to facilitate the protection, conservation, rehabilitation and sustainable use of wetlands in South Africa, in accordance with national policies and commitment to international conventions and regional relationships. The main objective of the programme is **wetland conservation** in South Africa, and this is conducted in a way that ensures **poverty reduction** through employment and skills development amongst vulnerable and marginalised groups.

As an EPWP, the WfWetlands Programme seeks to draw significant numbers of unemployed into the productive sector of the economy. These individuals gain skills while they work thus increasing their capacity to earn an income. Rehabilitation efforts are thus focused on wetland conservation and the appropriate use of wetlands in a way that attempts to maximise employment creation, support for small business and the transfer of skills to the unemployed and poor.

In the 15 years since 2004, the WfWetlands Programme has invested over R1.1 billion in wetland rehabilitation and has been involved in approximately 1 500 wetlands, thereby improving or securing the health of over 70 000 hectares of wetland environment. The WfWetlands Programme has created more than 34 000 jobs and over 3.2 million person-days of paid work. Local people are recruited to work and targets for employment specify that the programme's workforce should comprise at least 55% women, 65% youth and 2% people with disabilities

2.1.1 Programme, projects and phases

In order to manage the WfWetlands Programme, wetlands that have been prioritised and identified for rehabilitation have been grouped into "Wetland Projects" within each Province. Each Wetland Project encompasses several wetland systems which each are divided into smaller, more manageable and homogenous wetland units. As a result, a Wetland Project may be located within one or more quaternary catchments within a Province.

Each Project is managed in three phases over a two-year cycle. The first two phases (Phase 1 and Phase 2) straddle the first year of the cycle and involve planning, identification, design and authorisation of interventions. The third phase (Phase 3) is implementation of specific interventions to achieve rehabilitation, and this takes place during the second year. The WfWetlands Programme is currently managing 48 Wetland Projects countrywide, and approximately 800 interventions within these Wetland Projects will be implemented to meet the objectives of the Programme.

2.1.2 Methods of rehabilitation

The successful rehabilitation of a wetland requires that the cause of damage or degradation is addressed, and that the natural flow patterns of the wetland system are re-established (flow is encouraged to disperse rather than to concentrate). The main aims of the WfWetlands Programme are:

- Restoration of hydrological integrity (e.g. raising the general water table or redistributing the water across the wetland area); and
- Recreation of wetland habitat towards the conservation of biodiversity.

Rehabilitation activities range from stabilising degradation to the more ambitious restoration of wetlands to their original conditions. Typical activities within the Wetland Projects include:

- Plugging artificial drainage channels created by development or historical agricultural practices to drain wetland areas for other land use purposes;
- Constructing structures (gabions, berms, and weirs) to divert or redistribute water to more natural flow paths, or to prevent erosion by unnatural flow rates that have resulted from unsustainable land use practices or development; and
- Removing invasive alien or undesirable plant species from wetlands and their immediate catchments as part of the Working for Water Programme.

2.1.3 Intervention options

Methods of wetland rehabilitation may include hard engineering interventions such as:

- Earth berms in conjunction with gabion systems to block artificial channels that drain water from or divert polluted water to the wetland;
- Concrete weirs to act as settling ponds, to reduce flow velocity or to re-disperse water across former wetland areas thereby re-establishing natural flow paths;
- Concrete, earth or gabion structure plugs to raise channel floors and reduce water velocity;
- Concrete or gabion structures to stabilise head-cut or other erosion and prevent gullies; and
- Gabion structures (mattresses, blankets or baskets) to provide a platform for the growth of desired wetland vegetation.

Soft engineering interventions also offer successful rehabilitation methods, and the following are often used together with the hard engineering interventions:

- The revegetation of stabilised areas with appropriate wetland and riparian plant species;
- Fencing off of sensitive areas within the wetland to keep grazers out and to allow for vegetation to become re-established;
- The use of biodegradable or natural soil retention systems such as eco-logs, plant plugs, grass or hay bales, and brush-packing techniques; and
- The removal of undesirable plant and animal species as part of the Working for Water initiative. Alien invasive plant clearing is an important part of wetland rehabilitation.

For more information on the WfWetlands Programme, please refer to the WfWetlands Context Document included in the front of this report.

2.2 Project team

The project team currently comprises a Director and three Deputy Directors who oversee the WfWetlands Programme and Assistant Directors for Wetlands Programmes (ASDs) who oversee the identification and implementation of projects in their regions. They are supported by a small team who fulfil various roles such administration, Geographical Information Systems (GIS) and training.

Aurecon South Africa (Pty) Ltd (Aurecon) has been appointed to undertake the project activities and associated reporting required by the WfWetlands Programme. The Aurecon team comprises Design Engineers and Environmental Assessment Practitioners (EAPs) who undertake the planning, design and authorisation components of the project. The Aurecon Team, in partnership with GroundTruth, is assisted by an external team of Wetland Specialists who provide scientific insight into the operation of wetlands and bring expert and often local knowledge of the wetlands. The project team is also complimented by the WfWetlands ASDs who are each responsible for provincial planning and implementation. The team responsible for the field work specific to this Rehabilitation Plan is listed in **Section 3.3.1.**

2.3 Mutale Wetland Project

2.3.1 The Mutale Wetland Project

The Mutale wetland rehabilitation project is situated in quaternary catchments A92B approximately 50km north of Thohoyandou situated in the Limpopo province.

The Nyahlawe wetland is situated on the Nyahlawe River, a tributary of the Mutale River, near the village of Tshandama. The surrounding area has been extensively cultivated for semi-commercial and subsistence crop production. This land-use includes a substantial portion of the wetland habitat immediately above the interventions. The wetland was heavily utilized by the local community, being extensively cultivated for subsistence crops. However, cultivation declined markedly between 2006 to 2010 due to constructive community engagement on the impact of cultivation on the wetland. Working for Wetlands (WfWetlands) has actively been rehabilitating wetlands in the Limpopo Province since 2010.

The location of the wetland is listed below in **Table 1** and are illustrated within the quaternary boundaries in **Figure** 1**.**

Descriptions of the wetland, along with the identified problems and rehabilitation objectives are detailed below in **Chapters 4** and **5**.

Table 1: Location of the identified wetlands within the Mutale Wetland Project

Wetland Number	Wetland Name	Latitude	Longitude
A92B-02	Nyahlawe	22°45'32.33"S	30°31'43.88"E

Originally, in 2006, three structures were planned for this wetland. The wetland responded well to the rehabilitation measures (mainly erosion control drop-inlet weirs constructed with gabions). Additional interventions were added in subsequent years to protect existing interventions and to complete rehabilitation efforts in this wetland. However, the catchment of the wetland undergone intensive transformation in the past 2 decades and peri-urban sprawl as well overgrazing resulted in accelerated stormflows into the wetland exacerbating gully erosion in the system since 2016.

2.3.2 Project Scope

The scope of this Wetland Project is detailed in the table below (Error! Reference source not found.). The primary motivation for the proposed interventions within the wetland system will be to address the current erosion in the wetland to protect the rest of the wetland from degradation and to secure the current erosion control measures.

Table 2: Project Scope

Province & Wetland Project	Limpopo: Mutale
Quaternary Catchments	A92B
Quaternary Catchment areas (Ha)	41ha
Nearest Town/s	20km north of Thohoyandou
Partnership	None
Number of wetlands identified during the assessment	1
Wetland names	Nyahlawe
Extension of existing work	Yes
Available budget for new interventions	TBC
Estimated cost of new interventions	TBC
	TBC

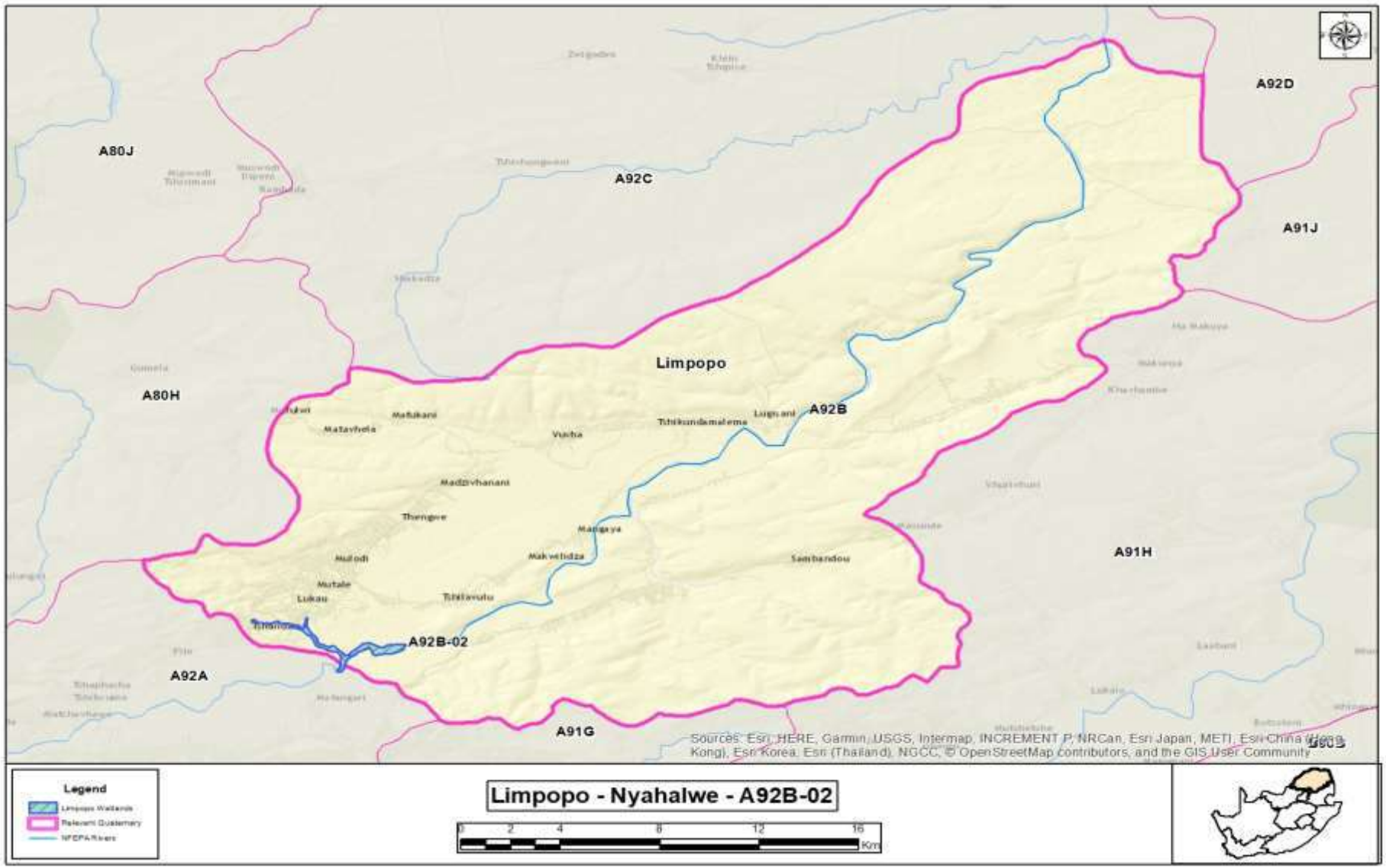

Figure 1: Topographic map showing the location, cadastral boundaries and access routes of quaternary catchment A92B

3 GENERAL METHODOLOGY

Each Wetland Project is managed in three phases over a two-year cycle as shown in the flow diagram in **Figure 2** below. The first two phases straddle the first year of the cycle and involve planning, identification, design and authorisation of interventions. The third phase is implementation, which takes place during the second year. This approach was however adapted, as described below, for the Nyahlawe project since the proposed works were identified during a site visit to identify maintenance needs to existing wetland rehabilitation interventions.

3.1 Landowner consent

The ASD is responsible for undertaking the necessary landowner engagement and for ensuring that the requisite landowner consent forms required as part of Phase 2 of this project are signed. Refer to **Appendix E** for a copy of the landowner agreement.

3.2 Site visits

The nature of the work identified for the Nyahlawe project is mainly for maintenance to existing wetland rehabilitation structures. For this reason, site visits were undertaken by the following people on multiple occasions during 2017 and 2018:

- Dr Ferai Tererai (Deputy Director, WfWetlands)
- Dr Piet-Louise Grundling (Deputy Director, WfWetlands)
- Ms Collin Silima (ASD, WfWetlands)
- Mr Eric Munzhedzi (ASD, WfWetlands)
- Mr Cilliers Blaauw (Aurecon, Engineer)

The rehabilitation objectives together with the location and layout of the proposed interventions were agreed upon by the above listed team.

3.3 Wetland Assessment

The time and resources required to determine the current status of the wetlands was generally limited, and thus a rapid procedure was adopted to review the original assessments and provide an addendum on the current problems and rehabilitation objectives (**Appendix A**).

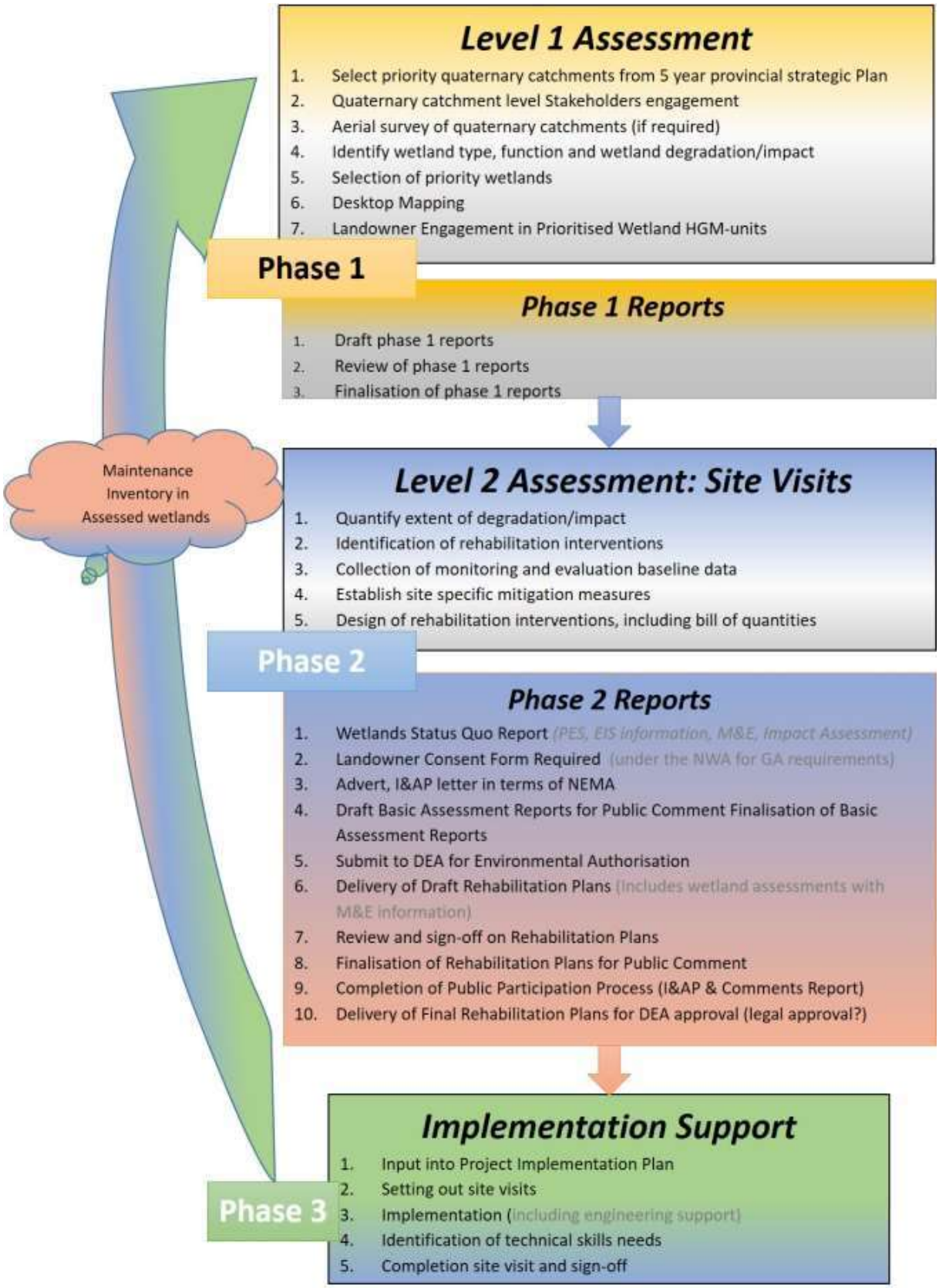

Figure 2: The three phases that must be undertaken for the successful rehabilitation of wetlands

3.4 Identification and location of intervention designs

The project team evaluated the various rehabilitation intervention options available and selected the most appropriate to achieve the rehabilitation objectives for the wetland. Choices of intervention options were also informed by the increased labour component as required by DEA. Any previously planned interventions that had not been implemented or included into the previous planning cycle reports were assessed and included into the current year's selection, if appropriate to the re-assessed rehabilitation objectives for the wetland. Agreed cost/benefit ratios in terms of 'Rands per hectare of rehabilitated wetland' were taken into account, along with operational considerations and larger scale project objectives.

After the appropriate intervention options were selected by the planning team, the engineer, in consultation with the Wetland Specialist determined the most appropriate designs and locations for the identified interventions in order to achieve the rehabilitation objectives for the wetland in question. GPS coordinates and digital photographs – sufficiently detailed to clearly identify the selected locations were then taken for record purposes. Appropriate dimensions of the locations were measured in order to be able to design and calculate quantities for the interventions.

i. Intervention naming convention

The accepted **naming convention** which has been applied to all interventions (old and new) is explained below with examples being provided as well.

A00A-00-000-00 (new),

A00A-00-000-01 (maintenance), where

Number	Explanation		
A00A	quaternary number		
00	wetland number		
200	intervention number with the '**200**' included for differentiation from previous interventions		
00	**New** intervention	**01**	**Maintenance** to intervention

An additional two digits will therefore be added to the end of each of the intervention numbers to indicate maintenance on this specific intervention and/or whether the structure is new (00) for tracking purposes. All new interventions will have a default of 00. Should built structures require maintenance, they would be numbered numerically beginning with '01' e.g. 01, 02, 03, etc. for each year that maintenance is undertaken on the intervention.

In addition, the new naming convention also added a '200' digit in the front of the intervention number to avoid confusion from previously named interventions.

3.5 Engineering design

The detailed procedure followed by the engineer is described in the Engineering Design Brief, which documents the procedure agreed upon by Aurecon and WfWetlands. The document also addresses important issues such as risk and liability. A summary of the process followed for the engineering design is described below:

- A control point investigation was undertaken (of the culvert under the road that crossed the stream about 1km upstream) to get an order of magnitude of impact of hydrology. The result of

this assessment allowed the engineer to select a suitable sizing of the spillway to be applied to the intervention.

- Construction materials were selected based on a range of site specific criteria including expected velocities, availability of materials such as rock, labour intensive targets, maintenance requirements etc.
- Interventions were designed based on the above to meet the objectives for wetland rehabilitation.
- The intervention designs were drafted to show, at a minimum, a plan view, a longitudinal section and front elevation at appropriate scales, and appropriate dimensions. A legend indicating basket sizes was included for gabion structures to improve design clarity for the implementers.
- Maintenance requirements for existing interventions in the assessed wetlands were similarly detailed and the anticipated costs calculated.

The engineer also reviewed and, if necessary, adjusted any previously planned interventions that are included into the current Rehabilitation Plan.

3.6 Development of the Rehabilitation Plan

The standardised Rehabilitation Plan format has been approved by the WfWetlands Programme Deputy Director for Planning, Monitoring and Evaluation. Summaries of the wetland prioritisation, problems and rehabilitation objectives are documented in the Rehabilitation Plan. Reports on the current status of the wetland were prepared by Dr Piet-Louis Grundling, who acted as the Wetland Specialist.

This Rehabilitation Plan was submitted to the WfWetlands ASD and Wetland Specialist for review before it was made available to stakeholders for comment. Any comments received during the comments period will be taken into account in the finalisation of the Rehabilitation Plan.

3.6.1 Reporting Format

All relevant information acquired during the assessments and field visits has been included in this document and its appendices.

- All intervention locations are given in geographical coordinates, (Degrees, Minutes and Seconds), based on the WGS84 datum.
- Mapping was done in Albers Equal Area Conic projection, WGS84 datum. The grids displayed on all maps are geographic and measured in Degrees Minutes and Seconds. The scale bar on each map is based on Albers Equal Area Conic projection and measured in metres.

4 NYAHLAWE – A92B-02

The assessment of the Nyahlawe wetland, its problems, and the development of the rehabilitation objectives are described in **Appendix A**: Wetland Status Quo Report. The following subsections provide a brief summary for this wetland system.

4.1 Landowner details

The Mutale project area comprises of communal land (**Table 3**). Consent for any prosed wetland rehabilitation (subject to the approval of the Rehabilitation Plans) on this property has been obtained and is available in **Appendix E**.

Table 3: Mutale Landowner/s and SG Key

Wetland Number	Property SG Key	Owner / Trust	Consent Obtained
A92B-02	T0MT00000000025500000	Thengwe Tribal Authority	5 March 2018

4.2 Wetland details

The Nyahlawe wetland is located in Quaternary Catchment A92B. **Table 4** provides a summary of the wetland details.

Table 4: Summary of the wetland details

Wetland Name	Nyahlawe
Wetland Number	A92B-02
River System Name	Mutale
Land Use in Catchment	Per-urban development, communal grazing, cultivation in the lower reaches, partially degraded bushveld, fuel for local community.
Land Use in Wetland	Semi-commercial and subsistence cultivation, communal grazing
No. of Properties Intersecting Wetland Area	1
Date of Planning Site Visit	N/A
Wetland Assessor(s)	Doug McCulloch (2008) Piet-Louis Grundling (2018)
Wetland size	41 ha

4.3 Wetland description[9]

The Nyahlawe wetland is located within sub-basin of quaternary catchment A92B that is 300 ha in extend and relatively steep in places. The catchment consists of a mountainous plateau that is covered in mixed broad-leafed woodland savanna (drier on the northern slopes) of the Soutpansberg Mountain Bushveld vegetation type. The catchment is characterized by a Mean Annual Precipitation (MAP) of 651.7mm and a Potential Evapotranspiration (PET) of 2134.2mm. The MAP to PET ratio is 0.3, indicating a semi-arid regime with irregular, high intensity rainfall events (LRI, 2009). The current land use is agriculture based with extensive grazing and subsistence cultivation that often extends to the edge of wetlands and watercourses. Rural urban sprawl, overgrazing and marginal cultivation resulted in the development of shallow erosion gullies.

4.4 Wetland problems[10]

The floods of 2000 caused major erosion in the Mutale River and its tributaries. By 2006 major gully erosion has worked its way up into the Nyahlawe wetland (along 1.5km of a valley bottom wetland with a length of 4km). Three structures were planned for this wetland in 2006 to protect the major part of the wetland. The wetland responded well to the rehabilitation measures (mainly gabion-based erosion control weirs). Additional interventions were added in subsequent years to protect existing interventions and to complete rehabilitation efforts in this wetland. However, the catchment of the wetland undergone intensive transformation in the past two decades since 1984 and peri-urban sprawl as well overgrazing resulted in accelerated stormflows into the wetland exacerbating gully erosion in the system since 2016. The current erosion phase does not only threaten the remainder of the wetland but also the erosion control works constructed since 2006.

4.4.1 Site photos

Vegetated sections of the Nyahlawe wetland.

[9] Information taken from *Appendix to the Mutale Rehabilitation Report No: L02218/191108/03,* compiled by Dr Piet-Louis Grundling, December 2018.

View downstream of an existing rehabilitation weir that is currently threatened by active erosion.

Sections of peat that has dried out and broke from the main peat body in the wetland.

4.5 Rehabilitation objectives

The primary objective of the proposed interventions within the wetland system would be to address the current erosion in the wetland and to protect the rest of the wetland from degradation and to secure the current erosion control measures. Therefore, the rehabilitation objectives and strategy are described in Table 5 below.

Table 5: Rehabilitation objectives and strategy[10]

Rehabilitation objective	Rehabilitation strategy
• To prevent wetland degradation: • Control erosion by reducing the steep slope at the current headcut and erosion gully inflow points. • To secure the existing erosion control interventions.	• Slope the current erosion face to 1: 4. • Strengthen the exposed soil surface through revegetation with local indigenous species. • Apply a MacMat-R lining to the prepared surface. • Tie the new measures in with the current erosion measures to create an all-inclusive erosion base level control. • Remove redundant intervention. • Develop a future stormwater control initiative upstream in the villages.

4.6 Summary of proposed interventions

4.6.1 New interventions proposed

An Intervention Booklet is included as **Appendix C** of this report. The booklet will be used on site by the implementers and provides detailed design information on each intervention proposed in this planning cycle. For the purposes of this report, the interventions contained within the booklet are summarised in **Table 6** below. The "implementation order" as depicted in the table indicates the timing order in which interventions should be implemented within the wetland (number 1 first).

Please note that the location of the interventions (**Figure 3**) may change slightly as a result of changes in the landscape (due to continued erosion, for example) that may occur during the time period between the initial planning site visit and the actual implementation of the interventions. It is therefore important to note that the coordinates and the intervention designs provided in the Intervention Booklet (**Appendix C**) may need to be adjusted slightly at the time of implementation.

4.6.2 Design selection and sizing

The main objective of the interventions are to stabilise instream erosion. A gabion drop-inlet weir is proposed to accommodate a higher flow over the spillway as appose to the previously collapsed conventional "straight" weir. In support of this main structure a series of earth works (sloping) is proposed that are to be covered with MacMat-R to provide surface stability and support revegetation. An existing damaged gabion structure is to be removed to avoid diversion and concentration of flow that would result in further erosion. The simplicity of the type of intervention, quantity and cost of material to be introduced to the site were all taken into consideration in selection and sizing of the interventions.

[10] Information taken from *Appendix to the Mutale Rehabilitation Report No: L02218/191108/03,* compiled by Dr Piet-Louis Grundling, December 2018.

Table 6: Summary of the Mutale interventions

Intervention Structure Type	Intervention Number	Proposed Action	Implementation Order
Gabion Weir	A92B-02-202-01	Undertake maintenance activities on the existing gabion weir, including (but not limited to) back filling, compaction of soil behind the structure, sloping of the upstream spillway and concrete cladding of the spillway.	2b
Gabion Weir	A92B-02-203-01	Undertake maintenance activities on the existing gabion weir, including (but not limited to) cutting and sloping of the eroded channel downstream of the structure to prevent continued erosion, replacement of geotextile, back filling, compaction of soil behind the structure and concrete cladding of the spillway.	2c
Sloping and MacMat R	A92B-02-204-00	Sloping of the eroded channel upstream of the existing gabion weirs and placement of a MacMat R soil blanket on top of the sloped area to encourage regrowth of vegetation and to prevent continued erosion.	1a
Sloping and MacMat R	A92B-02-205-00	Sloping of the eroded channel upstream of the existing gabion weirs and placement of a MacMat R soil blanket on top of the sloped area to encourage regrowth of vegetation and to prevent continued erosion.	1c
Gabion Weir	A92B-02-206-01	Removal of the flood damaged gabion weir that is no longer serving a purpose in the wetland and is posing an erosion risk.	2a

Figure 3: Wetland map, A92B-02 showing the location of existing and new interventions.

4.7 Construction Environmental Management Programmes issues

The proposed rehabilitation is to be undertaken on communal land and the project team should access the site and manage the site in accordance with the WfWetlands Best Management Practices and specific requirements of the Thengwe Tribal Authority. The implementation of these interventions must also take into account all relevant provisions of WfWetlands Best Management Practices and the EMP, the recommendations of the approved Basic Assessments and Environmental Authorisation for the project. The Intervention Booklet, Environmental Authorisation and EMP are included as **Appendices C, D and F** of this report, respectively, and shall accompany the Implementers to site.

4.8 Future recommendations

Various maintenance interventions are proposed to take place as described in Table 8. However, it is also recommended that the following actions/tasks be implemented:

- Commission a catchment-based study to understand long term change and the future impacts expected on Nyahlawe and other wetlands in the Mutale catchment.
- Implement stormwater control measures within the villages upstream of the wetland.
- Ensure that current and future (planned) interventions form a comprehensive approach in addressing internal wetland and catchment related impacts.
- Ensure that monitoring and evaluation forms part of the future management of this system.

5 REFERENCES

Grundeling, P.2018. Appendix to the Mutale Rehabilitation Report No: L02218/191108/03. Department of Environmental Affairs.

Mucina, L and Rutherford, MC. 2006. The Vegetation of South Africa, Lesotho and Swaziland, Strelitzia 19, South African National Biodiversity Institute: Pretoria.

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APPENDIX A

WETLAND STATUS QUO REPORT

Appendix to the Mutale Rehabilitation Report No: L02218/191108/03

Status Quo Assessment of Wetland A92B-02

Province:	**Limpopo**
Project:	**Mutale – Nyahlawe**
Assessor:	**Piet-Louis Grundling**
Wetland No:	**A92B-02**
Report Date:	**14 Dec 2018**

Dr Piet-Louis Grundling

December 2018

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Front page photo: re-activated erosion threatens current erosion control measures

LIST OF FIGURES

NO TABLE OF FIGURES ENTRIES FOUND.

1. Introduction

The Nyahlawe wetland is situated on the Nyhalwe River, a tributary of the Mutale River, near the village of Tshandama (Figure 1 and 2). The surrounding area has been extensively cultivated for semi-commercial and subsistence crop production and this land-use includes a substantial portion of the wetland habitat immediately above the interventions. The Nyahlawe wetland can be classified as an unchannelled valley bottom wetland. The wetland was heavily utilized by the local community, being extensively cultivated for subsistence crops. However, cultivation declined markedly between 2006 to 2010 due to constructive community engagement on the impact of cultivation on the wetland.

Originally, in 2006, three structures were planned for this wetland. The wetland responded well to the rehabilitation measures (mainly erosion control drop inlet weirs constructed with gabions). Additional interventions were added in subsequent years to protect existing interventions and to complete rehabilitation efforts in this wetland. However, the catchment of the wetland undergone intensive transformation in the past 2 decades and peri-urban sprawl as well overgrazing resulted in accelerated stormflows into the wetland exacerbating gully erosion in the system since 2016.

2. Nyahlawe System-Quaternary Catchment A92B

The Nyahlawe wetland is located within sub-basin of quaternary catchment A92B that is 300 ha in extend and relatively steep in places. The following background info are provided by Mucina and Rutherford (2006): The catchment consists of a mountainous plateau that is covered in mixed broad-leafed woodland savanna (drier on the northern slopes) of the Soutpansberg Mountain Bushveld vegetation type. The catchment is characterized by a Mean Annual Precipitation (MAP) of 651.7mm and a Potential Evapotranspiration (PET) of 2134.2mm. The MAP to PET ratio is 0.3, indicating a semi-arid regime with irregular, high intensity rainfall events (LRI, 2009). The current landuse is agriculture based with extensive grazing and subsistence cultivation that often extends to the edge of wetlands and watercourses. Rural urban sprawl, overgrazing and marginal cultivation resulted in the development of shallow erosion gullies.

Wetland details:

Wetland Name	Nyahlawe
Wetland Number	A92B
River System Name	Mutale
Land Use in Catchment	Per-urban development, communal grazing, cultivation in the lower reaches, Partially degraded bushveld, Fuel for local community.
Land Use in Wetland	Semi-commercial and subsistence cultivation, communal grazing

Wetland Assessor(s)	Doug McCulloch (2008) Piet-Louis Grundling
Wetland size	41 ha

3. Wetland Rehabilitation Problems

The floods of 2000 caused major erosion in the Mutale River and its tributaries. By 2006 major gully erosion has worked its way up into the Nyalwe wetland (along 1.5km of a valley bottom length of 4km). Three structures were planned for this wetland in 2006 to protect the major part of the wetland. The wetland responded well to the rehabilitation measures (mainly gabion-based erosion control drop inlet weirs). Additional interventions were added in subsequent years to protect existing interventions and to complete rehabilitation efforts in this wetland. However, the catchment of the wetland undergone intensive transformation in the past 2 decades since 1984 (Figure 2) and peri-urban sprawl as well overgrazing (Figure 2 to 4) resulted in accelerated stormflows into the wetland exacerbating gully erosion (Figure 5) in the system since 2016 (Figure 6 to 7). The current erosion phase does not only threaten the remainder of the wetland but also the erosion control works constructed since 2006.

4. Wetland Rehabilitation Objectives

The primary objective of the proposed interventions within the wetland system would be to arrest the current erosion in the wetland (Figure 8 and 9) to protect the rest of the wetland from degradation and to secure the current erosion control measures.

Rehabilitation objective	Rehabilitation strategy
1. To prevent wetland degradation through controlling erosion by reducing the steep slope at the current headcut and erosion gully inflow points. 2. To secure the current erosion control infrastructure.	• Slope the current erosion face 1: 4. • Strengthen the exposed soil surface by revegetation ~~and~~. • Lining with a MacMat R soil blanket. • Tie the new measures in with the current erosion measures to create an all-inclusive erosion base level control. • Remove redundant intervention. • Establish a stormwater control initiative upstream in the villages.

5. Wetland Rehabilitation Strategy

Understanding the geomorphology and hydrology of this system and the changes in the catchment hydrology is key in making rehabilitation recommendations. Likewise, a proper interpretation of the human impacts and subsequent natural event resulting in the erosion of the system. Unfortunately, the current level of investigation is not sufficient in that in depth research into the geomorphology (e.g. drilling into the sediment sequence to basal rock) or

studying the landuse based catchment hydrology over an extended period of time can't be afforded. As such interpretation is made of imagery and site inspections. The site inspections focused on the study of flow patterns, sediment, vegetation and impacts on a landscape level. Therefore, the recommendation is made to keep hard interventions to minimum and to focus on softer measures such as erosion control blankets. An adaptive management approach is recommended where more interventions can be planned in future as the systems respond over time to the 1st series of interventions. Stormwater control measures must be initiated within the villages upstream of the wetland Monitoring and evaluations should therefore be an important component of the future management of this system.

6. Proposed interventions Impacts

The proposed interventions address the wetland problems and achieve the rehabilitation objectives as follows:

Intervention No	Specific Impact Type	Intervention Structure Type	Rehabilitation objective
	Gully erosion	Sloping and MacMat R	• Facilitate erosion control and revegetation. • Slope the current erosion face 1:4. • Strengthen the exposed soil surface by revegetation. • Lining with a MacMat R soil blanket. • Tie the new measures in with the current erosion measures to create an all-inclusive erosion base level control.
	Storm water	Establish a stormwater control initiative upstream in the villages	• Capture rain water from roofs • Swales • Contour berms • Energy dissipaters
A92B-02-202-01	Gully erosion	Gabion weir	• Undertake maintenance activities on the existing gabion weir, including (but not limited to) cutting and sloping of the eroded channel downstream of the structure to prevent continued erosion, replacement of geotextile, back filling, compaction of soil behind the structure and concrete cladding of the spillway.
A92B-02-203-01	Gully erosion	Gabion weir	• Undertake maintenance activities on the existing gabion weir, including (but not limited to) cutting and sloping of the eroded channel downstream of the structure to prevent continued

Intervention No	Specific Impact Type	Intervention Structure Type	Rehabilitation objective
			erosion, replacement of geotextile, back filling, compaction of soil behind the structure and concrete cladding of the spillway.
A92B-02-204-00	Gully erosion	Sloping and MacMat R	• Sloping of the eroded channel upstream of the existing gabion weirs and placement of a MacMat R soil blanket on top of the sloped area to encourage regrowth of vegetation and to prevent continued erosion.
A92B-02-205-00	Gully erosion	Sloping and MacMat R	• Sloping of the eroded channel upstream of the existing gabion weirs and placement of a MacMat R soil blanket on top of the sloped area to encourage regrowth of vegetation and to prevent continued erosion.
A92B-02-206-01	Gully erosion	Gabion weir	• Removal of the existing gabion weir that is no longer serving a purpose in the wetland.

7. Wetland Management Recommendations

A catchment based study needs to be commissioned to understand long term change and the future impacts expected on this and other wetlands in the Mutale catchment. Stormwater control measures must be initiated within the villages upstream of the wetland. Current and future (planned) interventions must form a comprehensive approach in addressing internal wetland and catchment related impacts. Monitoring and evaluations should therefore be an important component of the future management of this system

8. References

Mucina, L. and Rutherford, M.C. (eds) 2006. The Vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.

Working for Wetlands. 2006. Wetland Rehabilitation Plan – Sambandou Wetland.

Figure 1: Location of the Nyahlawe wetland in the northeastern part of Limpopo Province

Figure 2: Land use extent in the Nyahlawe catchment in 1984: mainly agriculture with some villages.

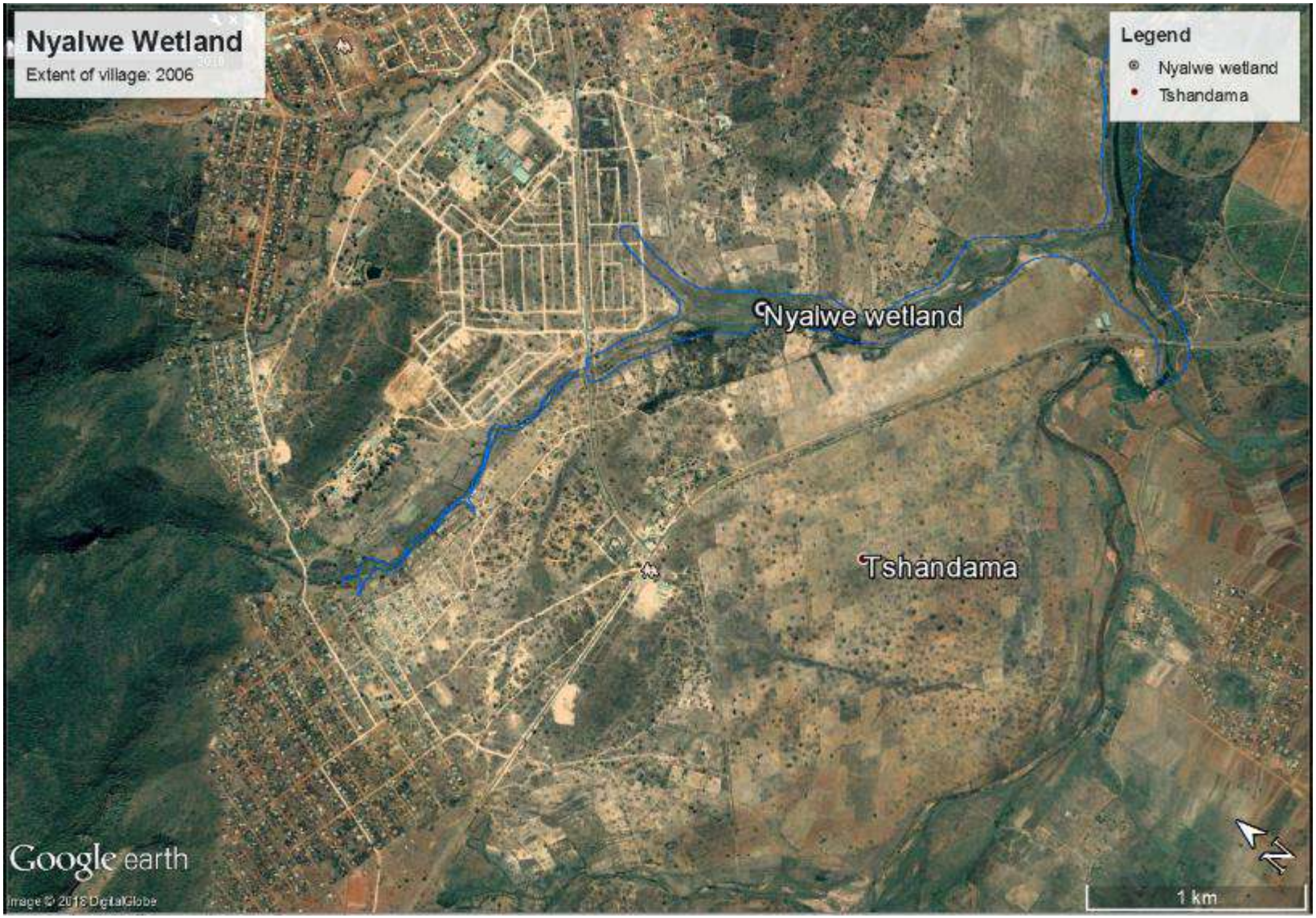

Figure 3: Land use extent in the Nyahlawe catchment in 2006: note the expansion of villages.

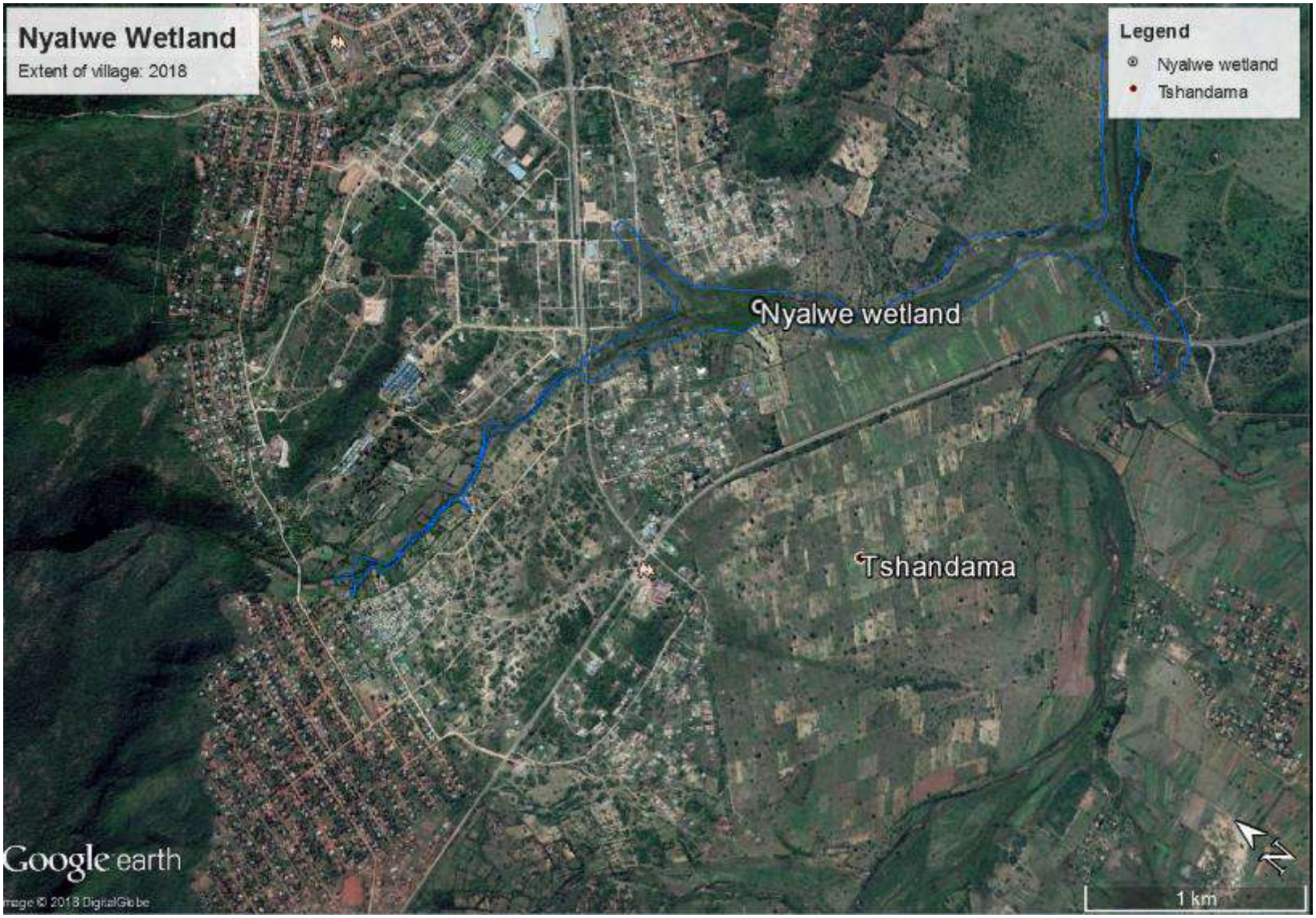

Figure 4: Land use extent in the Nyahlawe catchment in 2018: note the expansion of villages and intensification of infrastructure.

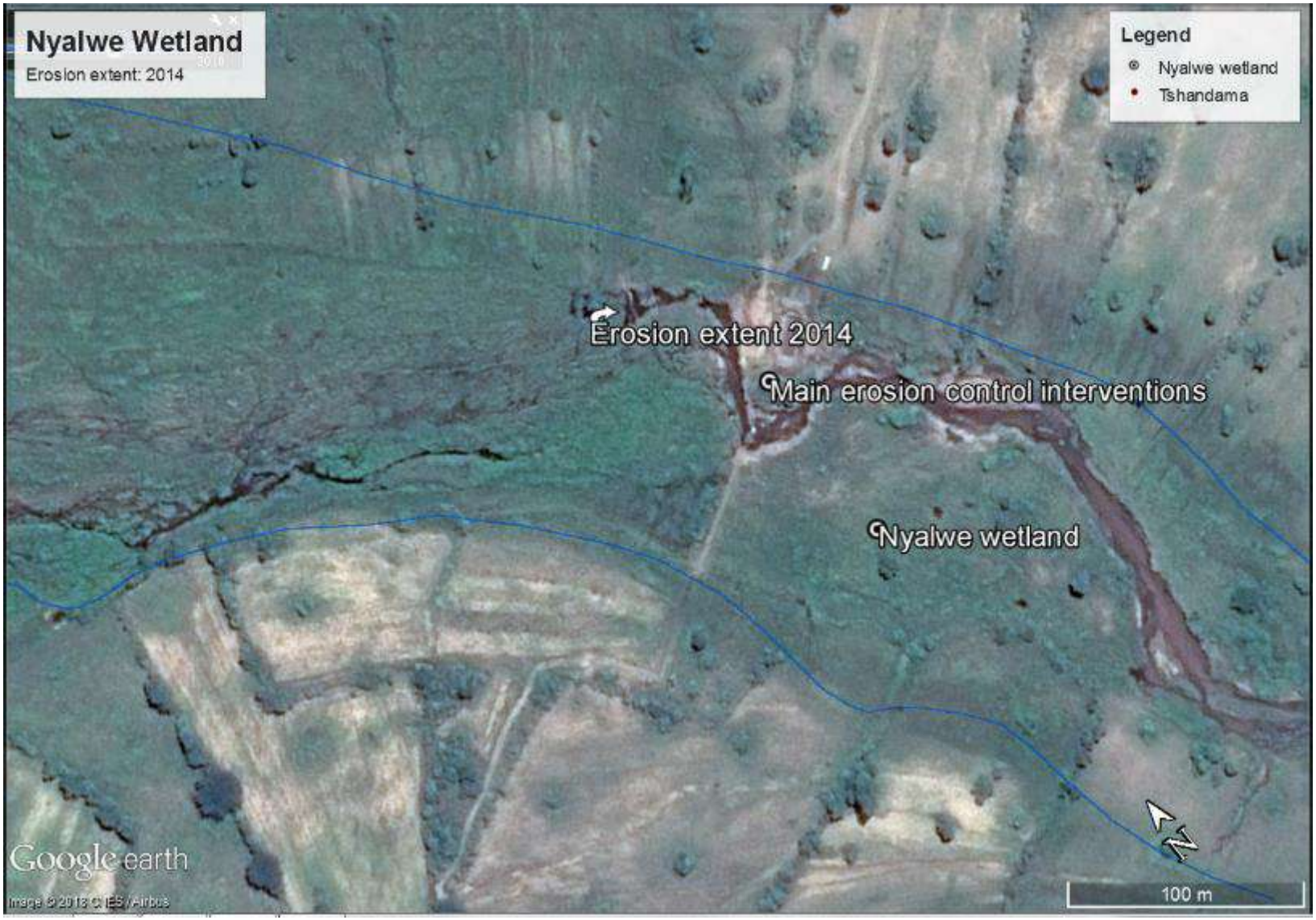

Figure 5: The extent of gully erosion in 2014. Rehabilitation measures were upgraded during this period.

Figure 6: The recovery of the wetland upstream of the main interventions is evident in this Google Earth image of 2016.

Figure 7: The re-activation and expansion of erosion by 2018 during implementation of the main erosion control measures.

Figure 8: The extent of the re-activated erosion is evident in this 2018 Google Earth Image

Figure 9: Photos of the site depicting the extent of the erosion

LIMPOPO

Project Ref: 2010/Phase 1/Report 02-LP Final

PHASE 1 - PLANNING REPORT FINAL

MUTALE

A92A
A92B
A91H
A80H

August 2010

Environmental Affairs
Water Affairs
Agriculture, Forestry and Fisheries

EXPANDED PUBLIC WORKS PROGRAMME

Aurecon Ref: 5169a/105782

SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE

PHASE 1 PLANNING REPORT FOR MUTALE, A92A, A92B, A80H AND A91H, LIMPOPO

MAIN REPORT

Final

August 2010

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PROJECT DETAILS

TITLE	:	Phase 1 Planning Report for the Working for Wetlands Rehabilitation Programme: Mutale
AUTHORS	:	Donnelly McCleland Ms. Collin Nemadodzi Mr Piet-Louis Grundling
SUBCONSULTANTS	:	Ixhaphozi Enviro Services CC
INTERNS	:	None
CLIENT	:	South African National Biodiversity Institute
PROJECT NAME	:	Working for Wetlands Programme~ Phase 1 Reporting
REPORT STATUS	:	Final
REPORT NUMBER	:	105782\5169a
SUBMISSION DATE	:	August 2010

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SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE
Planning, Monitoring and Evaluation
Approved for the South African National Biodiversity Institute by:

.....

C. Nemadodzi
SANBI Provincial Coordinator: Limpopo

South African National Biodiversity Institute:
Planning, monitoring and evaluation

ASSUMPTIONS AND LIMITATIONS

In compiling this report, the following has been assumed:

- The level and accuracy of the information provided from the desktop investigation which was undertaken by the Wetland ecologists, in addition to input from SANBI's Provincial Coordinators is sufficient for the wetland prioritisation process. This data informed the findings and conclusions of this report.
- More detailed assessments for wetland rehabilitation planning will be undertaken during the field assessment (phase 2) which will be carried out on the wetlands prioritized in this phase 1 planning.
- The level of planning and wetland prioritisation carried out for each project area was dependant on the categorisation of the project as determined by the project details[1] for this planning project and as described in the methodology section of this document. This level of planning and prioritisation should be taken into account when utilising this document.
- Information contained in this Report will be used during phase 2 to guide the planning for the site visits and associated findings for inclusion in the Rehabilitation plans and Basic Assessment Reports.
- SANBI's Provincial Coordinators will be undertaking the landowner engagement and have obtained the requisite landowner consent forms[2] required as part of Phase 1.
- SANBI have provided all relevant information and documentation required to compile this Phase 1 report.
- Rehabilitation activities should not be carried out using this document alone as a reference. This document is a precursor to, and should be read in conjunction with, the 'Final Rehabilitation Plan'.

Gaps in knowledge

- The intervention points and wetland boundary polygons provided in this report are based on the shapefiles that have been provided by SANBI. The datasets have been updated by the SANBI Provincial Coordinators and the Wetland ecologists during phase 1. The spatial location of the wetlands and interventions will be verified during the phase 2 site visits, upon which the spatial datasets will be updated where necessary. Aurecon can therefore not be held accountable for any inaccuracies in the spatial datasets generated in this report.
- The planning described in this document is only a phase 1 prioritisation of wetlands. Limited field work and visual aerial surveys of certain areas (for Category 3 projects) was undertaken during this prioritization process.
- The information in this Report is based on existing available information and input from SANBI's Provincial Coordinator as well as the specialist Wetland ecologists. Until this Report has been signed off by SANBI, the content of the Report should be considered as preliminary.

[1] provided and confirmed by SANBI's Provincial Coordinators
[2] Standard operating procedure; Wetland survey and consent; Terms and conditions of rehabilitation

This report is a revision of the 2009 Phase 1 report undertaken by the service provider, Land Resources International (LRI). Aurecon hereby acknowledges the authorship of any original information contained in this document.

This Report must be read in conjunction with the following reports for this project:

1. Phase 2 Planning Reports which include the:
    a. Basic Assessment Report,
    b. Rehabilitation Plan, and the
    c. Wetland Assessment.

DISTRIBUTION LIST:

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C. Nemadodzi	SANBI Provincial coordinator	√		√
National stakeholders				
Refer to **Appendix B** below.			√ (email notification)	
Provincial stakeholders & I&APs				
Refer to **Appendix C** below.			√ (email notification)	

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ABBREVIATIONS

BAR	Basic Assessment Report
CARA	Conservation of Agricultural Resources Act
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DWA	Department of Water Affairs
EIA	Environmental Impact Assessment
EPWP	Expanded Public Works Programme
GA	General authorisation
IA	Implementing Agent
I&APs	Interested and Affected Parties
IDP	Integrated Development Plans
NEMA	National Environmental Management Act
NWA	National Water Act
PIP	Project Implementation Plan
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks

1 WORKING FOR WETLANDS PROGRAMME OVERVIEW

Working for Wetlands is a government programme (similar to Working for Water, Working on Fire and LandCare) managed by the South African National Biodiversity Institute (SANBI) on behalf of the national government departments of Environmental Affairs (DEA), Water Affairs (DWA), and Agriculture, Forestry and Fisheries (DAFF), and forms part of the Expanded Public Works Programme (EPWP). While the programme's primary focus is wetland rehabilitation, the protection, rehabilitation and sustainable use of those wetlands is simultaneously entrenched within the programme's core aims and objectives.

1.1 Vision and Objectives

The vision of Working for Wetlands is to facilitate the conservation, rehabilitation and sustainable use of wetlands in South Africa, in accordance with national policies and commitment to international conventions and regional relationships. The two main objectives of the programme are wetland conservation in South Africa and poverty reduction through job creation and skills development amongst vulnerable and marginalised groups.

Given this approach of linking wetland conservation to sustainable economic development, the programme forms part of the EPWP, which seeks to draw significant numbers of unemployed workers into the productive sector of the economy, gaining skills while they work and increasing their capacity to earn income? Projects are thus focused on rehabilitation, conservation and the appropriate use of wetlands in a way that attempts to maximize employment creation, support for small business and the transfer of skills to the unemployed and poor.

1.2 Budget and Scope of Work

The programme started off with a R 20 million budget that was implemented across 14 projects in 2001. The budget has been increasing steadily and so has the number of projects implemented and beneficiaries employed. The programme is currently implemented across 35 projects countrywide with a budget of R75 million and employs over 1300 workers. The programme makes use of external support to implement its work. Fourteen implementing agents are currently employed and some are Section 21 companies. Implementers are responsible for employing contractors and their teams (workers), and ensuring that rehabilitation plans are adequately implemented. Funds are transferred from SANBI to the implementing agents, who in turn pay contractors and their teams.

Local people are recruited to work in projects. Wage information sourced from the best practice guidelines suggests that workers and contractors would be paid daily rates of R 68.04 and R 276.46[3] respectively and would be employed on limited term contracts, i.e. 24 months in a five-year cycle.

[3] without a Supervisor

Typical activities undertaken within the projects include:

- The construction of structures to control erosion in the wetland, trap sediment and raise water tables;
- The control of invasive alien plants within the immediate catchment, and in the wetland;
- Plugging of artificial drainage channels in the wetland;
- Addressing offsite causes of degradation in the catchment;
- Raising awareness of wetlands among workers, landowners and the general public;
- Providing adult basic education and training, and technical skills, and;
- Developing management plans for the rehabilitated wetlands.

1.3 Training and Capacity Building

Working for Wetlands has established a working relationship with the Department of Labour through the Working for Water programme. This partnership provides accredited training in accordance with the special public works Code of Good Practice agreements. Capacity building by Working for Wetlands operates primarily at two levels. The first concerns the need to ensure the development of adequate capacity to rehabilitate, manage and conserve wetlands in South Africa. The second relates to the commitment of Working for Wetlands as an expanded public works programme, to provide appropriate training to its workers in order for them to exit the programme with marketable skills and enhanced personal development. Workers receive two days of training, either vocational or social development-related, for every 22 days worked. Vocational training includes technical matters related to project activities, occupational health and safety, first aid, fire awareness, and business skills (contractor development). Social development includes literacy, primary health, personal finance, HIV/Aids and diversity awareness.

1.4 Support for Government, Non-Government And Private Agencies

Working for Wetlands engages with provinces, especially government departments and agencies responsible for biodiversity and environment, and municipalities through individual projects. A stronger working relationship with these spheres of government is being promoted through the programme's emphasis on partnerships. In particular, compatibility with Integrated Development Plans and rehabilitation project objectives will be a key area of future focus. Working for Wetlands encourages municipalities to participate in provincial wetland forums as these forums are the platform for the roll out of all the programmes' processes, including planning for future work. Provincial forums also offer support from the government departments and private sectors that are represented. Partnerships with non-governmental organizations and the private sector are also critical, requiring collaboration and cooperation with a wider range of stakeholders and role players in the wetland management field.

The strategic framework of Working for Wetlands underlines the need for a more refined planning process at catchment scale. Catchment scale planning seeks to promote ecosystem-scale planning. Catchment scale planning seeks to promote

ecosystem-scale outcomes, long-term custodianship, and the entrenchment of rehabilitation in broader local institutions and frameworks.
The recent move to a systematic wetland rehabilitation planning process has provided a fertile and conducive platform for partnerships to be formed and/or strengthened as the process draws in a much wider stakeholder base.

1.5 Legislative Context

Working for Wetlands operates within the context of the Constitution Act, No. 108 of 1996, whereby everyone has the right to have the environment protected and conserved for the benefit of present and future generations. Other national legislation that protects the environment includes the:

- National Environmental Management Act, No. 107 of 1998 (NEMA);
- National Water Act, No. 36 of 1998 (NWA); and the
- Conservation of Agricultural Resources Act, No. 43 of 1983 (CARA).

This legislation informs and guides the Working for Wetlands programme in terms of its vision and objectives, whilst simultaneously regulating the wetland rehabilitation activities which Working for Wetlands carries out. Working for Wetlands has put in place systems to achieve compliance with all legislation. For example, Basic Assessments for Environmental Authorisation are carried out for all listed activities involved in wetland rehabilitation to comply with NEMA.

In terms of Section 39 of the NWA, a General authorisation[4] (GA) has been granted for certain activities that are listed under the NWA that usually require a Water Use License; as long as these activities are undertaken for wetland rehabilitation. These activities include '*impeding or diverting the flow of water in a watercourse*[5]' and '*altering the bed, banks, course or characteristics of a watercourse*[6]' where they are specifically undertaken for the purposes of rehabilitating[7] a wetland for conservation purposes.

A Memorandum of Agreement has been entered into between the DAFF, DEA, DWA and SANBI for the Working for Wetlands programme. Through co-operative governance and partnerships, this Agreement aims to streamline the authorisation processes to facilitate efficient processing of applications for authorisation of wetland rehabilitation activities under CARA, NEMA and NWA respectively.

[4] Government Notice No. 1198, 18 December 2009
[5] Section 21(c) of the NWA, No. 34 of 1998
[6] Section 21(i) of the NWA, No. 34 of 1998
[7] Defined in the NWA as "*the process of reinstating natural ecological driving forces within part of the whole of a degraded watercourse to recover former or desired ecosystem structure, function, biotic composition and associated ecosystem services*"

2 INTRODUCTION

Aurecon South Africa (Pty) Ltd was appointed by SANBI to undertake the various project activities and associated reporting required for the various phases of the rehabilitation planning cycle. These included Phase 1 Reports, the wetland rehabilitation plans as well as the Basic Assessment Reports required for each project area within all nine provinces. Refer to **Figure 1** below that graphically depicts the entire planning process employed by Working for Wetlands to rehabilitate wetlands.

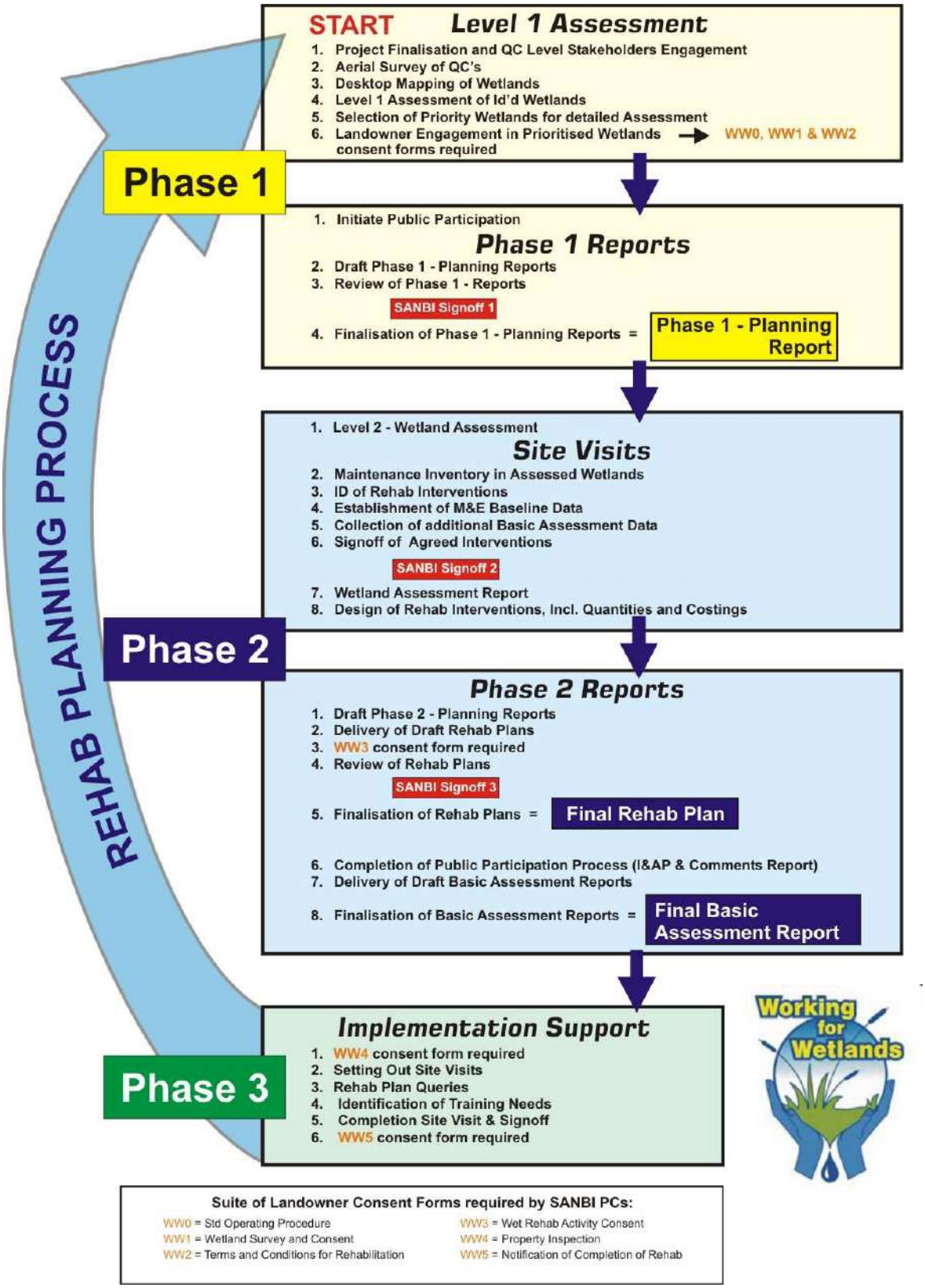


Figure 1: The three phases that must be undertaken for the successful rehabilitation of wetlands

The planning process (beginning in Phase 1 and ending in Phase 3) is based on a 24 month timeframe and is thus undertaken each year. Phase 1 and 2 are undertaken in the first twelve months and Phase 3 in the second twelve months. There are a number of actions and associated milestones and deliverables that are completed for each phase. These are graphically summarised in **Figure 1** above.

2.1 Purpose of the Phase 1 Report

The purpose of the Phase 1 Report is to identify within a province which are priority catchments within which work needs to be undertaken on a broad scale, and to identify key stakeholders who would review and comment on the Phase 1 and later the detailed planning (Phase 2) reports.

This report thus explains the general methodology and approach that was undertaken as part of the wetland prioritisation phase (Phase 1). The document then describes the detail of the Phase 1 Planning for the wetland rehabilitation project. This Report thus documents the findings and conclusions that came out of the Level 1 Assessment.

2.2 Purpose of the Phase 2 Report

The Phase 2 reports consist of a Basic Assessment Report, a Wetland Assessment as well as a Wetland Rehabilitation Plan that is compiled for each project. The reports are compiled after the wetlands, prioritised during phase 1, have been visited by the project team. The Phase 2 reports thus document and provide detail on the type and location of interventions that are needed to rehabilitate wetlands within a specific catchment area. The motivation for the rehabilitation work, and the potential impacts associated with the interventions are also detailed in these reports. After the public comment period where the stakeholders and Interested and Affected Parties are afforded an opportunity to comment on the draft reports, the updated BAR and Rehabilitation Plan is then sent to the authorities for their consideration and decision in terms of the authorisation process.

Separate Wetland Rehabilitation Plan documents per project detailing the rehabilitation plan for, and the individual intervention designs within each prioritised wetland is thus compiled during Phase 2 of the planning process. The Wetland Rehabilitation Plans will be the output of the Phase 2 planning process. Basic Assessment Reports (BARs) will also be compiled for each of the provinces as part of Phase 2. This is due to the fact that certain interventions (and thus projects) trigger the Environmental Impact Assessment (EIA) Regulations under the NEMA, and therefore Environmental Authorisation from the Department of Environmental Affairs (DEA) is thus required. The Wetland Rehabilitation Plans will be used to inform the BARs which will be submitted to DEA. A separate South African National Parks (SANParks) BAR will also be compiled for all wetlands/ projects that are located on land that is owned by SANParks

Once the DEA have issued the Environmental Authorisation, and the landowner(s) has signed (approved) the proposed rehabilitation work detailed in the Rehabilitation plan, the interventions would be implemented by the Implementing Agent (IA) within the following year. This occurs within Phase 3 of the project cycle.

Continuous evaluation and monitoring of the interventions would be undertaken to establish the effectiveness of the structure in rehabilitating the identified wetland.

3 GENERAL METHODOLOGY

Depending on the preliminary investigations already undertaken, and the subsequent level of information available for a particular project, the project is grouped into one of three categories. Projects are thus grouped based on the scale at which the assessment for planning still needs to be carried out. This is explained in more detail below and is graphically depicted in **Figure 2** below.

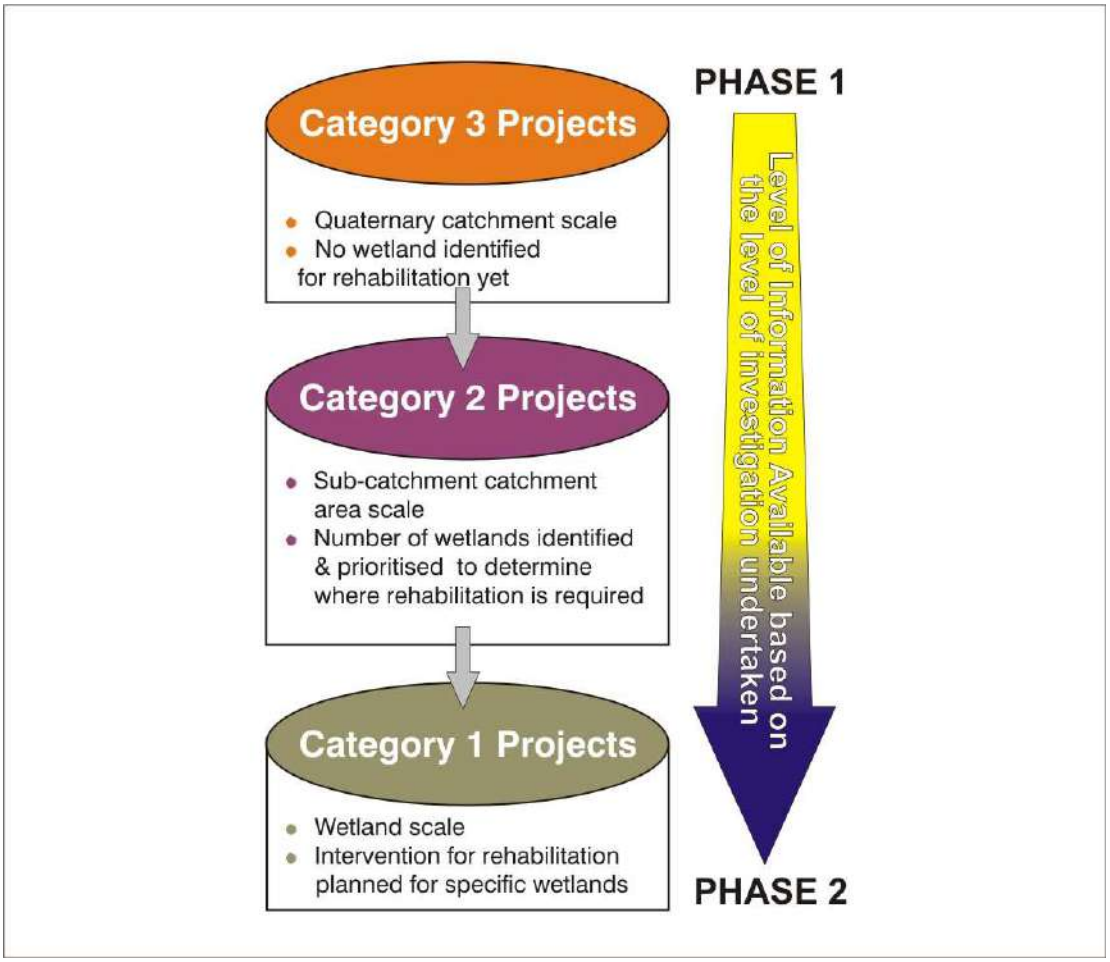


Figure 2: Definition of projects categorisation

Projects grouped as **Category 3** are those that have no/ little information available as only a quaternary catchment or management area has been identified by Working for Wetlands. Based on further investigation by the Wetland ecologist and input from the SANBI Provincial Coordinator, the quaternary catchment area is assessed (via desktop analysis and/ or a fly-over of the area) to identify potential wetlands that warrant rehabilitation.

Compared to Category 3 projects, preliminary investigation has already been undertaken for **Category 2** projects where there is more certainty regarding which wetlands should be rehabilitated. An assessment of the wetlands (already identified within a sub-catchment area) has therefore been undertaken to establish where rehabilitation is required for each of the identified wetland(s).

Categories 1 projects have significant existing information available and therefore interventions required to rehabilitate the specific wetland have already been identified.

This categorisation process was developed to clearly identify the status of each of the projects in terms of the level of investigation/ work required. The Working for Wetlands rehabilitation programme continues each year on a cyclical basis. Accordingly there are certain scenarios for projects that affect their categorisation and therefore status in terms of programme.

There are overlap periods (Category 1 projects) for example whereby the rehabilitation work has been identified, however for various reasons has not yet been implemented. In addition, certain Working for Wetlands projects have been running for many years and SANBI's Provincial Coordinators are thus extremely familiar with the wetlands, planning and associated rehabilitation work that is required for that particular area. Other projects, however that are located within quaternary catchments with little or no research having been undertaken require further investigation and fieldwork in terms of the rehabilitation required for the identified wetland. Finally projects that have had all of the identified rehabilitation work completed (i.e. the interventions have been built within the wetland), require that other wetlands be identified and investigated in terms of future rehabilitation work. These are Category 3 projects as an assessment of a completely new quaternary catchment still needs to be undertaken.

For each province, a planning team was identified and consisted of:

- a wetland specialist,
- an Engineer,
- an Environmental Practitioner, and
- the Working for Wetlands Provincial Coordinator.

Depending on the area within which the project team will be working, other specialists that could include a fluvial geomorphologist, hydrologist and/ or a wetland avifauna specialist would provide expert input into the relevant study(ies)/ reporting.

Prior to the initiation of Phase 1, the Environmental Practitioner, Engineers as well as the SANBI Provincial Coordinator attended the WET-Tools course whereby the WET-RehabPlan, WET-EcoServices, WET-Health and WET-Prioritise manuals were explained. As the wetland assessment methodology developed by WET-Tools is used by the Wetland ecologists to assess the potential of, and value in rehabilitating a specific wetland, it was vital that the project team be aware of and understand the methodology behind the prioritisation process. This methodology is discussed in more detail in the Wetland Assessments that would form part of the Phase 2 reporting.

The Environmental Practitioner performed the role of the 'Area manager' for their respective province. The Environmental Practitioner was therefore responsible for coordinating the project team in terms of organising site visits as well as obtaining requisite information for the reporting. As the Area Manager, the Environmental Practitioner compiled the Phase 1 Reports based on specialist input from the Wetland ecologists as well as input from the Provincial Coordinator. The Environmental Practitioner was also responsible for compiling the Rehabilitation plan and for writing the Basic Assessment Report using information provided by the Engineer as well as

the Wetland ecologists (in the form of a wetland assessment).

The general methodology described in this section applies to a full **Category 3** project. Certain of these steps would be omitted from Category 1 and 2 projects. Mutale combines a number of individual sites, some of which have undergone rehabilitation before, while others are in the early stages of planning, thus the full methodology is included below.

The Phase 1 planning for wetland rehabilitation is a wetland identification and prioritisation exercise to determine a feasible number of wetlands that can most effectively be assessed in further detail for rehabilitation by Working for Wetlands. This process is described diagrammatically in **Figure 3** and is explained in more detail in the following sections.

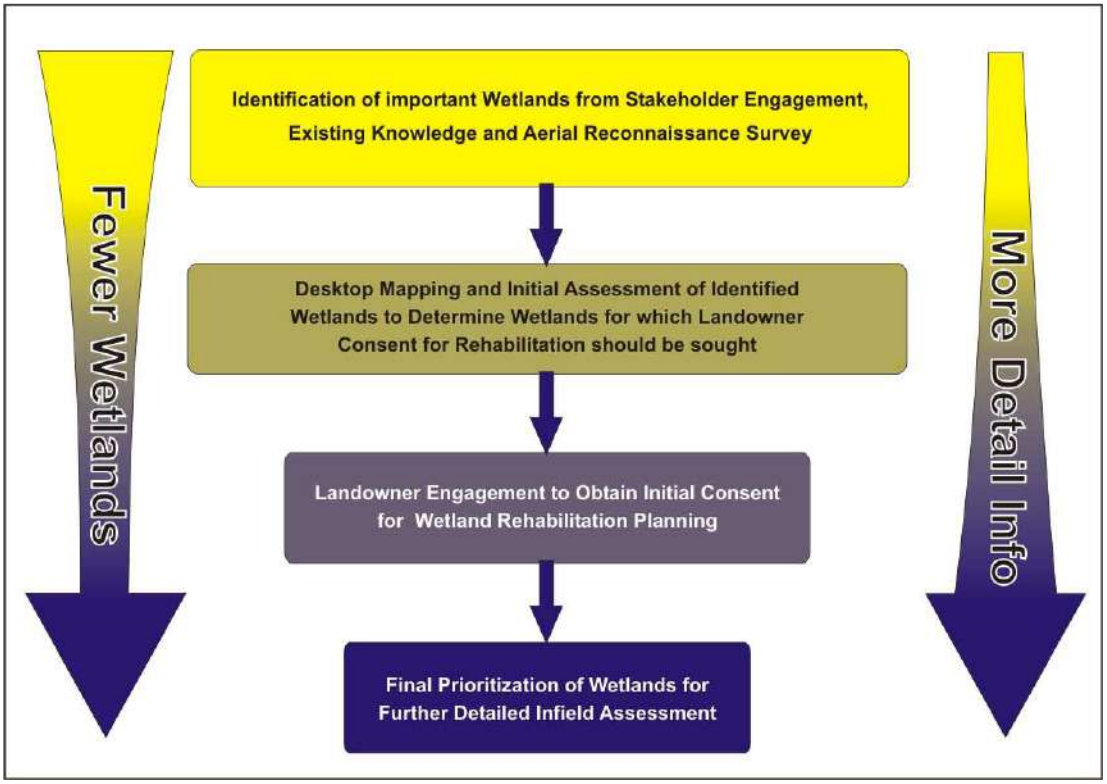


Figure 3: Wetland Prioritisation Process

3.1 Project Assessment

A brief review was undertaken regarding the history and background of the project. This included an audit of previously planned interventions that have not yet been implemented or included into the current Project Implementation Plan (PIP). These intervention designs were assessed and if necessary updated during the rest of the planning process to determine whether or not they should be included into future rehabilitation plans and PIPs.

3.2 Catchment Level Stakeholder Engagement and Objective Determination

Provincial or quaternary catchment level stakeholders were identified for each project from the planning team's background knowledge and the Working for Wetlands Provincial Coordinator's contacts. These stakeholders included municipalities, the Departments of Water Affairs (DWA), Agriculture and Environmental Affairs as well as local interested and affected parties (I&APs). Where possible these stakeholders were engaged through an existing forum such as the provincial wetland forum. In other cases they were met with individually.

The objectives of this engagement were to:

- ensure that the stakeholders were aware of the Working for Wetlands projects in their area,
- obtain stakeholder input in:
  - identifying catchment management needs,
  - identifying rehabilitation objectives for the catchment,
  - identifying priority areas for wetland rehabilitation,
- determine if there were any broader plans or initiatives within which the Working for Wetlands projects should fit or within which they could operate/ work, and
- obtain approval for the proposed project areas.

3.3 Catchment Assessment and Wetland Prioritisation

Where necessary, a brief review was undertaken of local knowledge and of the existing up-to-date studies undertaken of the identified quaternary catchments relating to the affected wetland(s).

For Category 3 projects, the identified quaternary catchments were visually surveyed from a light aircraft by a team consisting of at a minimum the wetland specialist to get a comprehensive overview of the catchment. Where possible, Working for Wetlands Provincial Co-ordinators were also involved in this survey. Co-ordinates captured in Degrees Minutes and Seconds (WGS 84) and photographs of problem points identified from the air were collected.

These problem points were used in combination with desktop mapping using aerial imagery of identified wetlands to rate the potential for rehabilitation of each wetland based on the table below. These ratings were used in combination with the identified catchment rehabilitation objectives, catchment priority areas and operational considerations to prioritise wetlands for potential rehabilitation.

Table 1: Class ratings for wetlands depending on the benefit(s) resulting from their rehabilitation

Description of the class based on the score rating
0 The returns are considered to be very low or the sites considered too expensive to rehabilitate for any significant gain.
1 A site which has potential (e.g. intact area threatened by headcut erosion) but where the returns are likely to be low (e.g. because the intact area is small <3 ha) or uncertain.
2 A site where the returns are potentially moderate.
3 A sites where returns are potentially high (e.g. a large area, i.e., > 20 ha, threatened by gully erosion).

3.4 Landowner Engagement

The properties in which the prioritised wetlands were located were identified. The landowners of these properties were contacted and their consent for any proposed wetland rehabilitation subject to their approval of the final rehabilitation plans was sought by the SANBI Provincial Co-ordinators. Any wetlands for which landowner consent was not obtained were excluded from the prioritisation process.

3.5 Finalisation of Prioritised Wetlands

The list of prioritised wetlands was updated based on the signed consent forms that were received from the landowners. Wetlands that did not have consent forms signed were excluded from the list. Preliminary estimates of the amount of rehabilitation work available for each wetland was then determined.

3.6 Identification of Local Stakeholder Group

The final step of the Phase 1 Planning was the constitution of a local stakeholder group to provide guidance and input into the wetland rehabilitation project.

3.7 Reporting Format

All relevant information acquired during the assessments and field visits has been included in this document and its appendices in a hierarchy as shown in **Figure 4**.

All intervention locations are given in geographical coordinates, (degrees, minutes and seconds), based on the WGS84 datum.

Mapping was done in Albers Equal Area Conic projection, WGS84 datum. The grids displayed on all maps are geographic and measured in Degrees Minutes and Seconds. The scale bar on each map is based on Albers Equal Area Conic projection and measured in metres.

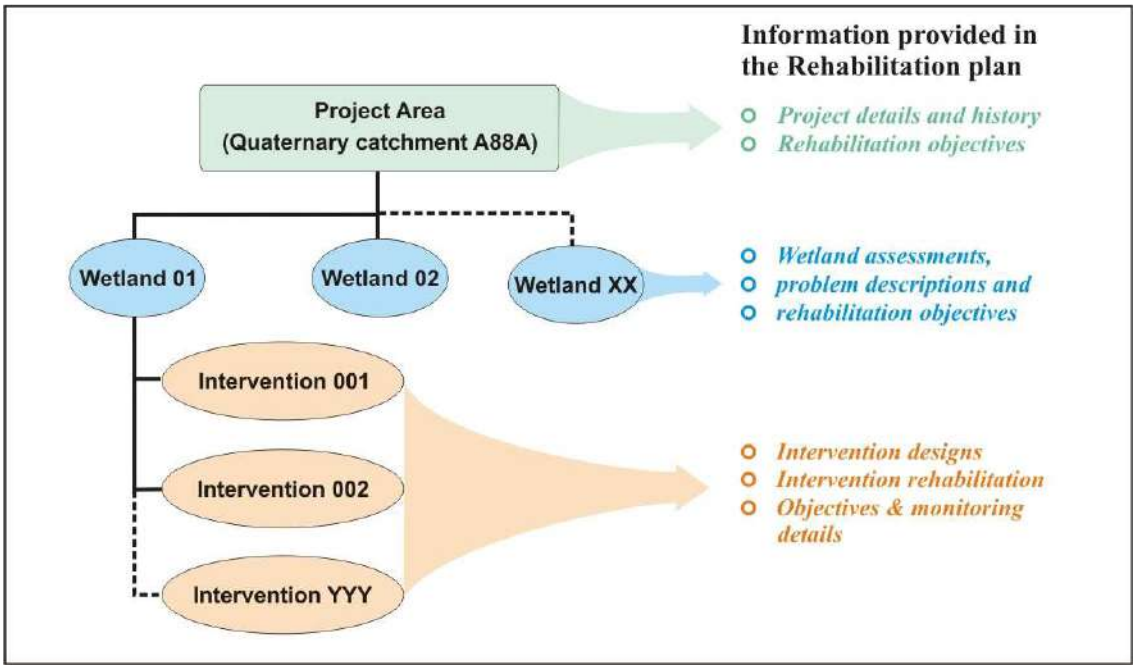


Figure 4: Hierarchy used in the Wetland Rehabilitation Plan

4 PROJECT DESCRIPTION

The Mutale wetland rehabilitation project for the 2010/2011 financial year is situated in quaternary catchments A92A and B, A80H and A91H, approximately 50 km north of Thohoyandou in Limpopo province. Work commenced in 2007 in quaternary catchment A92B, and the rehabilitation of the wetlands identified in this catchment was completed in 2009/2010. Wetlands were identified in the two adjacent quaternary catchments from satellite and aerial imagery, as well as topographic maps. An aerial survey was conducted, which identified several problems. New sites identified from the aerial survey were Tshiombedi at Tshandama and Nwanedi at Tshamulungwi. The co-ordinates of these were recorded for ground verification during the subsequent phase two site visit. The quaternary catchment and wetland locations are shown in **Figure 5** and **Figure 6.**

4.1 Project Details

Table 2: Project details

Project Name	Mutale
Region (Province)	Limpopo
Project Budget	R 2, 627, 900.00
Planning Category	Category 2
Nearest Town	Thohoyandou
Partnership	Local Authorities

4.2 Project Scope

The scope of the project is listed in the table below:

Table 3: Project scope

Quaternary Catchment Area (A80H, A91H)	71,529 Ha
Number of wetlands identified during the assessment	4
Extension of existing work (previous financial year)	Yes
Work to commence at new wetlands in 2011/ 2012	Yes

4.3 Project Location

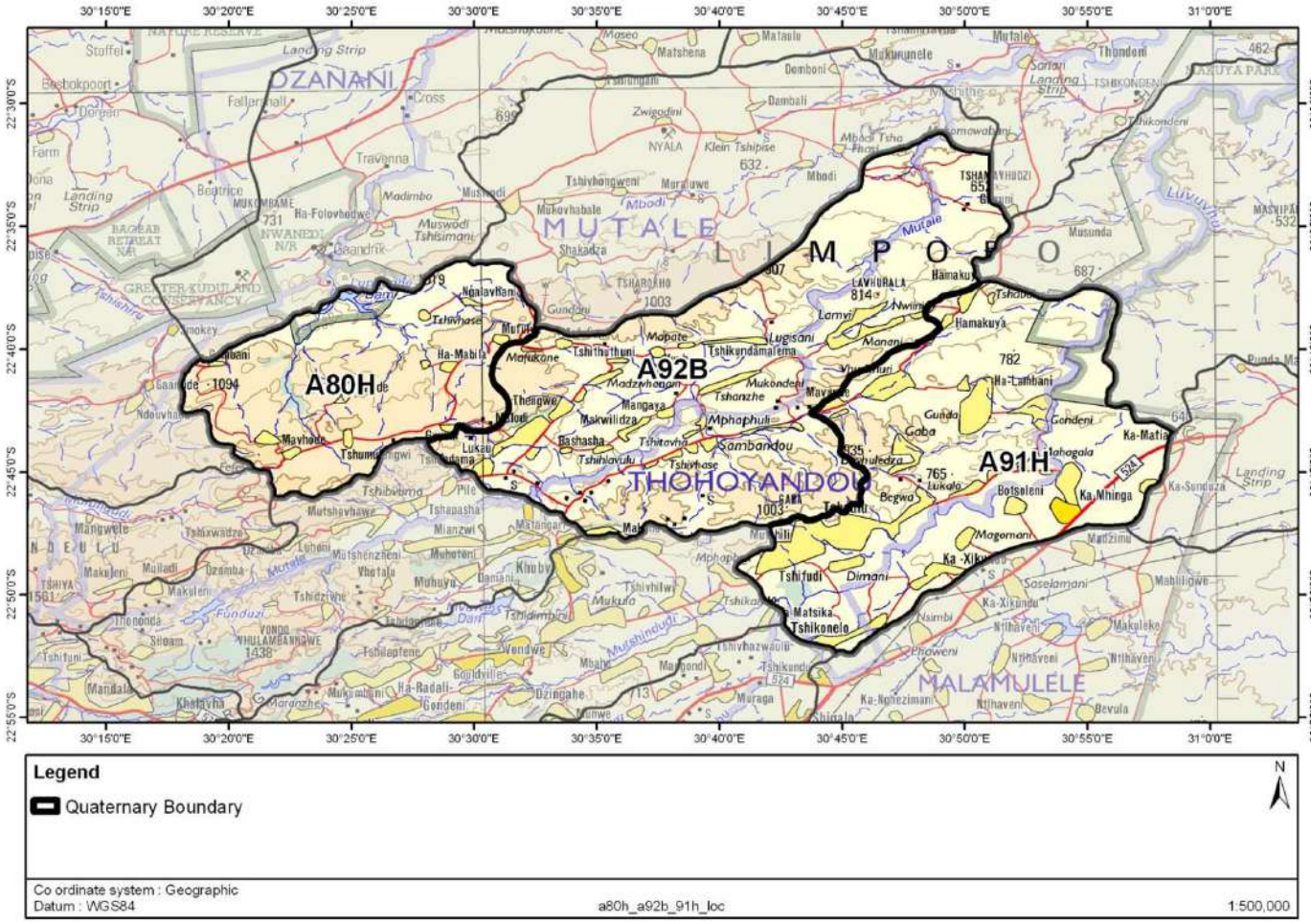


Figure 5: Locality quaternary catchment of the Mutale project, A80H, A92B, A91H.

4.5 Project Rehabilitation History

The historical information supplied is not considered to be a comprehensive account of the location, costs and types interventions previously implemented within the project area. In many instances the project areas had various funding sources and project management teams and available information was limited or anecdotal.

Wetland rehabilitation within the Mutale project area has been carried out at Lake Fundudzi in the upper reaches of the Mutale River, and in wetlands associated with this and the Sambandou River in catchment A92B, downstream of Lake Fundudzi in the Mutale sub-catchments (i.e. A92B). Much of this work was completed in the 2009/2010 financial year, however, wetlands in the Upper Mutale (A92A) upstream of Lake Fundudzi are earmarked for significant maintenance work and catchment related activities (e.g. alien invasive clearing). Further work will be carried out in the adjacent catchments, and in particular in wetlands associated with the *Luvuvhu* River.

Table 4: Rehabilitation History of Mutale

Wetlands	Financial Year of Rehabilitation	No. Of interventions	Continued Rehabilitation	Budget
A92B-05	2007, 2008, 2009	6	False	R 326,126
A92B-17	2007, 2008, 2009	6	False	R 1,416,663
A92B-02	2007/2008, 2009	6	False	R 1,023,354
A92B-04	2008, 2009	5	False	R 179,345
A92B-1	2008, 2009	11	False	R 916,333
A91H	20010, 2011	4		R2,675,840.00

There is significant emphasis on erosion control, lifting water tables, reducing the rate of drainage, reclaiming wetland habitat and stabilizing wetlands that still persist within the landscape.

It is hoped that by preventing further degradation, with full buy-in from the surrounding communities, people will be able to draw benefit from these wetlands in a sustainable manner into the foreseeable future. A recent decision by the tribal authority to issue fines for cutting down indigenous trees in the headwaters of Fundudzi is indicative of community buy in; resulting in the decision to focus on maintenance and alien invasive clearing in Fundudzi's catchment to consolidate community support. This will support an increase in the labour component of the project.

5 CATCHMENT LEVEL STAKEHOLDER ENGAGEMENT

The minutes of the most recent forum meeting and attendance register are included in **Appendix A**. Anybody wanting to be represented within the project should get in contact with the Working for Wetlands Provincial coordinator, who can be reached through the Working for Wetlands contact details listed at the beginning of this document.

Table 5: Catchment Level Stakeholders

Name	Organisation	Interest	Contact Number
Mr. Meshack Masindi	LEDET	Limpopo Wetlands Forum	0724126673
Mr. Marius Snyders	SANParks		0722017936
Mr. Vhangani Silima	Mondi Wetlands Project		
Ms. L Hlekane	DWAF		
Mr. N.R Mudau	LEDET		
Mr. Stanley Tshitwamulomoni	DEAT		
Mr. Vincent Mashele	SANBI – invasive species		
Mr. Piet-Louis Grundling	IES		
Mr. G Nukeri	LEDET		
Mr. R Baloyi	LEDET		
Mrs. Constance Mafuwae	SANParks		
Mr. L Ravhandalala	DEAT		
Mr. M Dikgale	LEDET		
Prof B. Vd waal	Univen	Various research/ student projects in area	0729749581

Table 6: Limpopo Wetland Forum Contacts

Meeting/Forum	Contact	Organisation	Contact No.
LWF	Stephen Kgobalale (Chairperson)	Department of Agriculture	072 122 3061
SANBI Provincial co-ordinator	Ms. Collin Nemadodzi	SANBI	071 686 1975

Since that time, in consultation with Marius Snyders and Collin Nemadodzi, the two adjacent catchments were identified for rehabilitation due to:

- the level of use by local communities;
- the proximity of the wetlands to existing logistical structures; and
- the importance of the rivers associated with wetlands.

However, due to the need to increase the labour component of projects and because of community support the focus will shift to include substantial maintenance work and invasive clearing in the headwaters of Lake Fundudzi, Sambandou, Tshitavha, Tshaandama and Makuya areas.

6 CATCHMENT OBJECTIVES AND PRIORITY AREAS

The Mutale project and relevant catchments are located within the Soutpansberg Centre of Endemism. Here the complex relationship between topography and macroclimate resulted in an intricate mosaic of habitats and micro-climates. The consequent exceptional diversity of biotopes is inhabited by complex and, as yet, mostly undescribed assemblages of plant and animal communities. This diversity of biotopes is unmatched anywhere else in southern Africa. The impressive biotic diversity that the area holds is only one aspect of the ecological complexity of the Soutpansberg. A variety of wetlands including peatlands, mires and Lake Fundudzi occur in this centre of endemism. Lake Fundudzi is South Africa's only true inland lake and has many legends associated with it, particularly relating to the fact that water is never seen to flow out of the lake as the outflow is part of a landslide an covered in rock. Furthermore, the Mutale River is one of a few tributaries from the eastern part of the mountain feeding into the Luvuvhu River which is an integral part of the Makuleke community Ramsar site in northern Kruger National Park (Mostert, 2007; http://www.soutpansberg.com/workshop/synthesis/botanical_div.htm. 2010; Low & Rebelo, 1996).

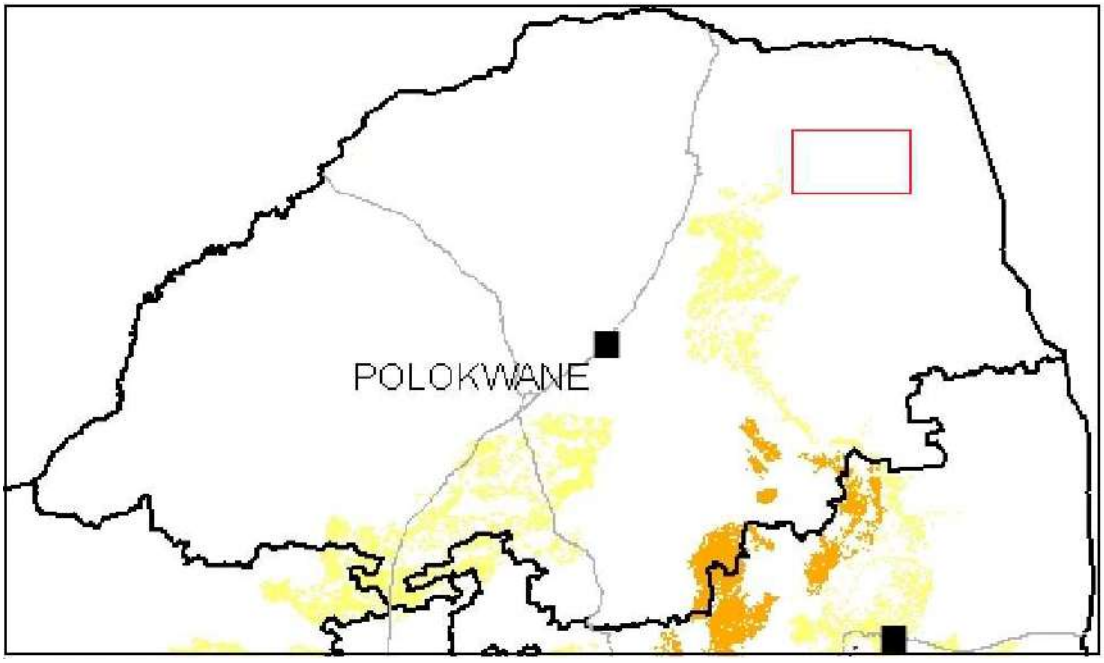


Figure 6: Threatened Ecosystems

Project area (red square) falls outside national threatened ecosystems zones (http://bgis.sanbi.org/ecosystems/project2.jpg).

The objectives and priority areas for wetland Rehabilitation in the catchment are therefore the following:

Table 7: Catchment Objectives for Mutale

	Objective	Motivation
A	Water storage and quality	The Mutale and Luvuvhu Rivers are important sources of water to communities living adjacent to them. It is also an important feeder to the Limpopo and Luvuvhu Rivers feeding into the Makuleke Ramsar site. SANParks credit the Mutale River as supplying the Luvuvhu River with the best quality water of all its tributaries. Wetlands are known to have the ability to improve water quality through biological, physical and chemical processes. These include plant absorption, bacterial transformations, as well as physio-chemical processes such as sedimentation, adsorption, and precipitation. Wetlands are especially effective in removing specific pollutants such as reducing high concentrations of nitrates in water. The protection and improvement of wetland habitat integrity via rehabilitation efforts can help maintain and raise water quality levels respectively. The Mutale and Luvuvhu Rivers support a substantial population, all of whom are dependent on these rivers for water. The following threatened eco-systems do occur: 1. Lowveld Riverine Forest (FOa 1) 2. Tzaneen Sour Bushveld (SVl 8) (SANBI:Threatened Ecosystems in South Africa, 2009)
B	Conserving wetland-related biodiversity	Wetland habitat that still remains reasonably untransformed and suitable for the support of wetland-dependant species is also under increasing threat due to competition for human land use. The result is habitat loss and fragmentation, as well as the reduction in wetland dependant biodiversity. By protecting and improving wetland habitat, especially along inear wetland systems, linkages or corridors can be improved/protected, which facilitate the movement and gene flow among wetland and other fauna and flora species. Various mires and peatlands occur in Soutpansberg and the area is an important peatland eco-region (Marneweck et al, 2000; Grundling and Grobler, 2005) The following threatened eco-systems do occur: Swamp Forest (Foa 2) (SANBI:Threatened Ecosystems in South Africa, 2009)
C	Soil conservation	A substantial area of wetland habitat is used for subsistence agriculture. An objective of these interventions is to enable this to be sustainable. Specifically designed wetland interventions such as gabions and/or so called "soft" engineering options can help halt and reverse

	Objective	Motivation
		active erosion and associated losses in wetland integrity and desiccation. Management practices such as fencing wetland areas to prevent overgrazing can also help curb erosion damage and result in improved wetland integrity and functioning. The end result of which is the continued and improved provision of ecosystem services to local and downstream users, including both man and nature. Central to this is buy-in from the local community using the wetlands. A high degree land-owner/ land-user engagement is imperative to the long term success of the project, which is likely to involve the forging of partnerships with government institutions (Dedet, municipalities) and NGO's with similar objectives. Lake Fundudzi is of spiritual significance to the adjacent communities and the current rate of sedimentation in the lake due to catchment degradation is of concern.
D	Poverty Alleviation	In line with project objective.

Table 8 Wetland Priority for Mutale

No	Priority Area	Motivation (referencing catchment objectives)
1	Luvuvhu	Large erosion threat, erosion damage, good potential for sustainable agricultural use, very important from water quality perspective due to size.
2	Lambwe	Erosion damage, drainage, agricultural use
3	Nwanedzi	Erosion threat, erosion damage, drainage, agricultural use.

7 PRIORITISATION OF WETLANDS

7.1 Background Information

An aerial survey was conducted in 2009 and 2010 to assist with prioritising wetlands. This information was used in conjunction with existing recent aerial imagery to identify and assess potential wetland intervention sites. Priority wetlands were identified within the catchment based on the aerial imagery and using

- operational criteria,
- land owner participation/agreement, and
- desktop WET-Health assessments for new project areas.

Preliminary identification of problems and site-specific rehabilitation objectives within the prioritised wetlands was performed utilising the aerial imagery.

7.2 Aerial Survey

An aerial survey of the catchment was carried out on 29 April 2009 and in 2010. The flight in 2010 was of limited value due to low cloud. Only one additional point (no 16) is thus included in the list below.

The following problem points were recorded during the flight. Photographs of the various problems identified will be included in the final Phase 1 report.

Table 9: Problem points

Point ID	Latitude	Longitude	Problem	Rehab Potential Rating	Photo Name
1	-22°44'16''	30°24'06''	Gully Erosion	Moderate Potential	N/A
2	-22°45'11''	30°23'56''	Gully Erosion	Moderate Potential	N/A
3	-22°43'47''	30°45'46''	Drain (Artificial)	Moderate Potential	N/A
4	-22°40'16''	30°30'03''	Drain (Artificial)	High Potential	N/A
5	-22°35'19''	30°54'04''	Gully Erosion	Moderate Potential	N/A
6	-22°39'35''	30°51'07''	Other	Moderate Potential	N/A
7	-22°40'20''	30°49'17''	Drain (Artificial)	Moderate Potential	N/A
8	-22°48'22''	30°45'58''	Headcut Erosion	Moderate Potential	N/A
9	-22°48'04''	30°48'34''	Headcut Erosion	Moderate Potential	N/A
10	-22°48'21''	30°48'23''	Headcut Erosion	Moderate Potential	N/A
11	-22°48'03''	30°49'08''	Headcut Erosion	Moderate	N/A

Point ID	Latitude	Longitude	Problem	Rehab Potential Rating	Photo Name
				Potential	
12	-22°48'36''	30°49'21''	Other	Moderate Potential	N/A
13	-22°47'14''	30°50'48''	Headcut Erosion	Moderate Potential	N/A
14	-22°45'22''	30°54'09''	Drain (Artificial)	Moderate Potential	N/A
15	-22°43'15''	30°57'15''	Drain (Artificial)	Moderate Potential	N/A
16	-22°45'58"	30°29'53"	Headcut and donga erosion	High Potential	N/A

Figure 7 - Headcut and Donga erosion, as well as excessive sedimentation in the Mutale

7.3 Wetlands Identified

The following wetlands were identified from existing up to date information, local knowledge, the aerial survey, 1:50,000 topographic maps, and aerial/satellite imagery.

Table 10: Identified Wetlands in Mutale

Wetland Number	Wetland Name	Longitude	Latitude
A80H-01	Nwanedzi	30°23'56"	-22°45'11''
A92A-01	Mutale-Fundudzi	30°17'11.69"	- 22°51'48.28
A92B-02	Mutale - Tshandama	30°29'53.48"	- 22°45'58.23"
A91H-01	Mkuya - Lambwe	30°49'17''	- 22°40'20''

Point locations of these wetlands are shown in **Figure 5**.

7.4 Wetlands Selected and Desktop Mapping

Based on the above background information and aerial survey information and an initial screening, the following wetlands were selected and mapped on a desktop basis using aerial imagery as show in the following layouts.

Table 11: Selected Wetlands in Mutale

Wetland Number	Wetland Name	Wetland Area (ha)
A80H-1	Nwanedzi	387.28
A92A-01	Mutale-Fundudzi	387.28
A92B-02	Mutale – Tshandama trib	60.00
A91H-01	Mkuya - Lambwe	202

This initial screening was based on the following (including catchment priorities and objectives):

- The size of the wetland;
- The degree of anthropogenic disturbance;
- The potential amount of work available;
- The likelihood of there being a high return on investment;

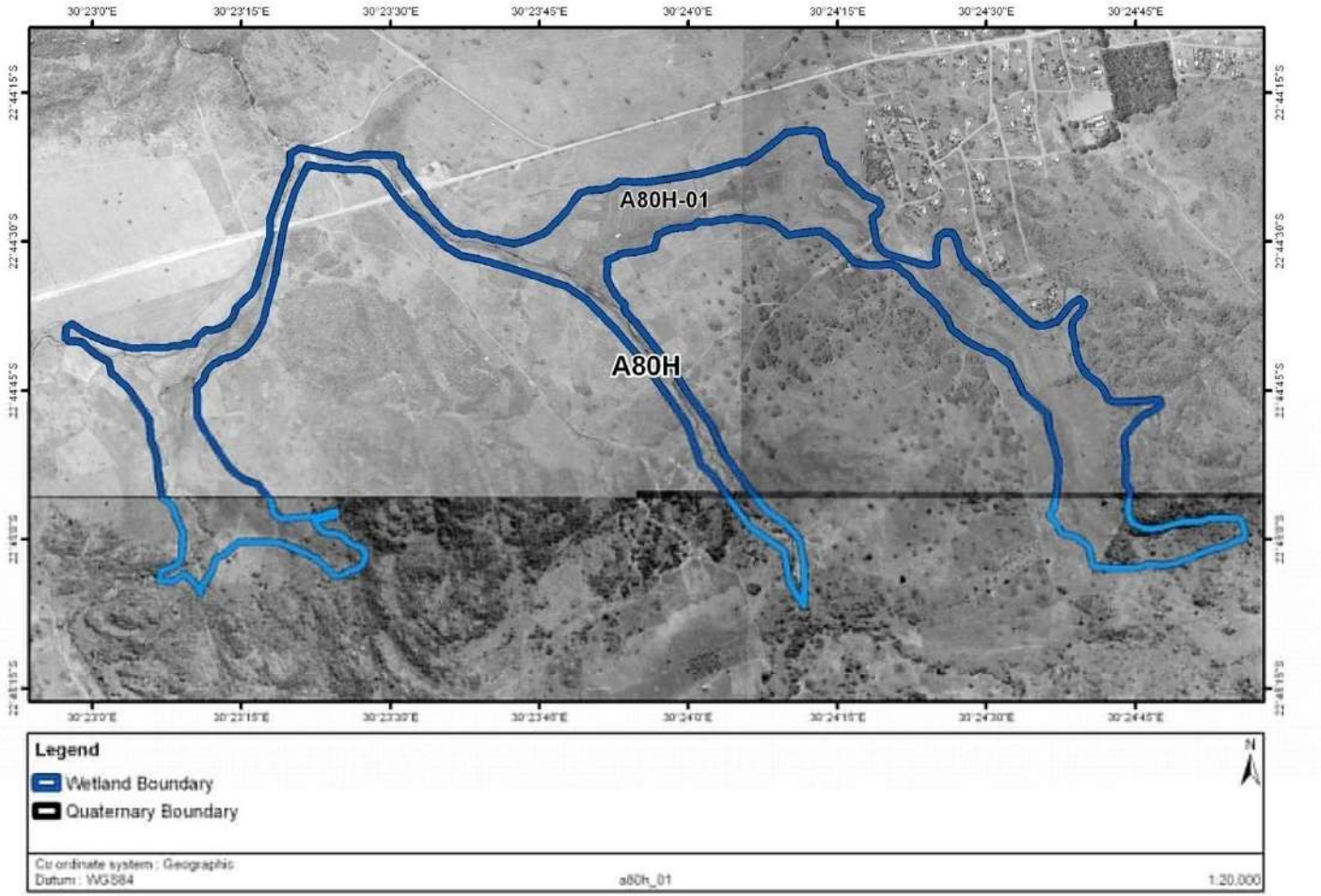


Figure 8: Desktop Mapping of Nwanedzi, A80H-01

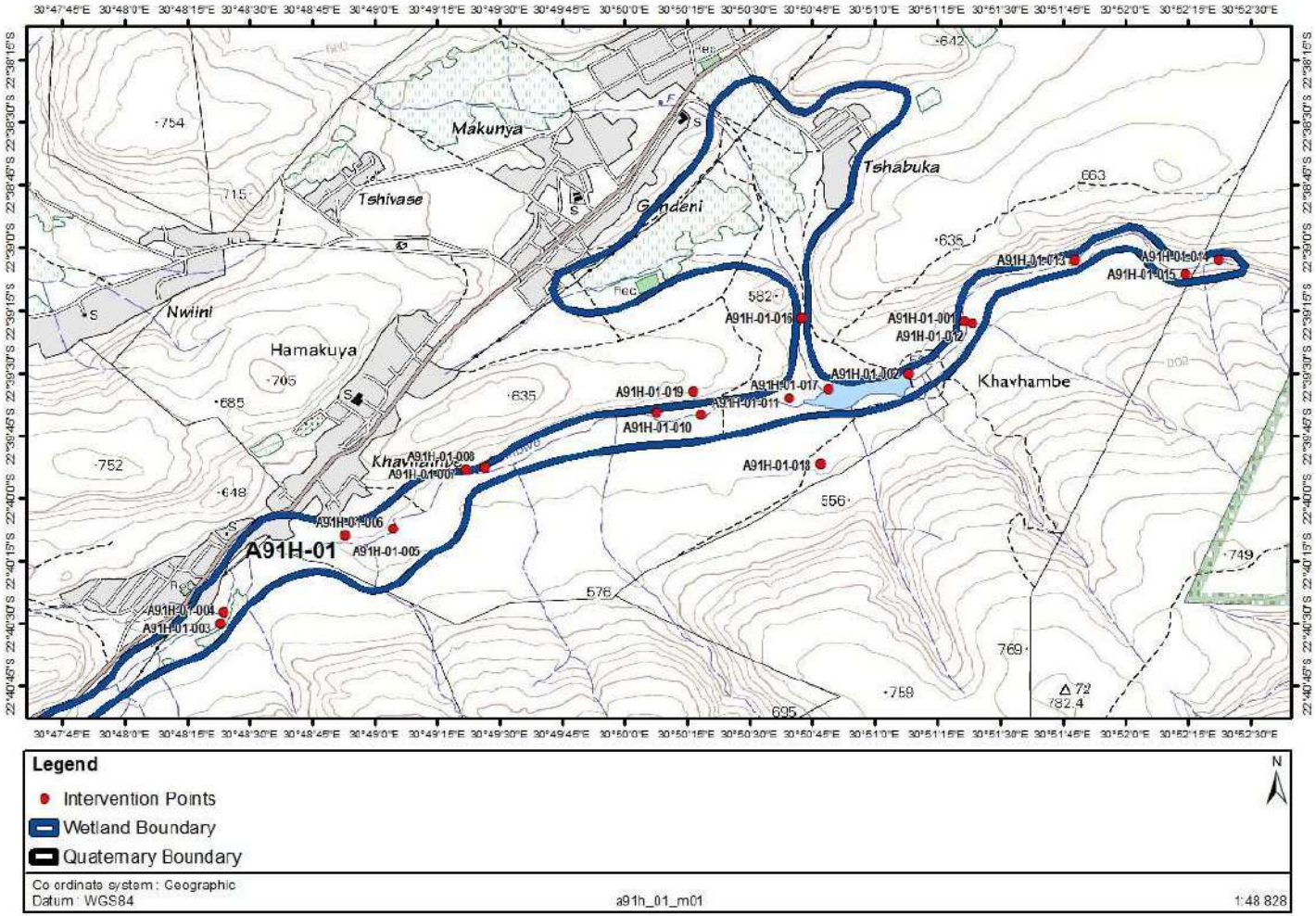


Figure 9: Mapping of Mkuya-Lambwe Wetland A91H-1

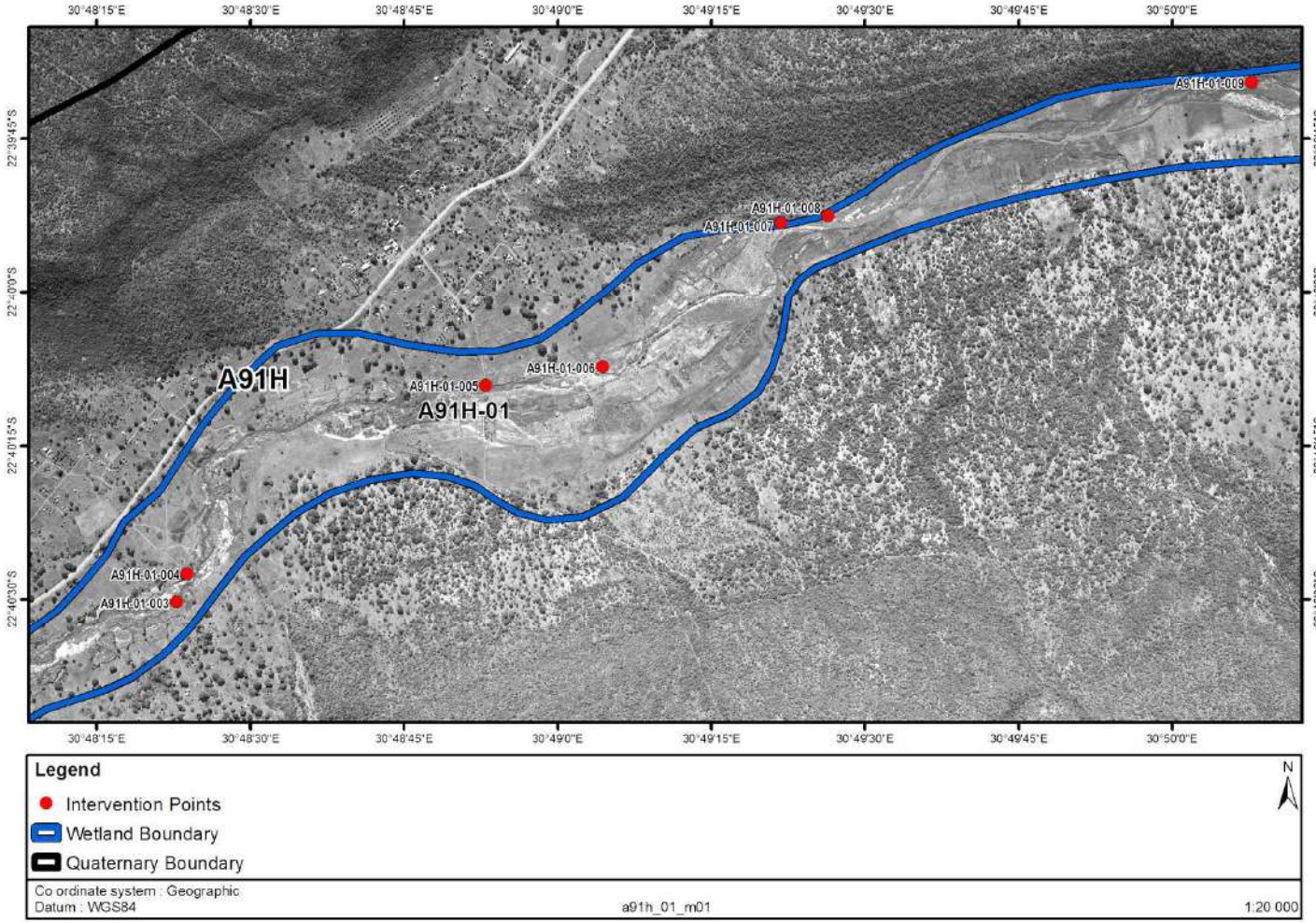


Figure 10: Desktop Mapping of Mkuya-Lambwe Wetland A91H-1 (Map 1)- *zoom in*

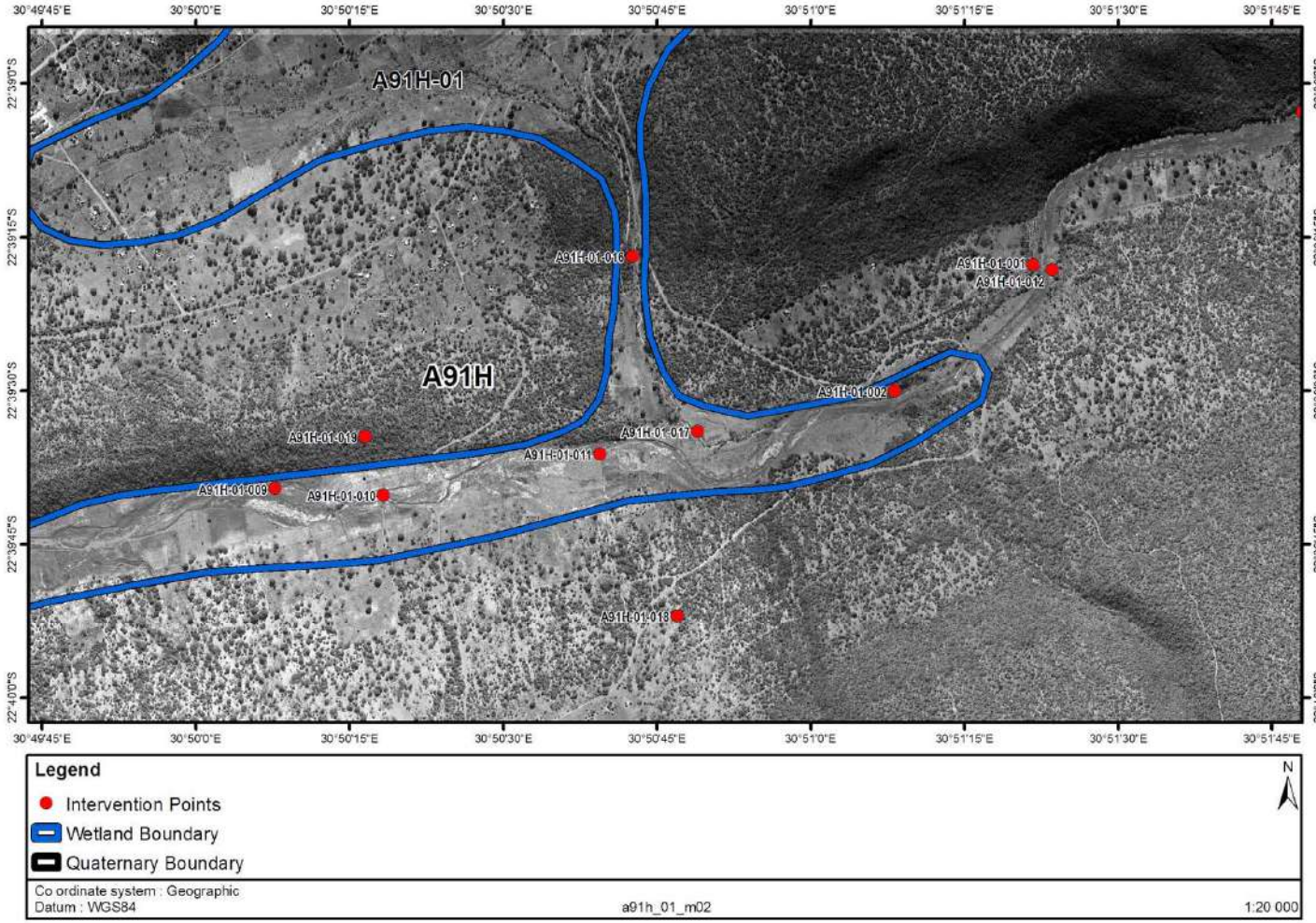


Figure 11: Desktop Mapping of Mkuya-Lambwe Wetland A91H-1 (Map 2) [8]- *zoom in*

[8] Please note that the wetland boundary should be extended in an easterly direction to include interventions A91H-1-001 and A91H-1-012. Refer to Figure 9 above.

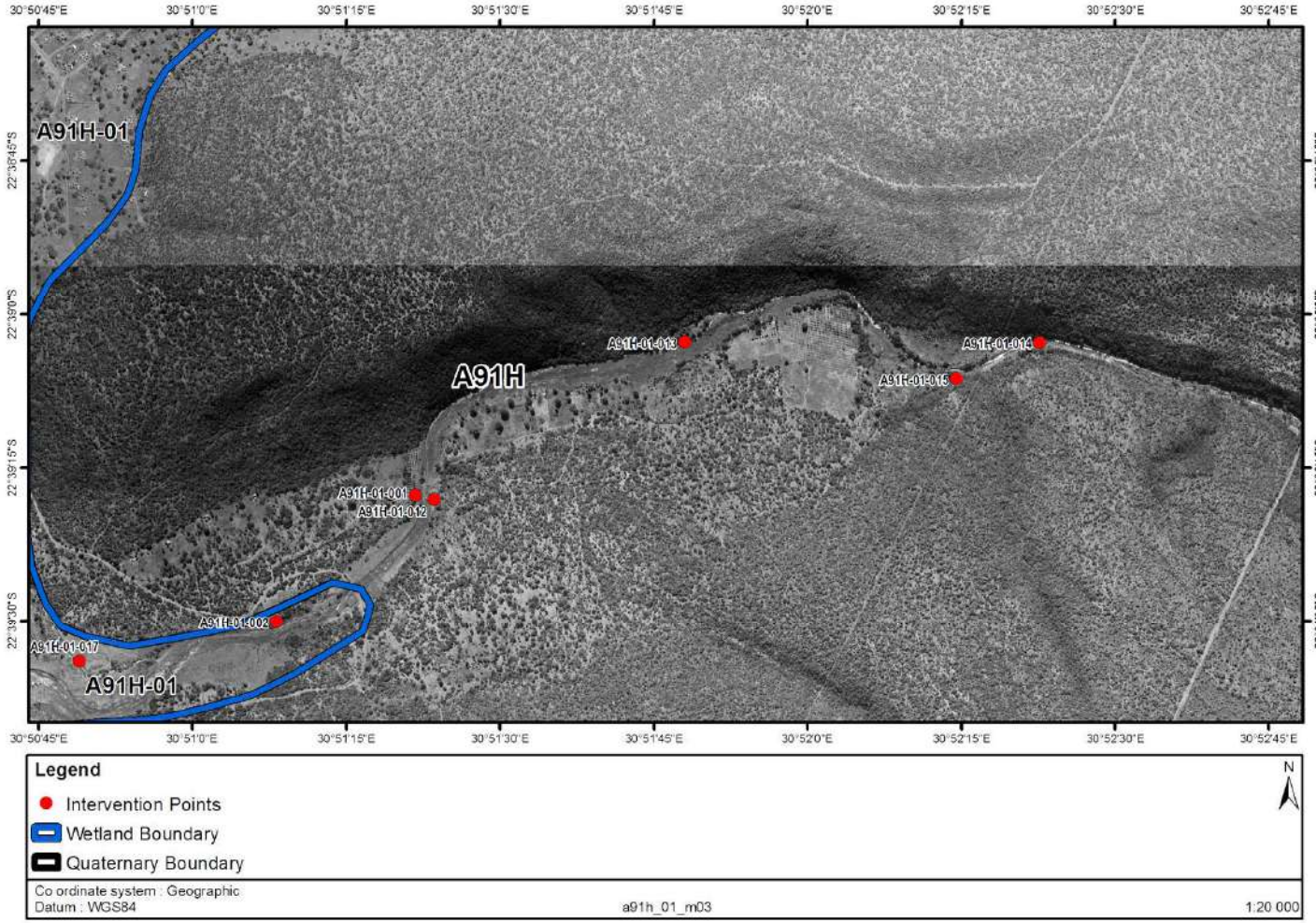


Figure 12: Desktop Mapping of Mkuya-Lambwe Wetland A91H-1 (Map 3)[9] - *zoom in*

[9] Please note that the wetland boundary should be extended in an easterly direction to include interventions A91H-1-001, A91H-1-012, A91H-1-013, A91H-1-014 and A91H-1-015. Refer to Figure 9 above.

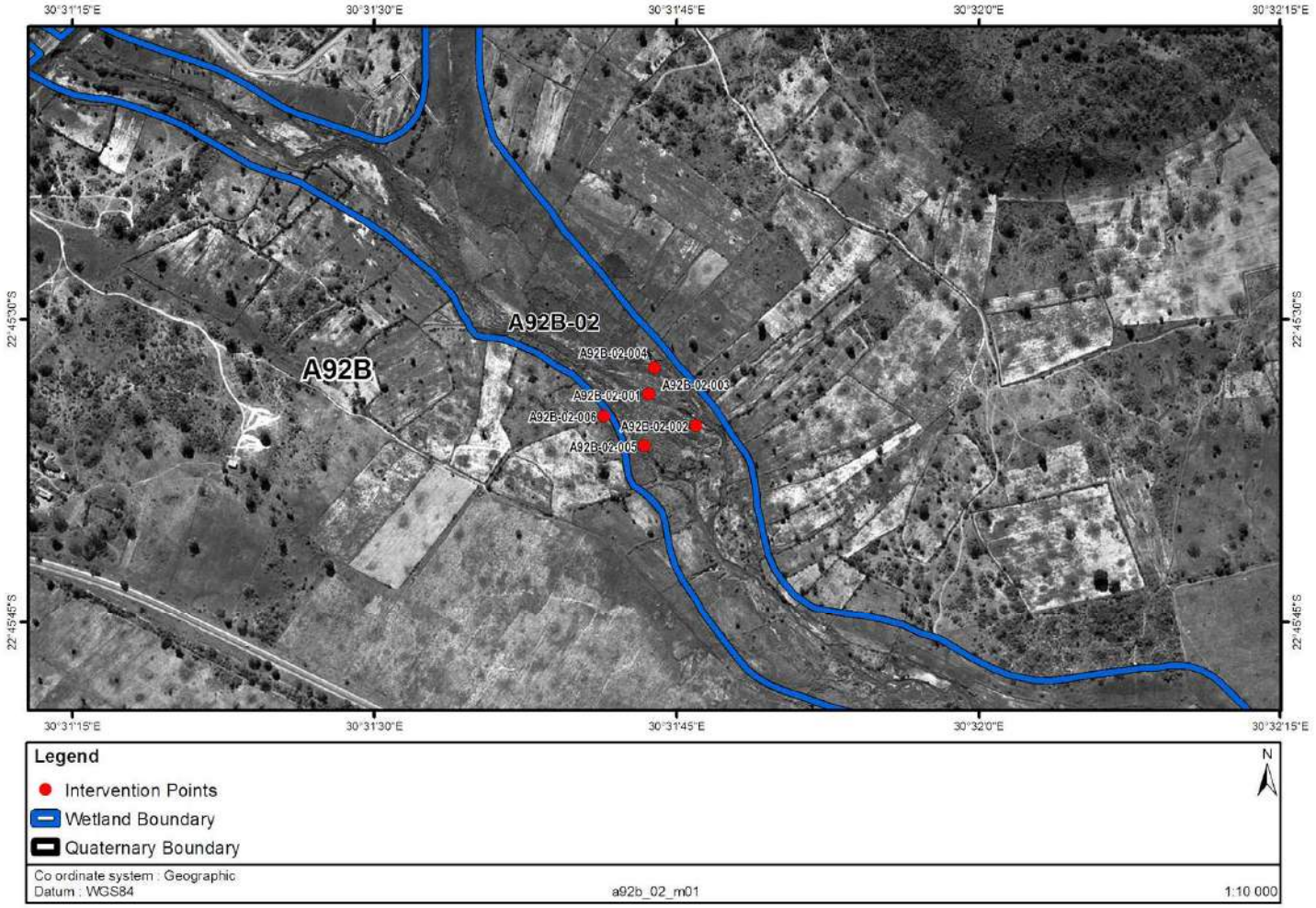


Figure 13: Desktop Mapping of Mutale-Tshandama Trib Wetland A92B -02-Map 1

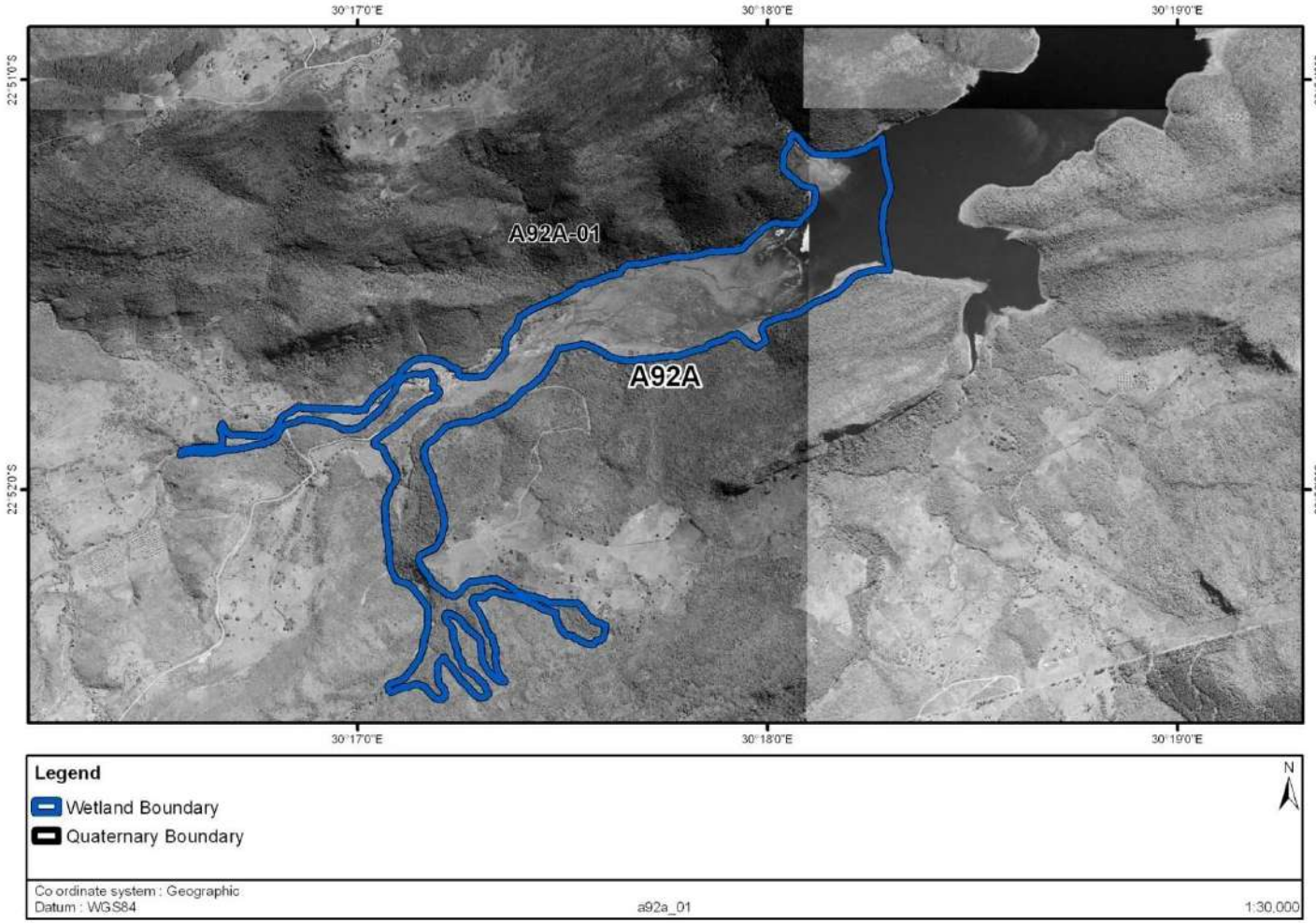


Figure 14: Desktop Mapping of Mutale-Fundudzi Trib Wetland A92A -01-Map 1

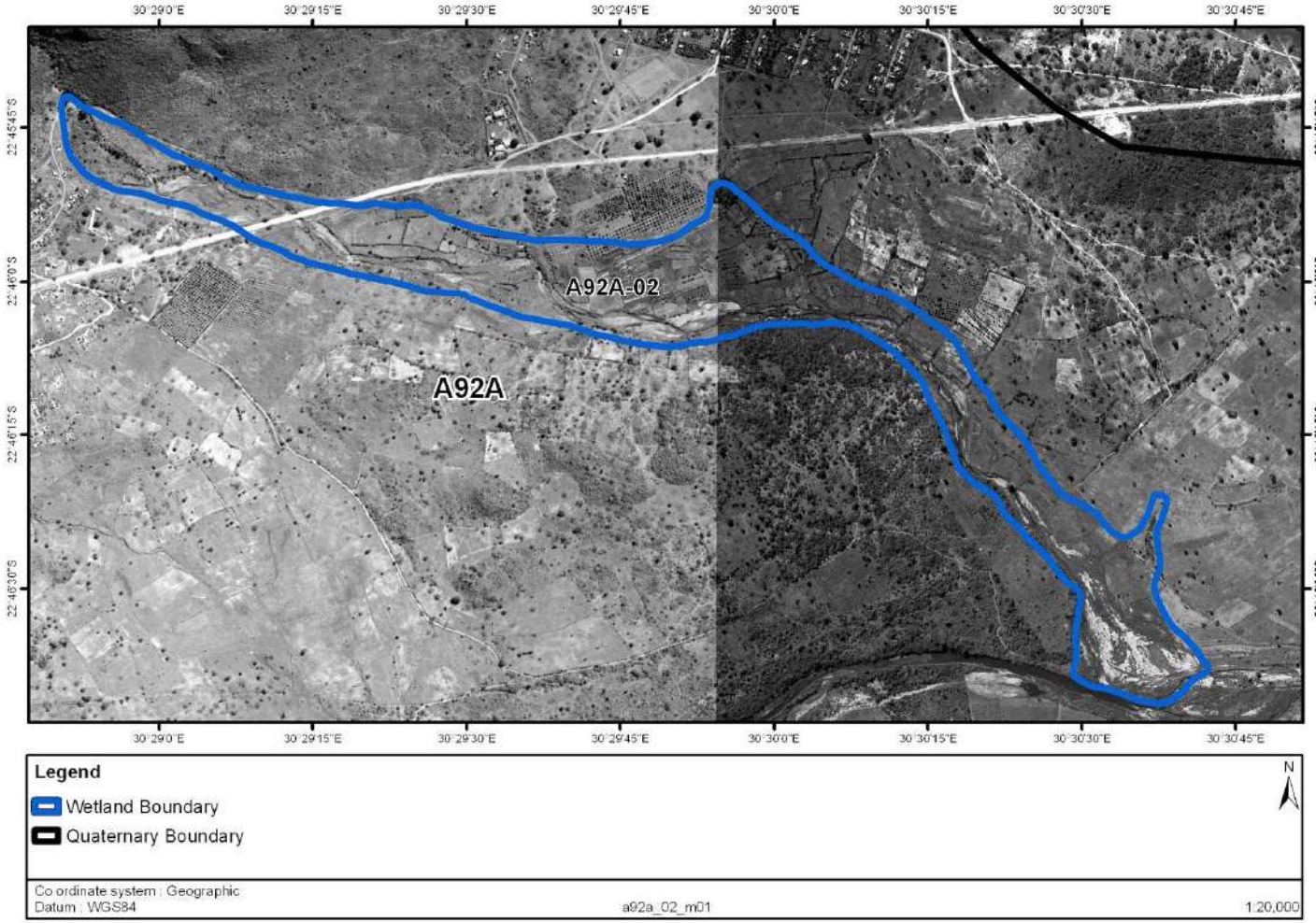


Figure 15: Desktop Mapping of Mutale-Fundudzi Trib Wetland A92A -02-Map 1

7.5 Landowner Consent

The following landowners were identified for each wetland and their consent for any proposed wetland rehabilitation subject to their approval of the final rehabilitation plans was sought. Copies of the consent obtained are provided in Appendix A and summarized in the following table.

Table 12: List of Landowners and SG Key for Mutale

Wetland Number	Property SG Key	Chief	Tribal Authority	Consent Obtained
A80H-01	T0MT00000000000000000	AP Rambuda	Rambuda	TBC
A91H-01	T0MT00000000000000000	Musilwa Mphaphuli	Mphaphuli	Yes
A91H-02	T0MT00000000000000000	Musilwa Mphaphuli	Mphaphuli	Yes
A91H-02	T0MT00000000025800000	NJ Maluleke	Shikundu	TBC (next planning cycle)
A91H-02	T0MT00000000026200000	SC Mhinga	Mhinga	TBC (next planning cycle)

7.6 Prioritised Wetlands

Based on the above, it is roughly estimated that there is 1 years worth of wetland rehabilitation work available in the prioritized wetlands assuming the current project budget of R 2.9 million. This estimate will be refined after more detailed infield assessments have been made during phase 2.

8 IDENTIFICATION OF LOCAL STAKEHOLDER GROUP

Table 13: Identified Local Stakeholders

Name	Organization	Interest	Contact Number
Mr. A Marokana	LEDET (Vhembe)	Limpopo Wetlands Forum	
Ms. Mutsa Masiyandima	International Water Management Institute	Limpopo Wetlands Forum	0128459100
Mr. Steven Kgobalale	Dept of Agriculture	Limpopo Wetlands Forum	0721223061
Mr. Marius Snyders	SANParks	Implementer	0137356569
Mr. Meshack Masindi	DEAT		0152959300
Mr. Vhangani Silima	Rand Water		083 5662483
Mr. Stanley Tshitwamulomoni	DEAT	Limpopo Wetland Forum	
Mr. B C W Van der Waal	UNIVEN Khathutshelo Magwede	Limpopo Wetland Forum	0159628479 or 0848113841
Ms. Margaret Ledwaba	DWAF (regional)	Limpopo Wetland Forum	
Mr. Hector Muvhenzi	Project Manager		0839634520
Ms. Thabelo Malaudzi	Road Agency Limpompo (RAL): Assistant Director (Environment)		0152976450

9 CONCLUSION

A two week comment period was provided on the draft Phase 1 Reports. Based on the comments received (refer to **Appendix D**) no substantive changes were made to this draft Phase 1 report.

This updated report is available for download from the Aurecon website (www.aurecongroup.com). Click on the "***Public Participation"***, and then the "**SANBI Working for Wetlands** project". The reports for Phase 2 (planning)[10] will also be made available at the above website address when they become available for comment.

Site visits to the prioritised wetlands will be conducted by the planning team. In consultation with landowners and other stakeholders, a rehabilitation strategy for each wetland will be developed, or confirmed, based on the wetlands specialist's assessment of the integrity of the wetland. Wetland rehabilitation interventions will be selected by the team and then designed by the engineer to achieve the objectives of the rehabilitation strategy. The wetland assessments, rehabilitation strategy and intervention designs will be detailed in the Wetland Rehabilitation Plan for the project which will be made available for review before being finalised.

[10] Basic Assessment Report (including the Wetland Assessment), Rehabilitation plan

APPENDIX A – STAKEHOLDER MEETING MINUTES

LIMPOPO
PROVINCIAL GOVERNMENT
REPUBLIC OF SOUTH AFRICA

Limpopo Wetlands Forum

Minutes

Venue: LEDET Building
Co: Suid and Dorp
Date: 18/03/2010
Time: 10:00

TASK	RESPONSIBLE PERSON
1. Apologies	
1. Peter Tsheola: LEDET 2. Stephen Kgobalale: DAFF 3. Arnot Ravele: Capricon District Municipality 4. Simon Mpamonyane: LNWB 5. Zebulon :LNWB 6. Marokana: LEDET 7. Rachel Chabalala	All
2.Welcome and introduction Welcome and Introduction done by	Masindi Meshack
3. Meeting chaired by	Mrs Silima N.C.
4. Matters arising from the previous minutes	
	Mrs Silima N.C.
5. Purpose of the day	
5. 1. Wetland Rehabilitation Initiatives • Three SANBI projects running in the province currently (Mutale Waterberg and Kruger) • Mutale was a warded a best performance project for the year 2009 in the whole country • Celebration for the award to be held on the 19th of February 2010 at the project site and the Forum is invited. Special invitation will be sent out in the middle of Jan 2010	Mrs Silima N.C.

5.2. Lepelle Northern Waterboard Wetlands • Six more wetlands were surveyed through the LNWB request (Masanteni, Ga-Riba1 and 2, Setlaboswana, Zebediela citrus estate, Motlapodi, and Badimong) • Proposed budget of R8.2 million was submitted to the LNWB in December 2009. • Awaiting the responses from them which will be in the second week of February 2010 • The Water board advised SANBI to prioritize the wetlands according to their level of demand. See attached the Expenditure by Item per wetland • Engineers will only come out as soon as the LNWB has approved the budget • The forum will be updated of the latest development on this issues **5.3. Wetland INDABA Feed back** • INDABA held on the 27th October 2009 was a very big success in terms of venue and activities planned throughout the symposium • There has been a concern that the Limpopo forum was not well represented. The forum agree to have someone who will be taking the forum responsibilities in terms of reporting back of the year activities done and achieved in the province • The 2010 Indaba has been awarded to Free State. They have chosen Kimberly to be the host as Free state and Northern cape have one Wetland forum	Sekwele Ramogale
6. NEW MATTERS	
6.1. Provincial Wetland Celebration Event • The Provincial celebration was merged with the district celebration which was already in preparation at Mopani. The event will take place at Giyani area. • The reasons behind this district were to create more awareness on the conservation of water resource issues and management of wetland in the area. As it is now, the Mopani district is faced with water challenges and it makes it better suited for this kind of event • Other departments like and Health and Minerals and energy must be invited in this kind of event to raise awareness in terms of diseases control and effect of the global climate on people in relation with the change in the natural environment. • The mineral and energy contact person is Chuene Kgagodi on 015 287 4720 and email is kgagodichuene@dme.gov.za. • The date set out for celebration was 11 February 2010 and it is	All

subject to change depending on the responses of the MEC availability **6.2. Roles Clarifications** • Tsheola office and the Mopani District were task to come out with the agenda and for the next meeting • The contact person was Tsheola M.P. at 082 809 8925 and email Tsheola@ledet.gov.zaand also Chabalala R.T. at 082 419 7474 and email chabalala@ledet.gov.za • Collin Silima was asked to find sponsors • Draft letter to find the sponsors were to be circulated to the forum Masindi Meshack was task to draft the speech for the event. The draft speech was to be circulated on the 06th Jan 2010. • Tsheola office is in preparation with the brochures which will be corresponding with the theme of the event as well	
7.Way Forward	
• Draft Agenda by Tsheola Office • Draft Sponsors letter by Collin Silima by 17th Jan 2010 • Final Draftsponsors letter by 21st Jan 2010 • Draft speech by Meshack Masindi 06th Jan 2010 • Draft Baleni plan by Mishack to be presented on the next meeting • Progress report on the Draft Brochures by Tsheola office on the next meeting	All
8. Date and Venue of the next meeting	
• 08/01/2010 LEDET Building ,Co Suid and Dorp, Time : 10h00 • 18/07/ 2010 Forum meeting. Azmo Building Polokwane (Water Affairs)	
Closure	

APPENDIX B – DISTRIBUTION LIST

Please see below the list of national stakeholders who were notified of the availability of the Final Phase 1 Report for information.

JOB NAME: SANBI Working for Wetlands Programme
PROJECT NUMBER: 105782/5169
REPORT TITLE: Final Phase 1 Planning Report for the Working for Wetlands Rehabilitation Programme: Mutale
REPORT NUMBER: 5169a/105782
DATE: August 2010

No	Person	Organisation
1	Jackie Jay	Department of Water Affairs
2	David Kleyn	Department of Agriculture
3	Christo Marais	Department of Water Affairs
4	Kerryn Morrison	Endangered Wildlife Trust
5	Naomi Fourie	Department of Water Affairs
6	Guy Preston	Department of Water Affairs
7	Ramogale Sekwale	Department of Water Affairs
8	Wilma Lutsch	Department of Environmental Affairs
9	Bonani Madikizela	Water Research Commission
10	Stephen Kgobalale	Wetlands Forum

APPENDIX C – STAKEHOLDER LIST

Please see below the list of stakeholders who were notified of the availability of the Final Phase 1 Report for information.

JOB NAME: SANBI Working for Wetlands Programme
PROJECT NUMBER: 105782/5169
REPORT TITLE: Final Phase 1 Planning Report for the Working for Wetlands Rehabilitation Programme: Mutale
REPORT NUMBER: 5169a/105782
DATE: August 2010

No	Person	Organisation
1	M.M Masindi	LEDET
2	S. Stephen	DAFF
3	A. Arnot	Capricon District Municipality
4	Z. Zebulon	Lepelle Northern Water Board

APPENDIX D – I&AP COMMENTS RECEIVED ON THE DRAFT PHASE 1 REPORT

No I&AP comments were received on the draft Phase 1 Report.

APPENDIX B

GENERAL CONSTRUCTION NOTES

(Ignore notes which are inapplicable)

1. **Occupational health and safety is a priority!** All necessary precautionary measures must be undertaken to ensure safety of the team. Particular attention must be given to deep excavations where gentle sloping back of soil or shoring must be applied to prevent possible soil collapse. Where risks are foreseen, these must be reported to the Occupational Health and Safety Agent employed by SANBI, who may need to seek further advice. In addition, no excavated earth or other materials should be stockpiled within a distance of one metre from the edge of any excavation. The one metre wide strip along the edges of all sides of an excavation should at all times be kept clear of objects such as lumps of clay, rocks or tools that could injure workers in the excavation if they were to fall in.

2. Check all dimensions on site to determine if any amendments to the designs are necessary. Note the required final height of the structure relative to the original ground level. The responsible engineer must be consulted before any changes are made to dimensions.

3. Excavation must be carried out to the final levels. Soil must be placed in areas best suited for re-use, for example, when building an earthen diversion embankment, the soil excavated should be used immediately in building up the embankment (on condition the excavated soil is of suitable quality). The excavated soil should alternatively be stockpiled immediately upstream of the site of the proposed wall. The topsoil must be stockpiled separately from the subsoil.

4. Where soil is to be the foundation for non-soil structures (for example, gabions and rafted weirs), all sand deposits must be removed and the floor well compacted while the soil is at optimum moisture content.

5. In instances where the addition of Gypsum (CaSO4) has been specified for the amelioration of a dispersive soil, mixing must be carried out off site, after which it must be transported to the construction site.

6. When the final level of the soil construction has been reached the previously stockpiled topsoil must be added as an extra height and planted to suitable vegetation (unless other provision for protection of the structure has been specified).

7. When backfilling soil against concrete or gabion work, extra care must be taken to ensure that a waterproof join with the structure is, as far as possible, achieved. Compaction must be carried out in layers as specified by the engineer. Material containing organic matter must not be used for this backfilling purpose.

8. Ensure that the correct steel reinforcing, as specified, has been delivered to site. Ensure that the minimum cover, as specified by the engineer, is achieved at all times. All welded steel mesh joins must have an overlap of at least 200mm and must be securely tied with 2mm building wire. At least three rings at 150mm spacing are required. Where reinforcing bars are used, bars at joins must be overlapped as per the distance specified

on the drawings. Particular attention must be paid to ensure the correct placing of steel reinforcing (particularly steel mesh with different bar sizes).

9. Before placing concrete on a rock foundation, carefully chip away any loose surface layers and wash away all debris. New surfaces must be painted with a cement slurry prior to the placing of the concrete.

10. Ensure that all shuttering is strong and well supported. It is recommended that the concrete be placed in layers no greater than one metre per day. The shuttering must be well oiled on the inside to prevent the concrete from sticking. Spacers between shuttering must be placed every one metre, both vertically and horizontally, with a minimum of two in both directions.

11. Note that when mixing concrete it is preferable to use a full pocket of cement with each mix. The specified cement water ratio must be maintained at all times.

12. The poured concrete must be "rodded" to ensure proper compaction. Never add more than one metre height of concrete in any one day, and attempt to lay the concrete in even, horizontal layers throughout the length of any section. Check the specifications for any requirement of expansion joints. The shuttering should be left for at least two days before stripping. Wetting the concrete while it is curing will make for a strong construction. Backfilling of soil against the completed structure may only be done after a period of at least seven days.

13. The use of "plums" in concrete: in some instances it may be feasible and economic to reduce the amount of concrete in mass gravity structures, by replacing up to 33% of the volume of concrete by the judicious use of suitable hand sized quarried rock. Where this is specified the rocks (purchased as handstone) must be so placed that there is always a minimum cover of 50mm between the rock and the shuttering, as well as between any two adjacent rocks. This should only be done where it is stated on the drawings that is permissible.

14. The standard procedures for the opening up and wiring together of gabion baskets and mattresses are well documented, and supplied with every delivery of the products. They must be strictly adhered to in all respects. Ensure that the lids of the final (top) baskets are always folded down and wired in a downstream direction.

15. Where rock-filled gabion baskets are used for the construction of keywalls, the trenches must be dug wide enough so that sufficient access is available to properly backfill and compact all the way around them. Making the trench only wide enough to receive the baskets is not acceptable, as water will eventually find its way around the structures and cause problems.

16. Where structures are to be built in dispersive soils, the following should be noted:

    - Impermeable cut off wall (at least 500mm deep) to be constructed under spillway section of the structure
    - Key walls to be impermeable

- Impermeable barriers to be constructed between key walls and spillway section of structures

17. Sloping and vegetating gully banks where specified:

    Where the gully is no more than approximately 1.0 metre deep, and the catchment area small (say ten hectares), the topsoil of the site immediately adjoining the channel is removed and stockpiled in a safe place nearby. The subsoil thus laid bare is excavated at a slope not less than 1:3 (V:H) and deposited in the gully. This deposit is carefully compacted while in a moist state. The topsoil is now returned to the sloped area, and spread as evenly as possible over it. Vegetation suitable to the site is planted. The additional advantage to this idea is that, as the channel cross section is made shallower and wider and established to vegetation, so the chances of floodwaters overflowing into the adjacent flood area will be that much greater. Note that the base of the modified channel should be planted to strong, hydrophitic plants while the outer edges will require plants more suited to drier regimes. It must be emphasised that the stockpiling of the topsoil and its replacement is vital, especially where very erodible subsoil is present. Failure to do this will be tantamount to a waste of money and effort.

18. The orientation of all wetlands and interventions is to be taken facing downstream i.e. left bank and right bank are to be identified **facing downstream**.

19. The Bill of Quantities for the various rehabilitation interventions only included revegetation in those instances where the engineer considered the re-vegetation of the denuded area as important due to the size of the area affected or due to the risk associated with scouring and erosion.

APPENDIX C

INTERVENTION BOOKLET

Intervention Summary

Mutale - Limpopo

Intervention Number	Description	Type	Reference Document	Design Revision
A92B-02-202-01	Gabion Weir	Maintenance	Mutale: Rehabilitation Plan 2019	1
A92B-02-203-01	Gabion Weir	Maintenance	Mutale: Rehabilitation Plan 2019	3
A92B-02-204-00	MacMat-R	New	Mutale: Rehabilitation Plan 2019	0
A92B-02-205-00	MacMat-R	New	Mutale: Rehabilitation Plan 2019	0
A92B-02-206-01	Gabion Weir	Maintenance	Mutale: Rehabilitation Plan 2019	1

A92B-02-202-01

Mutale - Limpopo

Details

Intervention	A92B-02-202-01
Designer	C. Blaauw
Design Date	25 August 2014
Type	Maintenance
Description	Gabion Weir
Rehabilitation Objectives	Prevent water flowing through spillway & maintain water level upstream
Latitude (D°M'S")	22°45'33.56"S
Longitude (D°M'S")	30°31'45.11"E

Location Photograph: A92B-02-202-01

Bill of Quantities

Item		Units	Quantity
Earth structure: Backfill and compact at 1:3 slope upstream of spillway	Prevent water flowing through spillway and maintain water level upstream	m3	2.00
Rockfill of upsteam backfilling	Prevent loss op backfill upstream of spillway	m3	51.60
Concrete cladding (100mm thick) the spillway gabion on upstream	Protect top edge of spillway and reduce back fill volume	m3	4.30

General construction notes as set out in the Construction Environmental Management Programme apply, along with all notes shown on design drawings and standard details. Where there is a conflict, the notes on design drawings apply.

The following site specific mitigation measures shall be implemented:

No additional mitigation measures are required.

A92B-02-203-01

Details

Intervention	Mutale
Designer	C. Blaauw
Design Date	05 May 2017
Type	Maintenance
Description	Gabion Weir
Rehabilitation Objectives	Prevent bypass flow and recover water level to prevent upstream erosion
Latitude (D°M'S")	22°45'34.13"S
Longitude (D°M'S")	30°31'44.24"E

Location Photograph: A92B-02-203-01

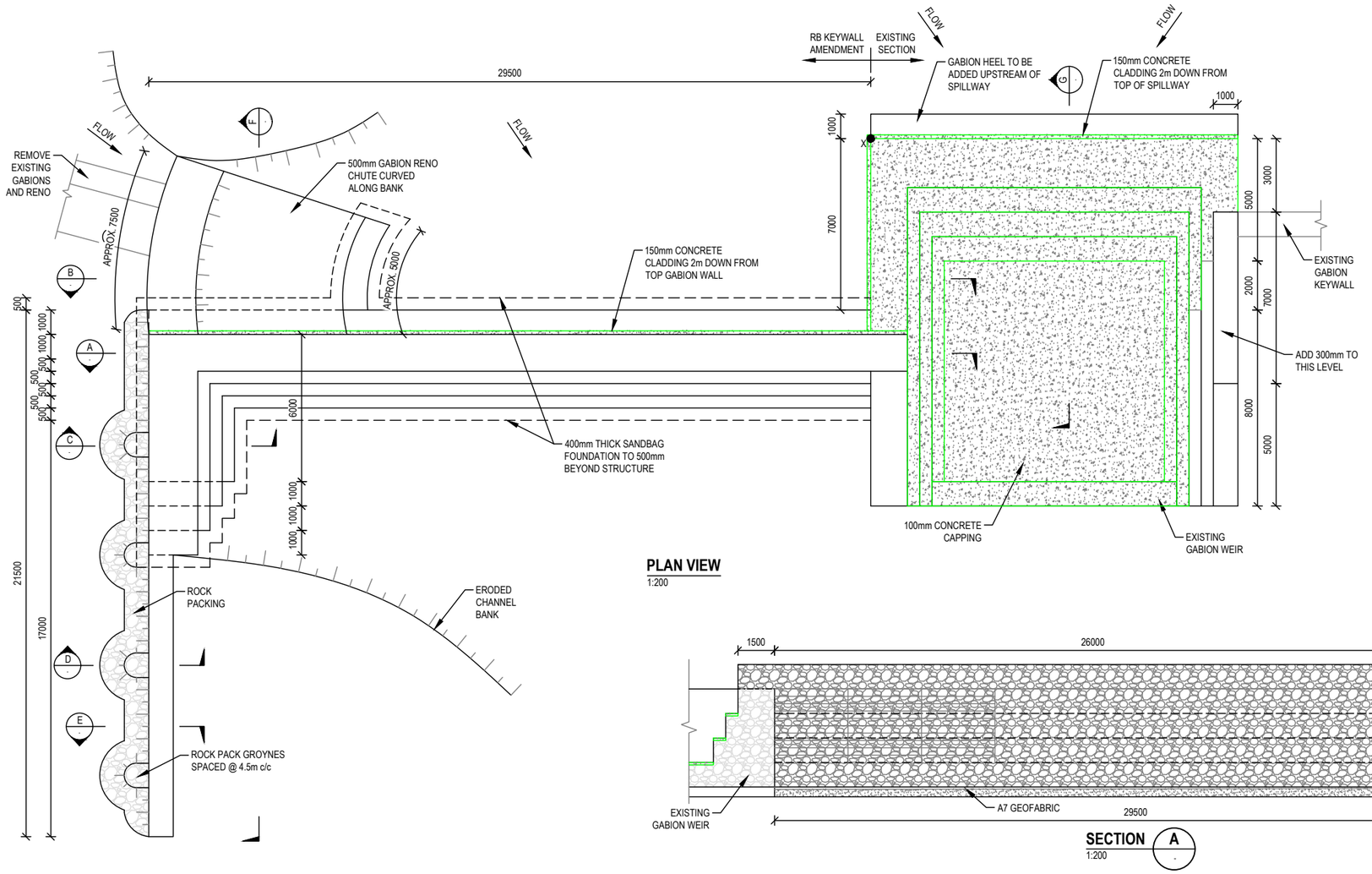
Bill of Quantities

Item	Objective	Units	Quantity
Gabion keywall on RB to be completed	Prevent bypass flow and recover water level to prevent upstream erosion	m3	120.00
Earthworks: Cut and slope edge channel downstream on RB at 1:4 slope	Stabilise slope to prevent further erosion	m3	34.40
Reno chute DS of RB keywall at 1:4 slope	Accommodate high flows and prevent re-entry flow erosion	m3	31.50
Concrete capping on spillway and stilling basin	Protect top of gabion baskets from abrasion and ensure level spillway	m3	20.60
Replace geotextile upstream of spillway with A7 type	Prevent water flowing through spillway and maintain water level upstream	m2	98.00
Earth structure: Backfill and compact and 1:3 slope upstream of spillway	Prevent water flowing through spillway and maintain water level upstream	m3	150.00
Rockfill of upsteam backfilling	Prevent loss op backfill upstream of spillway	m3	60.00
Concrete cladding (100mm thick) the spillway gabion on upstream	Protect top edge of spillway and reduce back fill volume	m3	6.80

General construction notes as set out in the Construction Environmental Management Programme apply, along with all notes shown on design drawings and standard details. Where there is a conflict, the notes on design drawings apply.

The following site specific mitigation measures shall be implemented:

No additional mitigation measures are required.



PLAN VIEW
1:200

SECTION A
1:200

SECTION B
1:200

GABION & RENO MATTRESS SIZES				
CODE	SIZE	AVAILABLE no. BASKETS ON SITE	ADDITIONAL no. BASKETS REQUIRED	TOTAL no. BASKETS TO BE USED
A	1.0 x 1.0 x 1.0m	-	-	-
B	1.5 x 1.0 x 1.0m	0	39	**39**
C	2.0 x 1.0 x 1.0m	58	25	**83**
D	3.0 x 1.0 x 1.0m	31	27	**58**
E	4.0 x 1.0 x 1.0m	-	-	**-**
F	2.0 x 0.5 x 0.5m	42	46	88
G	2.0 x 1.0 x 0.5m	-	-	10
H	3.0 x 1.0 x 0.5m	2	4	**6**
J	4.0 x 1.0 x 0.5m	4	0	4
K	2.0 x 1.0 x 0.3m	4	0	4
L	3.0 x 1.0 x 0.3m	28	2	30
M	6.0 x 2.0 x 0.17m	-	-	**-**
N	6.0 x 2.0 x 0.23m	-	-	**-**
P	6.0 x 2.0 x 0.3m	2	0	0

BILL OF QUANTITIES				
DESCRIPTION	UNIT	REV2 QTY	ADD. QTY	REV3 QTY
ADDITIONAL GABION BASKET AND ROCK VOLUME	m³	368.0	+131.4	499.4
150mm CONCRETE CLADDING VOLUME	m³	16.5	0.0	16.5
100mm CONCRETE CAPPING VOLUME	m³	21.0	0.0	21.0
ROCK PACKING	m³	32.0	+11.5	43.5
SANDBAGS	m³	82.0	0.0	82.0
A4 GEOFABRIC	m²	162.0	- 57.0	105.0
A7 GEOFABRIC	m²	430.0	+257.5	687.5

NOTES

1. AURECON AND GROUNDTRUTH ACCEPTS RESPONSIBILITY FOR THE ENGINEERING DESIGN TO THE EXTENT THAT THIS IS BASED ON AVAILABLE INFORMATION. THE AVAILABLE INFORMATION IS LIMITED TO WHAT COULD BE INTERPRETED DURING A SINGLE SITE VISIT OF NO LONGER THAN A FEW HOURS. LIMITED GEOTECHNICAL, TOPOGRAPHICAL, GEOMORPHOLOGIC AND OTHER ENGINEERING RELATED SURVEYS HAVE BEEN UNDERTAKEN TO INFORM THE DESIGN. THIS IS NON-STANDARD ENGINEERING PRACTICE AND THEREFORE AURECON, GROUNDTRUTH AND THEIR ENGINEERS ARE INDEMNIFIED BY THE CLIENT AND DO NOT ACCEPT RESPONSIBILITY FOR THE ASSOCIATED RISK OF FAILURE FROM THE ABOVE LIMITATIONS OR ANY DAMAGES THAT MAY OCCUR.
2. AURECON, GROUNDTRUTH AND THEIR ENGINEERS ARE INDEMNIFIED AGAINST ANY ASSOCIATED DAMAGES AND ACCEPT NO LIABILITY ASSOCIATED WITH THE CONSTRUCTION AND IMPLEMENTATION OF ENGINEERING INTERVENTIONS DUE TO THE ENGINEERS HAVING LIMITED CONTACT WITH THE IMPLEMENTER DURING THE CONSTRUCTION PHASE RESULTING IN OUR INABILITY TO DILIGENTLY SUPERVISE AND ASSESS ANY PROGRESS.

ACRONYMS AND ABBREVIATIONS:

1. N.G.L - NATURAL GROUND LEVEL
2. C/C - CENTRE TO CENTRE.
3. µm - MICRO METER

EARTHWORKS/ EARTH STRUCTURES:

1. ALL CUT AND FILL SLOPES TO BE NOT STEEPER THAN 1:4, UNLESS OTHERWISE SPECIFIED.
2. ALL EXPOSED DISTURBED SURFACES TO BE REVEGETATED, UNLESS OTHERWISE SPECIFIED. 100mm OF TOP SOIL TO COVER BERM. REVEGETATION TO BE UNDERTAKEN AT SUITABLE TIMING OF YEAR TO IMPROVE CHANCES OF TAKING.
3. SOIL FOR BERMS AND BACKFILL TO BE COMPACTED IN 100mm LAYERS AT OPTIMUM WATER CONTENT

DISPERSIVE SOILS:
(ONLY APPLICABLE IN AREAS WITH DISPERSIVE SOILS):

1. IT IS CRITICAL TO ENSURE THAT THE FOUNDING SOIL NEVER DRIES OUT AND REMAINS AS UNDISTURBED AS POSSIBLE. THE BASE OF THE INTERVENTION SHOULD THEREFORE BE CONSTRUCTED AS SOON AS A PORTION OF EXCAVATION HAS BEEN FINISHED.
2. FILL MATERIAL TO BE GOOD QUALITY, WELL-GRADED GRAVEL OR CLAY (NOT DISPERSIVE CLAY FOUND IN PARTS OF THE FLOOD PLAIN).
3. ALL MATERIAL THAT IS EXCAVATED FROM THIS SITE AND RE-USED FOR BACKFILLING AND COMPACTION SHALL BE WELL MIXED WITH LIME OR GYPSUM DEPENDING ON SOIL PROPERTIES WHICH IS TO BE CONFIRMED BY SOIL TESTING AT THE TIME OF CONSTRUCTION.

GABIONS:

1. GABION BASKETS AND RENO MATTRESSES TO BE CONSTRUCTED OF DOUBLE TWISTED, HEXAGONAL, PVC COATED, GALFAN, GALVANISED WIRE MESH OF NOMINAL DIAMETER 80mm MESH, WITH 3.4mm O/D FRAME WIRE AND 2.7mm o/d MESH WIRE WITH PARTITIONS AT 1m CENTRES.
2. ALL GEOFABRIC TO BE GRADE A7, NOT LESS THAN 4.4mm THICK, UNLESS OTHERWISE SPECIFIED IN DESIGN.
3. 100mm - 200mm STONE TO BE USED IN ALL GABIONS AND RENO MATTRESSES. STONE FILL MUST BE NON-FRIABLE & INSOLUBLE E.G. GRANITE, BASALT, LIMESTONE OR SANDSTONE.
4. ALL GABIONS AND RENO MATTRESSES TO COMPLY WITH SANS-1200-DK.
5. CONCRETE CAPPING TO BE MINIMUM 15MPa & MIX:
   1 BAG CEMENT
   125L SAND
   120L STONE
   30L WATER
6. GEOFABRIC TO BE INSERTED AT ALL SOIL/MESH INTERFACES UNLESS OTHERWISE SPECIFIED.
7. ALL LEVELS & DIMENSIONS REFER TOP OF GABION BASKETS PRIOR TO CONCRETE CAPPING.
8. ALL GEOFABRIC TO HAVE 200mm OVERLAPS BETWEEN SHEETS AND STITCHED WITH EITHER POLYESTER OR GALVANISED WIRE @ 300mm C/C.
9. FOUNDATION IMPROVEMENT TO BE CONSTRUCTED FROM 70kg SANDBAGS MADE OF BIDIM A4 AND FILLED WITH SAND OR WELL GRADED GRAVEL.

REV	DATE	REVISION DETAILS	APPROVED
3	05/05/2018	FOR CONSTRUCTION	P.C.BLAAUW
2	15/02/2018	FOR CONSTRUCTION	F.NAGDI
1	29/10/2015	FOR CONSTRUCTION	F.NAGDI
0	21/08/2014	FOR CONSTRUCTION	F.NAGDI

SCALE: AS SHOWN | SIZE: A3
DRAWN: J.MORRISON
DESIGNED: A.MNYAKA
CHECKED: R.BLACKHURST

FOR CONSTRUCTION
APPROVED
ENGINEER
REGISTRATION No. 201170106
DATE 05/05/2017

PROJECT: WORKING FOR WETLANDS PROGRAMME 2017-2020
PROVINCE - PROJECT AREA: LIMPOPO - MUTALE
INTERVENTION DESCRIPTION: GABION WEIR MAINTENANCE
DRAWING No.: QUATERNARY No. A23B - WETLAND No. 02 - INTERVENTION No. 203-01 - PAGE NUMBER 01 OF 04 - REV 3

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CLIENT: Working for Wetlands

Filename: P:\PROJECTS\113223 PLAN & ENV COMP WORK FOR WETLANDS\ENGINEERING\5 DEL DES\503 CADD\DRAWINGS\LIMPOPO\MUTALE\A92B-02-203-01\2018_3_CONSTR1 DWG\A92B-02-203-01_REV3.DWG
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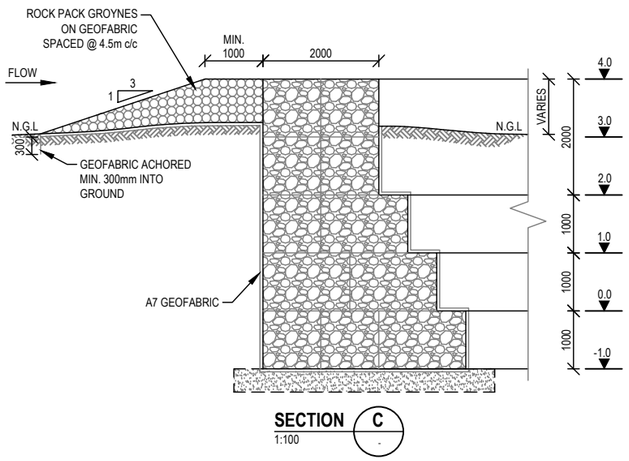
Plot Date: 10/5/2018 3:23:17 PM



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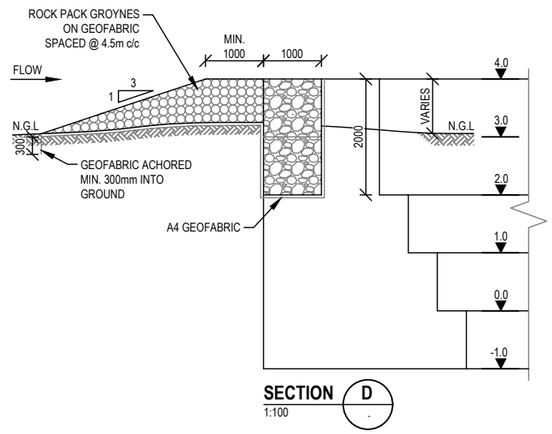

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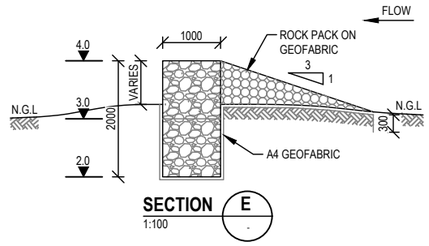

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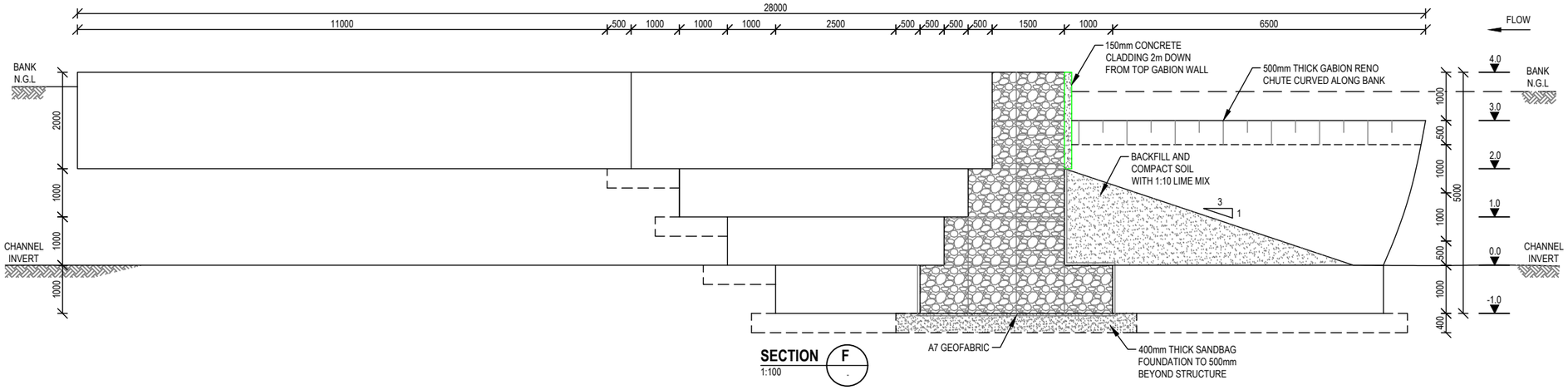

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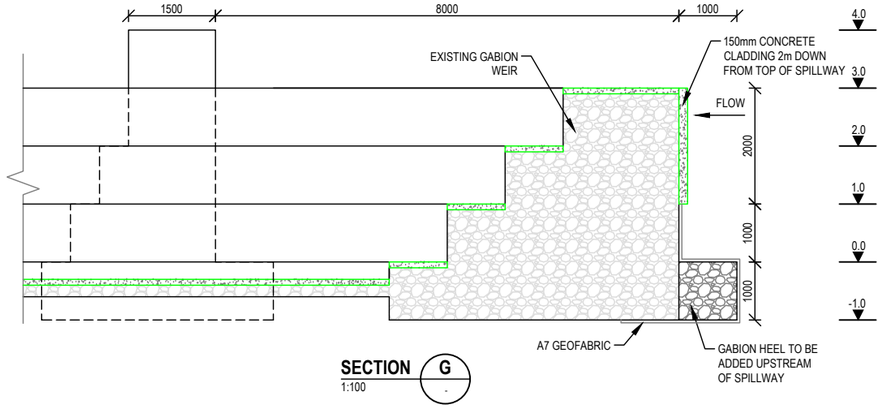

SECTION G
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REV	DATE	REVISION DETAILS	APPROVED
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SCALE	AS SHOWN
SIZE	A3
DRAWN	J.MORRISON
DESIGNED	A.MNYAKA
CHECKED	R.BLACKHURST

FOR CONSTRUCTION

APPROVED
ENGINEER
DATE 05/05/2017
REGISTRATION No. 201170106

PROJECT	WORKING FOR WETLANDS PROGRAMME 2017-2020
PROVINCE - PROJECT AREA	LIMPOPO - MUTALE
INTERVENTION DESCRIPTION	GABION WEIR MAINTENANCE

DRAWING No.	QUATERNARY No.	WETLAND No.	INTERVENTION No.	PAGE NUMBER	REV
	A23B	02	203-01	02 OF 04	3

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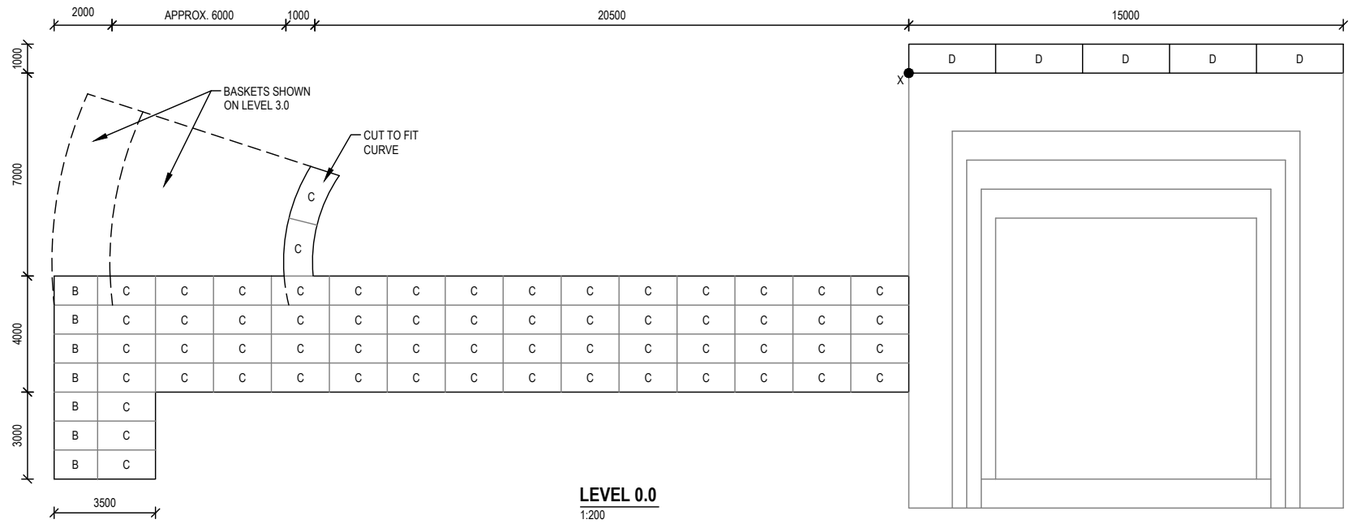
Plot Date: 10/5/2018 3:23:17 PM Office: Filename: P:\PROJECTS\113223 PLAN & ENV COMP WORK FOR WETLANDS\ENGINEERING\5 DEL DES\503 CADD\DRAWINGS\LIMPOPO\MUTALE\A92B-02-203-01\2018_3_CONSTR1 DWG\A92B-02-203-01_REV3.DWG



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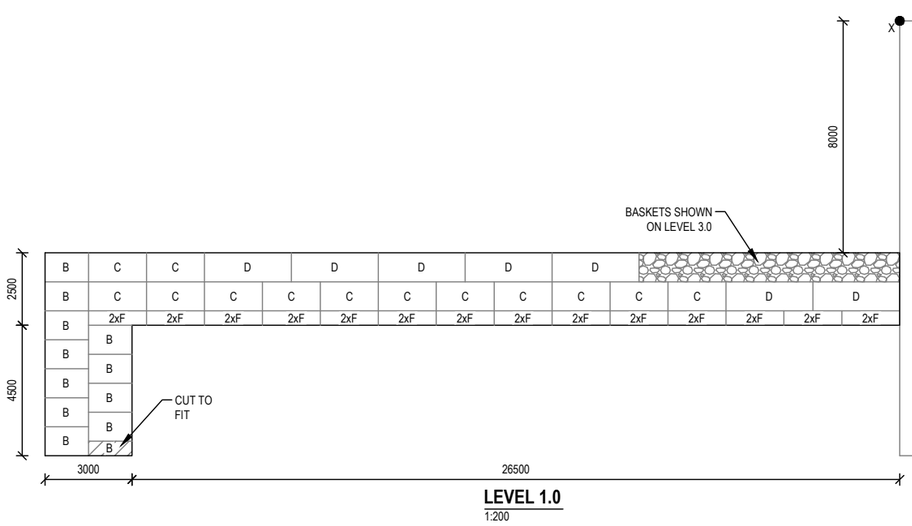

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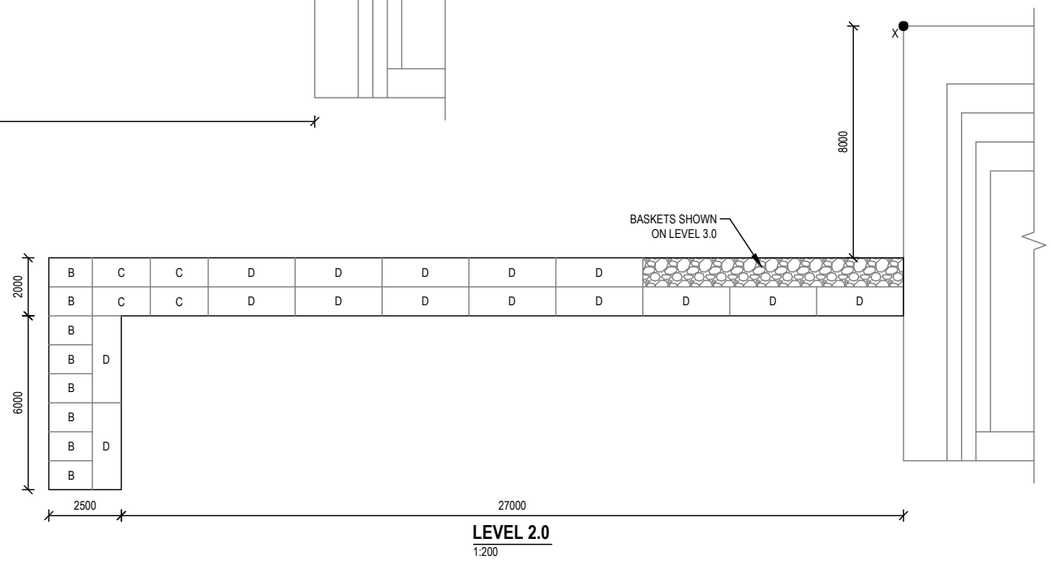

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SCALE	AS SHOWN
SIZE	A3
DRAWN	J.MORRISON
DESIGNED	A.MNYAKA
CHECKED	R.BLACKHURST

FOR CONSTRUCTION

APPROVED
ENGINEER
REGISTRATION No. 201170106
DATE 05/05/2017

PROJECT	WORKING FOR WETLANDS PROGRAMME 2017-2020
PROVINCE - PROJECT AREA	LIMPOPO - MUTALE
INTERVENTION DESCRIPTION	GABION WEIR MAINTENANCE
DRAWING No.	QUATERNARY No. A23B - WETLAND No. 02 - INTERVENTION No. 203-01 - PAGE NUMBER 03 OF 04 - REV 3

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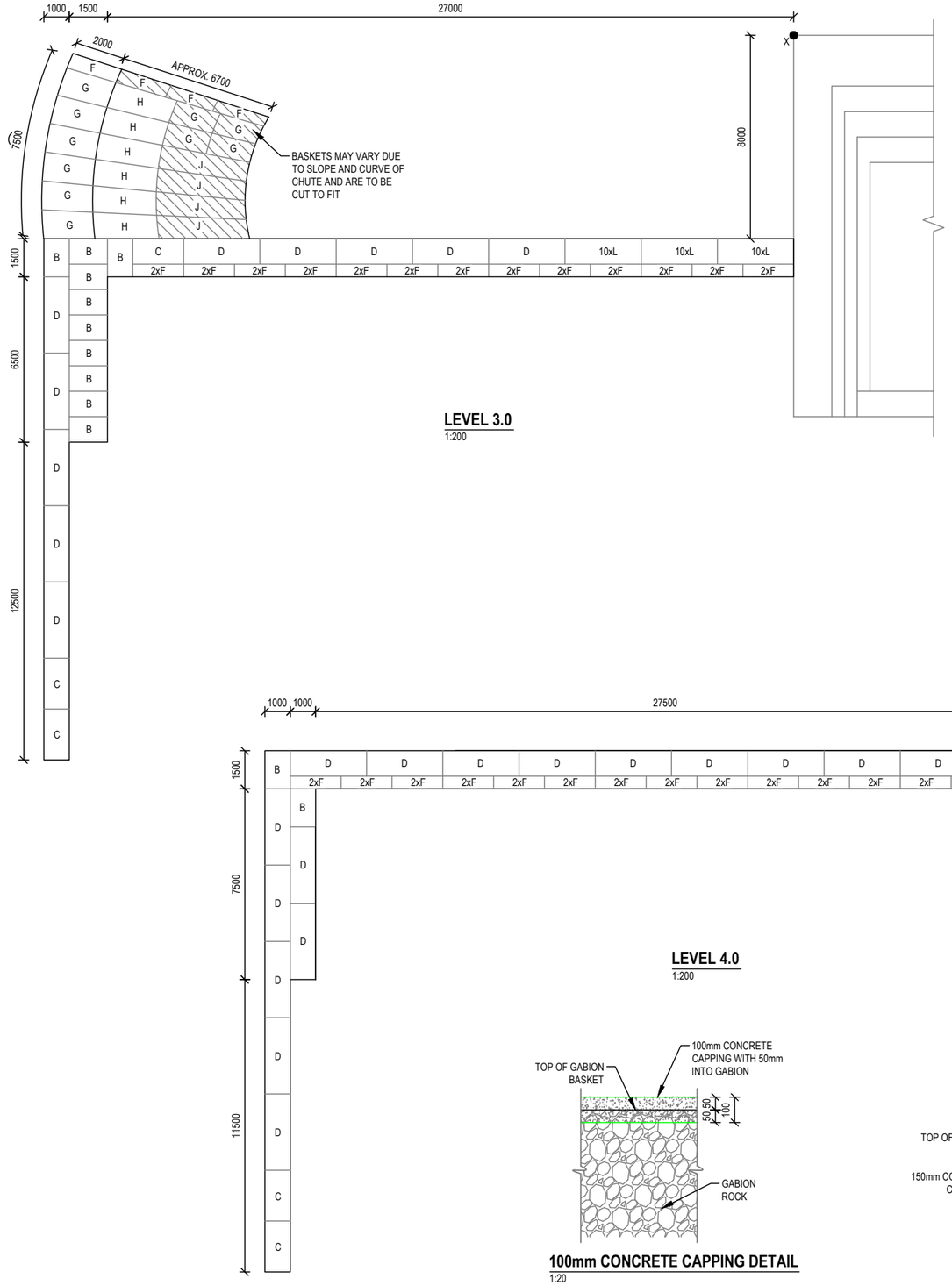
Plot Date: 10/5/2018 3:23:18 PM Office: Filename: P:\PROJECTS\113223 PLAN & ENV COMP WORK FOR WETLANDS\ENGINEERING\5 DEL DES\503 CADD\DRAWINGS\LIMPOPO\MUTALE\A92B-02-203-01\2018_3_CONSTR1 DWG\A92B-02-203-01_REV3.DWG



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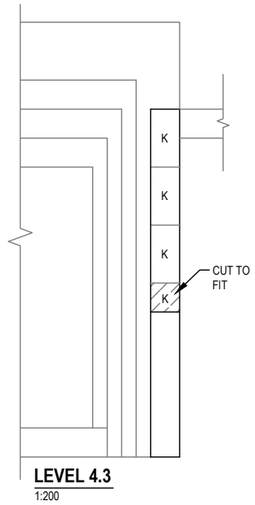

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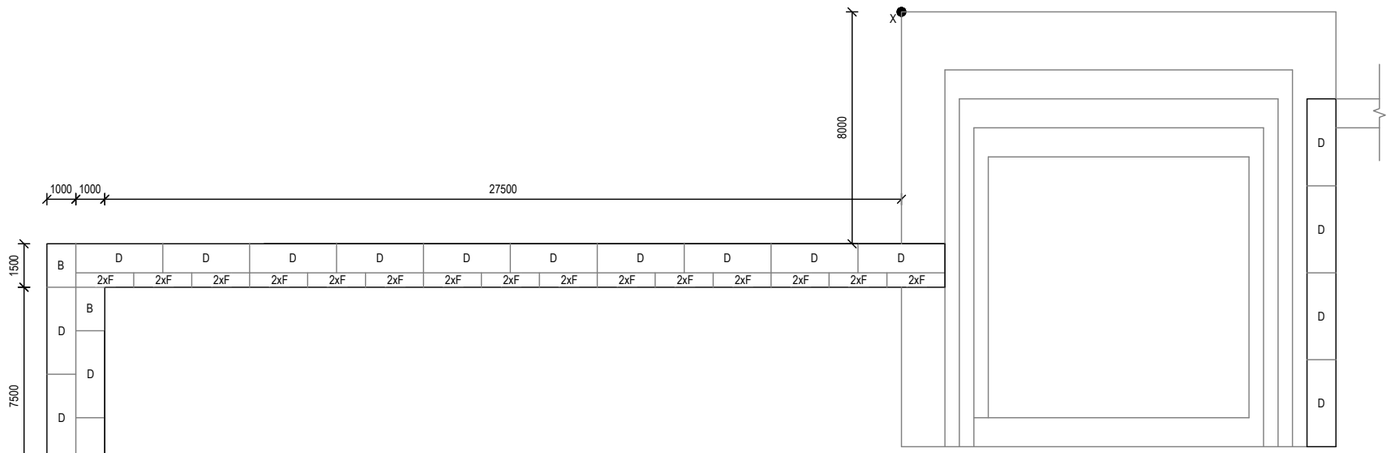

LEVEL 4.0
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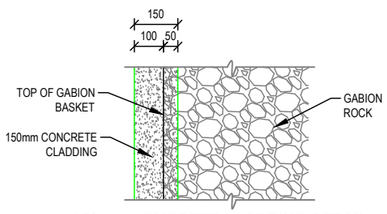
100mm CONCRETE CAPPING DETAIL
1:20



150mm CONCRETE CLADDING DETAIL
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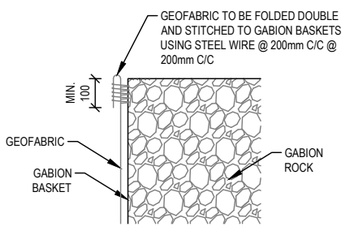

GEOFABRIC STITCHING DETAIL
1:20

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SCALE	SIZE
AS SHOWN	A3

DRAWN: J.MORRISON
DESIGNED: A.MNYAKA
CHECKED: R.BLACKHURST

FOR CONSTRUCTION

APPROVED
ENGINEER
DATE: 05/05/2017
REGISTRATION No.: 201170106

PROJECT	WORKING FOR WETLANDS PROGRAMME 2017-2020
PROVINCE - PROJECT AREA	LIMPOPO - MUTALE
INTERVENTION DESCRIPTION	GABION WEIR MAINTENANCE

DRAWING No.	QUATERNARY No.	WETLAND No.	INTERVENTION No.	PAGE NUMBER	REV
	A23B	02	203-01	04 OF 04	3

A92B-02-204-00 Rev

Details

Intervention	A92B-02-204-00
Designer	
Design Date	Unknown
Type	New
Description	MacMat-R
Rehabilitation Objectives	Facilitate erosion control and revegetation
Latitude (D°M'S")	22°45'31.73"S
Longitude (D°M'S")	30°31'41.69"E

Location Photograph: A92B-02-204-00

Bill of Quantities

Item		Units	Quantity
Place MacMat-R over sloped and prepaired soil surface and key in around perimeter (245m)	Prevent further head cut erosion and loss of peat	m2	1867.50
Earthworks: Cut and slope edge of headcut at 1:3 slope along perimeter	Stabilise slope to prevent further erosion	m3	466.00
Re-vegetate through MacMat-R & 100mm topsoil with vegetation from upstream the wetland	Re-instate vegetation cover to trap sedimnet and stabilise slopes	m2	1500.00

General construction notes as set out in the Construction Environmental Management Programme apply, along with all notes shown on design drawings and standard details. Where there is a conflict, the notes on design drawings apply.

The following site specific mitigation measures shall be implemented:

No additional mitigation measures are required.

A92B-02-205-00 Rev

Mutale - Limpopo

Details

Intervention	A92B-02-205-00
Designer	
Design Date	Unknown
Type	New
Description	MacMat-R
Rehabilitation Objectives	Facilitate erosion control and revegetation
Latitude (D°M'S")	22°45'34.06"S
Longitude (D°M'S")	30°31'42.65"E

Location Photograph: A92B-02-205-00

Bill of Quantities

Item	Objective	Units	Quantity
Place MacMat-R over sloped and prepaired soil surface and key in around perimeter (198m)	Prevent further head cut erosion and loss of peat	m2	1297.00
Earthworks: Cut and slope edge of headcut at 1:3 slope along perimeter	Stabilise slope to prevent further erosion	m3	648.00
Re-vegetate through MacMat-R and 100mm topsoil with vegetation from upstream the wetland	Re-instate vegetation cover to trap sedimnet and stabilise slopes	m2	1000.00

General construction notes as set out in the Construction Environmental Management Programme apply, along with all notes shown on design drawings and standard details. Where there is a conflict, the notes on design drawings apply.

The following site specific mitigation measures shall be implemented:

No additional mitigation measures are required.

A92B-02-206-01

Mutale - Limpopo

Details

Intervention	A92B-02-206-01
Designer	
Design Date	Unknown
Type	Maintenance
Description	Gabion Weir
Rehabilitation Objectives	Remove all material above NGL to prevent further unwanted channeling
Latitude (D°M'S")	22°45'32.38"S
Longitude (D°M'S")	30°31'43.88"E

Location Photograph: A92B-02-206-01

Bill of Quantities

Item		Units	Quantity
Remove reno baskets and remainig rock from stilling basin for re-use	Remove all material above NGL to prevent further unwanted channelling	m3	31.88
Remove gabion baskets and remaining rock from stilling basin for re-use	Remove all material above NGL to prevent further unwanted channelling	m3	6.25
Remove gabion baskets and remaining rock from spillway for re-use	Remove all material above NGL to prevent further unwanted channelling	m3	9.38
Remove gabion baskets and remaining rock from RB key wall re-use	Remove all material above NGL to prevent further unwanted channelling	m3	20.00

General construction notes as set out in the Construction Environmental Management Programme apply, along with all notes shown on design drawings and standard details. Where there is a conflict, the notes on design drawings apply.

The following site specific mitigation measures shall be implemented:

No additional mitigation measures are required.

APPENDIX D

ENVIRONMENTAL AUTHORISATION

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Private Bag X 447· PRETORIA · 0001· Environment House · 473 Steve Biko Road, Arcadia · PRETORIA

DEA Reference: 14/12/16/3/3/1/1893
Enquiries: Mr Lunga Dlova
Telephone: (012) 399 8524 **E-mail:** LDlova@environment.gov.za

Dr Farai Tererai
Working for Wetlands Programme
Department of Environmental Affairs
Private Bag X 447
PRETORIA
0001

Tel: 012 399 8970
Email: Fterarai@environment.gov.za

PER E-MAIL / MAIL

Dear Dr Tererai

APPLICATION FOR ENVIRONMENTAL AUTHORISATION IN TERMS OF THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, 1998 (ACT NO. 107 OF 1998) (NEMA); GOVERNMENT NOTICES. R982, R983 AND R985, AS AMENDED: THE WORKING FOR WETLANDS REHABILITATION PROGRAMME, LIMPOPO PROVINCE

With reference to the above application, please be advised that the Department has decided to grant an environmental authorisation to you. The Environmental Authorisation (EA) and reasons for the decision are attached herewith.

In terms of Regulation 4(2) of the National Environmental Management Act: the Environmental Impact Assessment Regulations, 2014, as amended (the EIA Regulations), you are instructed to notify all registered interested and affected parties, in writing within 14 (fourteen) days of the date of this EA, of the Department's decision as well as the provisions regarding the submission of appeals that are contained in the Regulations.

In terms of the Promotion of Administrative Justice Act, 2000 (Act No 3 of 2000), you are entitled to the right to fair, lawful and reasonable administrative action; and to written reasons for administrative action that affects you negatively. Further your attention is drawn to the provisions of the Protection of Personal Information Act, 2013 (Act no. 4 of 2013) which stipulates that the Department should conduct itself in a responsible manner when collecting, processing, storing and sharing an individual or another entity's personal information by holding the Department accountable should the Department abuses or compromises your personal information in any way.

Your attention is drawn to Chapter 2 of National Environmental Management Act, 1998 (Act No. 107 of 1998) National Appeal Regulations published under Government Notice R993 in Government Gazette No. 38303 dated 08 December 2014 (National Appeal Regulations, 2014), which prescribe the appeal procedure to be followed. Kindly include a copy of this document (National Appeal Regulations, 2014) with the letter of notification to interested and affected parties in this matter.

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Should any person wish to lodge an appeal against this decision, he/she must submit the appeal to the appeal administrator, and a copy of the appeal to the applicant, any registered interested and affected party, and any organ of state with interest in the matter within 20 days from the date that the notification of the decision was sent to the registered interested and affected parties by the applicant; or the date that the notification of the decision was sent to the applicant by the Department, whichever is applicable.

Appeals must be submitted in writing in the prescribed form to:

Director: Appeals and Legal Review of this Department at the below mentioned addresses.

By email: appealsdirectorate@environment.gov.za

By hand: Environment House
473 Steve Biko Street
Arcadia
Pretoria
0083; or

By post: Private Bag X447
Pretoria
0001

Please note that in terms of Section 43(7) of the NEMA, the lodging of an appeal will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged, you may not commence with any activity authorised in the EA until such time that the appeal is finalised.

To obtain the prescribed appeal form and for guidance on the submission of appeals, please visit the Department's website at https://www.environment.gov.za/documents/forms#legal_authorisatios or request a copy of the documents at appealsdirectorate@environment.gov.za .

Yours faithfully

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs
Date: 22/08/2016

Cc	Ms. F Gresse	Aurecon South Africa (Pty) Ltd	Tel: 021-526-6022	Email: Franci.Gresse@aurecongroup.com
	Mr Mapule Mokoko	Sekhukhune District Municipality	Tel: 013 262 7312/00	Email: Mahlanguq@sekhukhune.gov.za
	Ms Carol Makola	Makhuduthamaga Local Municipality	Tel: 013 265 8600	Email: carolm@makhuduthamaga.gov.za
	Mr Samuel Mabotja	Waterberg District Municipality	Tel: 014 718 3321/20	Email: smabotja@waterberg.gov.za
	Mr NS Bambo	Bela-Bela Local Municipality	Tel: 014 736 8000	Email: munmanager@belabela.gov.za
	Mr OP Sebola	Modimolle-Mookgophong Local Municipality	Tel: 014 718 2000	Email: Sebolao@modimolle.gov.za
	Mr C Mapholi	Vhembe District Municipality	Tel: 015 962 7500	Email: mapholic@vhembe.gov.za
	Mr Madi Simon	Thulamela Local Municipality	Tel: 015 962 7500	Email: madims@thulamela.gov.za

environmental affairs
Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Environmental Authorisation

In terms of regulation 25 of the Environmental Impact Assessment Regulations, 2014

ENVIRONMENTAL AUTHORISATION FOR THE WORKING FOR WETLANDS REHABILITATION PROGRAMME, LIMPOPO PROVINCE

Sekhukhune District Municipality;
Waterberg District Municipality; and
Vhembe District Municipality

Authorisation register number:	*14/12/16/3/3/1/1893*
Last amended:	*First issue*
Holder of authorisation:	*Working for Wetlands Programme*
Location of activity:	*Limpopo Province*

This environmental authorisation does not negate the holder of the authorisation's responsibility to comply with any other statutory requirements that may be applicable to the undertaking of the activity.

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Decision

The Department is satisfied, on the basis of information available to it and subject to compliance with the conditions of this environmental authorisation, that the applicant should be authorised to undertake the activities specified below.

Non-compliance with a condition of this environmental authorisation may result in criminal prosecution or other actions provided for in the National Environmental Management Act, 1998 and the EIA regulations.

Details regarding the basis on which the Department reached this decision are set out in Annexure 1.

Activities authorised

By virtue of the powers conferred on it by the National Environmental Management Act, 1998 (Act No.107 of 1998) and the Environmental Impact Assessment Regulations, 2014 the Department hereby authorises –

WORKING FOR WETLANDS PROGRAMME
(hereafter referred to as the **holder of the authorisation**)

with the following contact details –

Dr Farai Tererai
Working for Wetlands Programme
Department of Environmental Affairs
Private Bag X 447
PRETORIA
0001
Tel: (012) 399 8970
Cell: (081) 173 3057
E-mail: Fterarai@environment.gov.za

MS

to undertake the following activities (hereafter referred to as "the activity") indicated in Listing Notices 1 and 3 (GN R. 983 and 985):

Listed activities	Activity/Project description
GN 983: Item 12: *The development of-* *i. weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; or* *ii. infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs-* *a. within a watercourse;* *c. if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse*	In order to achieve the objectives of wetland rehabilitation, changes must be made to artificial drainage lines or eroding water channels if the wetland systems are to be returned to their original statuses. The following may be necessary: • The construction of concrete or gabion weirs within a watercourses (wetlands); • The formalisation of stream crossings to ensure that the integrity of wetland systems downstream and upstream of the crossings are protected from further degradation; and • The construction of walkways in public wetlands to limit human impact, and to form part of the educational component of the project.
GN R. 983 Item 19: *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;*	In order to implement the proposed rehabilitation interventions, soil would need to be removed as part of the site preparation and/or construction activities for example • Excavations may be required to build weir, etc. • Erosion channels may be filled with rocks or soil • Eroded embankments may need to be sloped for MacMat R to be applied.
GN 983: Item 27: *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for—*	In order for WfW to achieve rehabilitation objectives, the removal of alien invasive species will be required.

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(i) the undertaking of a linear activity; or *(ii) maintenance purposes undertaken in accordance with a maintenance management plan*	
GN 983: Item 48: *The expansion of- .* *i. infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or* *ii. dam or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;* *where such expansion or expansion and related operation occurs-* *a. within a watercourse;* *c. if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.*	In order to achieve the objectives of wetland rehabilitation, changes must be made to artificial drainage lines or eroding water channels if the wetland systems are to be returned to their original statuses. The following may be necessary: • The expansion of existing concrete or gabion weirs within watercourses (wetlands). Furthermore, some educational infrastructure may be required to limit human impact on the wetland system. Even though the interventions are intended to improve ecological status and habitats, this listing notice will be triggered because: • Walkways in public wetlands may constitute infrastructure with a footprint exceeding 100m^2.
GN R. 985 Item 12: *The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.* ***Limpopo Province*** *i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004.* *ii. Within critical biodiversity areas identified in*	In order for WfW to achieve rehabilitation objectives, the removal of alien invasive species will be required. The Sekhukhune Project wetland catchments occur in close proximity to the Leswena Nature Reserve and Schuinsdraai Nature Reserve, which are formally protected areas. The Limpopo Central Bushveld forms part of the greater Sekhukhune area and is a focus area of the National Protected Area Expansion Strategy (NPAES, 2010). The Waterberg project is currently focussing on the catchment area of the Nyl Floodplain which is located within a CBA.

bioregional plans; or *iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA.*	
GN R. 985 Item 14: *The development of-* *i. dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *ii. infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs -* *a. within a watercourse;* *c. if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* ***Limpopo Province*** *i. Outside urban areas, in:* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) World Heritage Sites;* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;*	In order to achieve the objectives of wetland rehabilitation, changes must be made to artificial drainage lines or eroding water channels if the wetland systems are to be returned to their original statuses. The following may be necessary: • The construction of concrete or gabion weirs within watercourses (wetlands); • The formalisation of stream crossings to ensure that the integrity of wetland systems downstream and upstream of the crossings are protected from further degradation; and • The construction of walkways in public wetlands to limit human impact, and to form part of the educational component of the project.
GN 985: Item 23: *The expansion of-* *i. dams or weirs where the dam or weir is expanded by 10 square meters or more in size;* *ii. infrastructure or structures where the physical*	In order to achieve the objectives of wetland rehabilitation, changes must be made to artificial drainage lines or eroding water channels if the wetland systems are to be returned to their original

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footprint is expanded by 10 square metres or more; *where such development occurs* *a. within a watercourse;* *c. if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* ***Limpopo Province*** *i. Outside urban areas, in;* *(bb) National Protected Area Expansion Strategy Focus areas;*	statuses. The following may be necessary: • The construction of concrete or gabion weirs within watercourses (wetlands); • The formalisation of stream crossings to ensure that the integrity of wetland systems downstream and upstream of the crossings are protected from further degradation; • The construction of walkways in public wetlands to limit human impact, and to form part of the educational component of the project.

as described in the Basic Assessment Report (BAR) dated May 2018 at:

SGIDS / coordinates of the boundary of the property or properties

Project: Sekhukhune

Wetland:	Sekhukhune	
Province:	Limpopo Province	
Local Municipality:	Makhuduthamaga Local Municipality	
Central coordinates / Mogaladi 282:	24°45'56.68"S	29°33'53.36"E
Central coordinates / Mogaladi 828:	24°45'11.10"S	29°33'17.59"E

Farm name and number:	Mogaladi 282
Portion Number:	RE
SG 21 Code:	TOKS00000000028200000

Farm name and number:	Mogaladi 828
Portion Number:	RE
SG 21 Code:	TOKS00000000082800000

Project: Waterberg

Wetland:	Nylsoog	
Province:	Limpopo Province	
Local Municipality:	Modimolle-Mookgophong Local Municipality	
Central coordinates:	33°51'00.36"S	18°40'05.52"E

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Farm number:	447
Portion Number:	286 and 290
SG 21 Code:	T0KR00000000044700286
SG 21 Code:	T0KR00000000044700290

Project: Mutale

Wetland: Nyahlawe
Province: Limpopo Province
Local Municipality: Thulamela Local Municipality
Central coordinates: 22°45'31.00"S 30°31'44.6"E

Farm name and number:	255
Portion Number:	RE
SG 21 Code:	T0MT00000000025500000

- for the Working for Wetlands Rehabilitation Programme, Limpopo Province, hereafter referred to as "the property".

- the location indicated in the locality plan, attached as Annexure 2 (Figure 1: Locality map showing the location of quaternary catchments within the Limpopo Province) of this authorisation.

The rehabilitation of wetlands will include the following:

Typical activities undertaken within the projects include:

- Plugging artificial drainage channels created by development or historical agricultural practices to drain wetland areas for other land use purposes;
- Constructing structures (gabions, berms, weirs) to divert or redistribute water to more natural flow paths, or to prevent erosion by unnatural flow rates that have resulted from unsustainable land use practices or development; and
- Removing invasive alien or undesirable plant species from wetlands and their immediate catchments (in conjunction with the Working for Water initiative).

Methods of wetland rehabilitation may include hard engineering interventions such as:

- Earth berms or gabion systems to block artificial channels that drain water from or divert polluted water to the wetland;
- Concrete and gabion weirs to act as settling ponds, to reduce flow velocity or to re-disperse water across former wetland areas thereby re-establishing natural flow paths;
- Earth or gabion structure plugs to raise channel floors and reduce water velocity;
- Concrete or gabion structures to stabilise head-cut or other erosion and prevent gullies;
- Concrete and/or reno mattress strips as road crossings to address channels and erosion in wetlands from vehicles; and
- Gabion structures (mattresses, blankets or baskets) to provide a platform for the growth of desired wetland vegetation.

Soft engineering interventions also offer successful rehabilitation methods, and the following are often used together with the hard engineering interventions:

- The use of biodegradable or natural soil retention systems such as eco-logs, MacMat-R plant plugs, grass or hay bales, and brush-packing techniques;
- The re-vegetation of stabilised areas with appropriate wetland and riparian plant species;
- Alien invasive plant clearing, which is an important part of wetland rehabilitation (this is supported by the Working for Water Programme).
- The fencing off of sensitive areas within the wetland to keep grazers out and to allow for the re-establishment of vegetation;
- In some instances, the use of appropriate fire management and burning regimes. The removal of undesirable plant and animal species; and
- In some wetlands, it may be possible to involve the community to develop a management plan for wise use within a wetland. This can involve capacity building through educating and training the community members who would monitor the progress. A plan could involve measures such as rotational grazing with long term benefits for rangeland quality.

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Conditions of this Environmental Authorisation

Scope of authorisation

1. The Working for Wetlands Rehabilitation Programme in the Limpopo Province is approved as per the geographic coordinates cited at the tables above in pages 6 - 7 above.
2. Authorisation of the activity is subject to the conditions contained in this environmental authorisation, which form part of the environmental authorisation and are binding on the holder of the authorisation.
3. The holder of the authorisation is responsible for ensuring compliance with the conditions contained in this environmental authorisation. This includes any person acting on the holder's behalf, including but not limited to, an agent, servant, contractor, sub-contractor, employee, consultant or person rendering a service to the holder of the authorisation.
4. The activities authorised may only be carried out at the property as described above.
5. Any changes to, or deviations from, the project description set out in this environmental authorisation must be approved, in writing, by the Department before such changes or deviations may be effected. In assessing whether to grant such approval or not, the Department may request such information as it deems necessary to evaluate the significance and impacts of such changes or deviations and it may be necessary for the holder of the authorisation to apply for further environmental authorisation in terms of the regulations.
6. The holder of an environmental authorisation must apply for an amendment of the environmental authorisation with the competent authority for any alienation, transfer or change of ownership rights in the property on which the activity is to take place.
7. This activity must commence within a period of five (05) years from the date of issue of this environmental authorisation. If commencement of the activity does not occur within that period, the authorisation lapses and a new application for environmental authorisation must be made in order for the activity to be undertaken.
8. Construction must be completed within five (05) years of the commencement of the activity on site.
9. Commencement with one activity listed in terms of this environmental authorisation constitutes commencement of all authorised activities.

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Notification of authorisation and right to appeal

10. The holder of the authorisation must notify every registered interested and affected party, in writing and within 14 (fourteen) calendar days of the date of this environmental authorisation, of the decision to authorise the activity.
11. The notification referred to must –
11.1. specify the date on which the authorisation was issued;
11.2. inform the interested and affected party of the appeal procedure provided for in the National Appeal Regulations, 2014;
11.3. advise the interested and affected party that a copy of the authorisation will be furnished on request; and
11.4. give the reasons of the competent authority for the decision.

Commencement of the activity

12. The authorised activity shall not commence until the period for the submission of appeals has lapsed as per the National Appeal Regulations, 2014 and no appeal has been lodged against the decision. In terms of section 43(7), an appeal under section 43 of the National Environmental Management Act, 1998 will suspend the environmental authorisation or any provision or condition attached thereto. In the instance where an appeal is lodged you may not commence with the activity until such time that the appeal has been finalised.

Management of the activity

13. The Environmental Management Programme (EMPr) submitted as part of the Application for EA is hereby approved. This EMPr must be implemented and strictly adhered to.

Frequency and process of updating the EMPr

14. The EMPr must be updated where the findings of the environmental audit reports, contemplated in Condition 22 below, indicate insufficient mitigation of environmental impacts associated with the undertaking of the activity, or insufficient levels of compliance with the environmental authorisation or EMPr.
15. The updated EMPr must contain recommendations to rectify the shortcomings identified in the environmental audit report.

16. The updated EMPr must be submitted to the Department for approval together with the environmental audit report, as per Regulation 34 of GN R. 982. The updated EMPr must have been subjected to a public participation process, which process has been agreed to by the Department, prior to submission of the updated EMPr to the Department for approval.
17. In assessing whether to grant approval of an EMPr which has been updated as a result of an audit, the Department will consider the processes prescribed in Regulation 35 of GN R.982. Prior to approving an amended EMPr, the Department may request such amendments to the EMPr as it deems appropriate to ensure that the EMPr sufficiently provides for avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.
18. The holder of the authorisation may apply for an amendment of an EMPr, if such amendment is required before an audit is required. The holder must notify the Department of its intention to amend the EMPr at least 60 days prior to submitting such amendments to the EMPr to the Department for approval. In assessing whether to grant such approval or not, the Department will consider the processes and requirements prescribed in Regulation 37 of GN R. 982.

Monitoring

19. The holder of the authorisation must appoint an experienced independent Environmental Control Officer (ECO) for the construction phase of the development that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations referred to in this environmental authorisation are implemented and to ensure compliance with the provisions of the approved EMPr.

19.1. The ECO must be appointed before commencement of any authorised activities.

19.2. Once appointed, the name and contact details of the ECO must be submitted to the *Director: Compliance Monitoring* of the Department at Directorcompliance@environment.gov.za.

19.3. The ECO must keep record of all activities on site, problems identified, transgressions noted and a task schedule of tasks undertaken by the ECO.

19.4. The ECO must remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is ready for operation.

Recording and reporting to the Department

20. All documentation e.g. audit/monitoring/compliance reports and notifications, required to be submitted to the Department in terms of this environmental authorisation, must be submitted to the *Director: Compliance Monitoring* of the Department at Directorcompliance@environment.gov.za.
21. The holder of the environmental authorisation must, for the period during which the environmental authorisation and EMPr remain valid, ensure that project compliance with the conditions of the environmental authorisation and the EMPr are audited, and that the audit reports are submitted to the *Director: Compliance Monitoring* of the Department at Directorcompliance@environment.gov.za.
22. The frequency of auditing and of submission of the environmental audit reports must be as per the frequency indicated in the EMPr, taking into account the processes for such auditing as prescribed in Regulation 34 of GN R. 982.
23. The holder of the authorisation must, in addition, submit an environmental audit reports to the Department within 30 days of completion of the construction phase (i.e. within 30 days of site handover) and a final environmental audit report within 30 days of completion of rehabilitation activities.
24. The environmental audit reports must be compiled in accordance with appendix 7 of the EIA Regulations, 2014 and must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the environmental authorisation conditions as well as the requirements of the approved EMPr.
25. Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

Notification to authorities

26. A written notification of commencement must be given to the Department no later than fourteen (14) days prior to the commencement of the activity. Commencement for the purposes of this condition includes site preparation. The notice must include a date on which it is anticipated that the activity will commence, as well as a reference number.

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Operation of the activity

27. A written notification of operation must be given to the Department no later than fourteen (14) days prior to the commencement of the activity operational phase.

Site closure and decommissioning

28. Should the activity ever cease or become redundant, the holder of the authorisation must undertake the required actions as prescribed by legislation at the time and comply with all relevant legal requirements administered by any relevant and competent authority at that time.

Specific conditions

29. No activities, which require a water use licence, must be allowed to encroach into a water resource without a water use authorisation.
30. A permit must be obtained from the relevant nature conservation agency for the removal or destruction of any indigenous protected and endangered plant and animal species if required.
31. No exotic plants must be used for rehabilitation purposes. Only indigenous plants occurring within a ten (10) kilometre radius of the development site must be utilised.
32. The Rehabilitation Plans for the project sites within these approved wetland systems must be submitted on an annual basis for approval by this Department prior to commencement of construction activities on site.
33. If any evidence of archaeological sites or remains (e.g., remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, marine shell and charcoal/ash concentrations), unmarked human burials, fossils or other categories of heritage resources are found during construction, the South African Heritage Resources Agency (SAHRA) must be alerted immediately, and a professional archaeologist or palaeontologist, must be contacted as soon as possible to inspect the findings.
34. An integrated waste management approach must be implemented that is based on waste minimisation and must incorporate reduction, recycling, re-use and disposal where appropriate. Any solid waste, which will not be recycled, must be disposed of at a landfill licensed in terms of section 20 (b) of the National Environment Management Waste Act, 2008 (Act No.59 of 2008). No waste material may be left on site after construction.

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35. Construction activities must take place in accordance to the requirements of the attached EMPr, which also includes general requirements from the Working for Wetlands Best Management Practices Plan.

General

1. A copy of this environmental authorisation, the audit and compliance monitoring reports, and the approved EMPr, must be made available for inspection and copying-

1.1. at the site of the authorised activity;

1.2. to anyone on request; and

1.3. where the holder of the environmental authorisation has a website, on such publicly accessible website.

2. National government, provincial government, local authorities or committees appointed in terms of the conditions of this authorisation or any other public authority shall not be held responsible for any damages or losses suffered by the holder of the authorisation or his/her successor in title in any instance where construction or operation subsequent to construction be temporarily or permanently stopped for reasons of non-compliance by the holder of the authorisation with the conditions of authorisation as set out in this document or any other subsequent document emanating from these conditions of authorisation.

Date of environmental authorisation: 22/01/2016

Mr Sabelo Malaza
Chief Director: Integrated Environmental Authorisations
Department of Environmental Affairs

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Annexure 1: Reasons for Decision

1. Information considered in making the decision

In reaching its decision, the Department took, *inter alia*, the following into consideration -

a) The information contained in the BAR dated May 2018;
b) The comments received from the BirdLife South Africa, Department of Agriculture Forestry & Fisheries (DAFF); Department of Environmental Affairs (DEA); Department of Water and Sanitation (DWS); SANParks; Limpopo Department of Economic Development, Environment and Tourism (LEDET); Sekhukhune District Municipality; Makhuduthamaga Local Municipality; Waterberg District Municipality; Modimolle-Mookgophong Local Municipality,; Bela-Bela Local Municipality; Vhembe District Municipality; Thulamela Local Municipality, and interested and affected parties as included in the BAR dated May 2018;
c) Mitigation measures as proposed in the BAR dated May 2018 and the EMPr; and
d) The objectives and requirements of relevant legislation, policies and guidelines, including section 2 of the National Environmental Management Act, 1998 (Act No.107 of 1998).

2. Key factors considered in making the decision

All information presented to the Department was taken into account in the Department's consideration of the application. A summary of the issues which, in the Department's view, were of the most significance is set out below.

a) The findings of the specialist study conducted and the recommended mitigation measures.
b) The need for the proposed project has been adequately addressed. The conservation of wetlands is fundamental to the sustainable management of water quality and quantity, and wetland rehabilitation is therefore essential to conserving water resources in South Africa. In responding to the challenge of stemming the loss of wetlands and maintaining and enhancing the benefits they provide, government has recognised that, in order to be truly effective, strategies for wetland conservation need to include a combination of proactive measures for maintaining healthy wetlands, together with interventions for rehabilitating those that have been degraded.

These objectives are currently being expressed in a coordinated and innovative way through the WfW Programme.

c) The BAR dated May 2018 identified all legislation and guidelines that have been considered in the preparation of the BAR dated May 2018.

d) The methodology used in assessing the potential impacts identified in the BAR dated May 2018 and the specialist studies have been adequately indicated.

e) A sufficient public participation process was undertaken and the applicant has satisfied the minimum requirements as prescribed in the EIA Regulations, 2014 for public involvement.

3. Findings

After consideration of the information and factors listed above, the Department made the following findings -

a) The identification and assessment of impacts are detailed in the BAR dated May 2018 and sufficient assessment of the key identified issues and impacts have been completed.

b) The procedure followed for impact assessment is adequate for the decision-making process.

c) The proposed mitigation of impacts identified and assessed adequately curtails the identified impacts.

d) The information contained in the BAR dated May 2018 is accurate and credible.

e) EMPr measures for the pre-construction, construction and rehabilitation phases of the development were proposed and included in the BAR and will be implemented to manage the identified environmental impacts during the construction phase.

In view of the above, the Department is satisfied that, subject to compliance with the conditions contained in the environmental authorisation, the authorised activities will not conflict with the general objectives of integrated environmental management laid down in Chapter 5 of the National Environmental Management Act, 1998 and that any potentially detrimental environmental impacts resulting from the authorised activities can be mitigated to acceptable levels. The environmental authorisation is accordingly granted.

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Annexure 2: Locality Plan

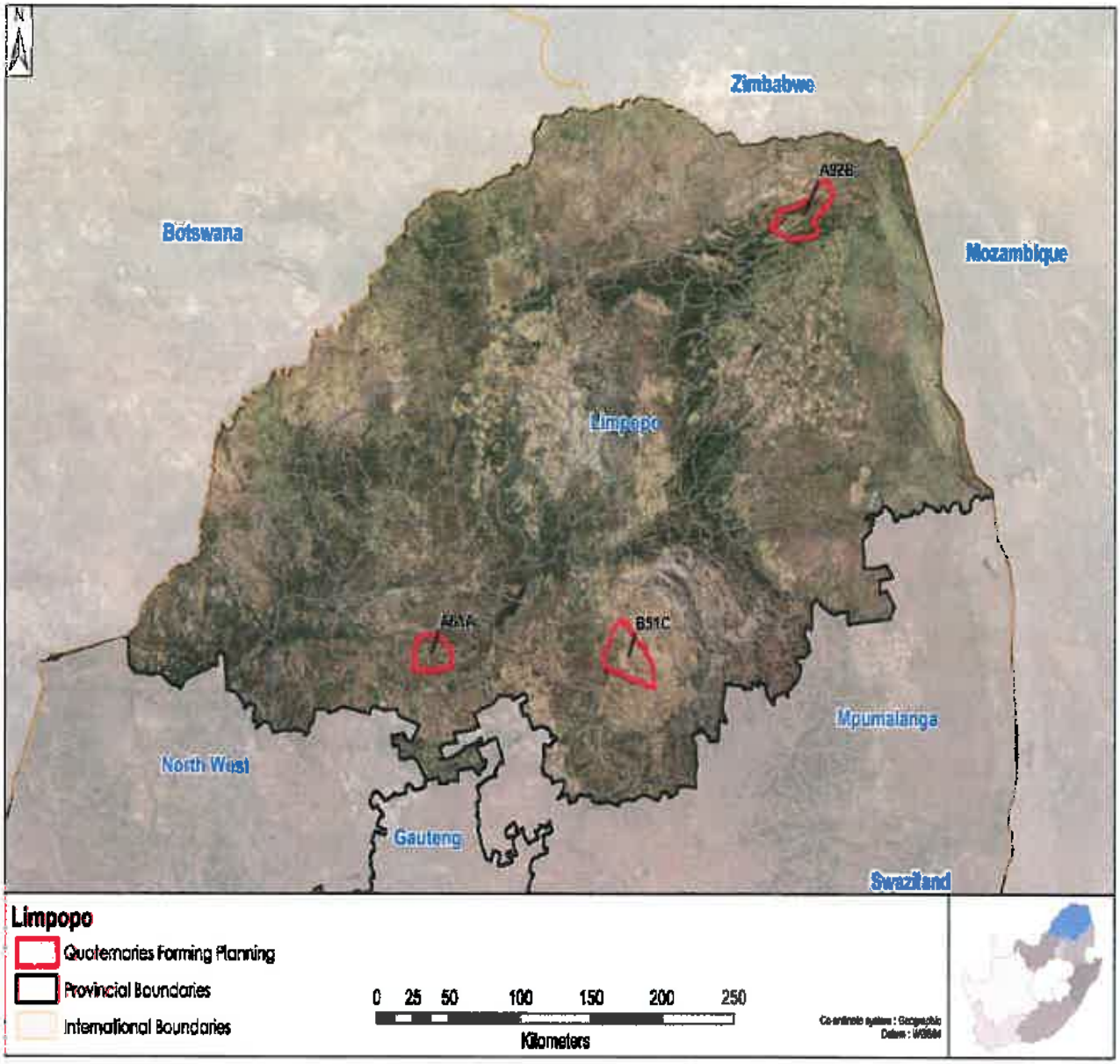

Figure 1: Locality map showing the location of quaternary catchments within the Limpopo Province.

APPENDIX E

LANDOWNER AGREEMENTS

WFW 003

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

Working for Wetlands

Working for Wetlands Programme

Wetlands Rehabilitation Activities Consent

Property Details	
Property Type:	THENGWE TRIBAL AUTHORITY
Registration Division:	THENGWE 2SS MT
Farm Number:	THENGWE 2SS MT
Portion Number:	THENGWE 2SS MT
Farm Name:	THENGWE 2SS MT
Surveyor-General Key:	MT
Province:	LIMPOPO
Unique Wetland Number:	A92B

Owner Details							
Owner Name: (Full Names/Full Registered Name)	NDITSHENI SETH NETHENGWE						
Person Type:		Company		Close corporation		Trust	Natural person
Registration/Identity Number:	5083105887086 (Where applicable. For a trust, attach a copy of the latest letters of trusteeship issued by the Master of the High Court.)						
Owner's chosen address for delivery of notices and documents:	Postal Address : P.O. BOX 39 MUTALE 0956		Physical Address : MUTALE-MUSANDA THENGWE-MUSANDA MUTALE, 0956				
	Telephone Number: 0731551991		Email Address:				

Project Name:	Working for Wetlands: Mutale Project

I/We hereby consent to the Working for Wetlands Programme and its appointed implementers undertaking the wetland rehabilitation activities listed in annexure "WFW 003A" attached hereto, for the project referred to above, subject to my/our approval of the relative Wetland Rehabilitation Plan, on the property described above of which I am the owner.

Name	NDITSHENI SETH NETHENGWE	**Position**	SENIOR TRADITIONAL LEADER
Signature		**Date**	05.03.2018

Please fax or post this form to:	**With a copy to:**
THENGWE TRIBAL AUTHORITY. P.O. BOX 39 MUTALE, 0956	The Planning, Monitoring and Evaluation Manager Working for Wetlands Programme, Private Bag X101, PRETORIA, 0001 Telefax (012) 8435165

DEPARTMENT OF CO-OPERATIVE GOVERNANCE, HUMAN SETTLEMENTS & TRADITIONAL AFFAIRS
THENGWE TRADITIONAL COUNCIL
05 MAR 2018
BOX 39 MUTALE 0956
VHEMBE DISTRICT SUPPORT CENTRE

TSHILOWANI HG
073 155 1791

Wetland rehabilitation activities to be carried out in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA)

[*Note: To be added to/amended as appropriate*]

Please note: The description of the project activities may not all occur, however they do provide some context for the possible interventions that may be implemented on your land.

Listed activity as described in GN 983, 984 & 985
***GN 983 (as amended): Activity 12**: the development of-* *i. dams or weirs, where the dam weir, including infrastructure and water surface area, exceeds 100 square metres; or* *ii. infrastructure or structures with a physical footprint of 100 square metres or more;* *where such developments occurs-* *(a) within a watercourse;* *(b) in front of development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;-* *excluding-* *(aa) the development of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies* *(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such developments occurs within an urban area;* *(ee) where such development occurs within existing roads, road reserve or railway line reserves; or* *(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.*
GN R983 (as amended): Activity 19:** The infilling or depositing of material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* *But **excluding where such infilling, depositing, dredging, excavation, removal or moving- *(a) will occur behind a development setback;* *(b) **is for maintenances purposes undertaken in accordance with a maintenance management plan**;* *(c) **falls within the ambit of activity 21 in this Notice, in which case that activity applies**;* ***(d)** occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or* ***(e)** where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.*
GN R983 (as amended): Activity 27:** The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for –* *i. the undertaking of a linear activity; or* ***ii. maintenance purposes undertaken in accordance with a maintenance management plan.

Listed activity as described in GN 983, 984 & 985
GN 983 (as amended): Activity 48: *The expansion of-* *(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or* *(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;* *where such expansion occurs-* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;* *excluding-* *(aa) the expansion of infrastructure or structures within existing ports or harbours that will not increase the development footprint of the port or harbour;* *(bb) where such expansion activities are related to the development of a port or harbour, in case activity 26 in Listing Notice 2 of 2014 applies;* *(cc) activities listed in activity 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;* *(dd) where such expansion occurs within an urban area; or* *(ee) where such expansion occurs within existing roads, road reserves or railway line reserves.*
GN R984 (as amended): Activity 24: *The extraction or removal of peat or peat soils, including the disturbance of vegetation or soils in anticipation of the extraction or removal of peat or peat soils, but* ***excluding where such extraction or removal is for the rehabilitation of wetlands in accordance with a maintenance management plan.***
GN R985 (as amended): Activity 12 (e): *The clearance of an area of 300 square metres or more of indigenous vegetation* ***except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.*** ***e. Limpopo*** *i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial BiodiversityAssessment 2004;* *ii. Within critical biodiversity areas identified in bioregional plans; or* *iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning.*
GN 985 (as amended): Activity 14 (e): *The development of-* *(i) Dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *(ii) Infrastructure or structures with a physical footprint of 10 square metres or more;* *Where such development occurs-* *(a) Within a watercourse;* *(b) In front of a development setback; or* *(c) If no development setback has been adopted within 32 of a watercourse, measured from the edge of a*

Listed activity as described in GN 983, 984 & 985
(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; *(ff) Core areas in biosphere reserves; or* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve; or* *ii. Inside urban areas:* *(aa) Areas zoned for use as public open space; or* *(bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority or zoned for a conservation purpose.*

WFW 003

South African National Biodiversity Institute
Working for Wetlands Programme

Wetlands Rehabilitation Activities Consent

Property Details	
Property Type:	THENGWE TRIBAL AUTHORITY
Registration Division:	THENGWE 255 MT.
Farm Number:	THENGWE 255 MT.
Portion Number:	THENGWE 255 MT.
Farm Name:	THENGWE 255 MT.
Surveyor-General Key:	MT
Province:	LIMPOPO
Unique Wetland Number:	

Owner Details							
Owner Name: (Full Names/Full Registered Name)	NETHENGWE NDITSHENI SETH						
Person Type:		Company		Close corporation	X	Trust		Natural person
Registration/Identity Number:	500310 5887 086. (Where applicable. For a trust, attach a copy of the latest letters of trusteeship issued by the Master of the High Court.)						
Owner's chosen address for delivery of notices and documents:	Postal Address : P.O BOX 39 MUTALE 0956		Physical Address : THENGWE - MASAMBA MUTALE 0956				

Project Name:	

I/We hereby consent to the Working for Wetlands Programme of the SA National Biodiversity Institute and its appointed consultants to undertake the necessary legal processes under the National Water Act (36 of 1998) and the National Environmental Management Act, as amended (107 of 1998) in order to obtain the requisite authorizations. I/We further consent to the Working for Wetlands Programme of the SA National Biodiversity Institute and its appointed implementers undertaking the wetland rehabilitation activities listed in annexure "WFW 003A" attached hereto, for the project referred to above, subject to my/our approval of the activities detailed in the relevant Wetland Rehabilitation Plan, on the property described above of which I am the owner.

Name	NETHENGWE N.S.	**Position**	SENIOR TRADITIONAL LEADER
Signature		**Date**	2013 · 01 · 31

Please fax or post this form to:	**With a copy to:**
The Planning, Monitoring and Evaluation Manager, Working for Wetlands, SA National Biodiversity Institute, Private Bag X101, PRETORIA, 0001. Telephone: (012) 843 5200, Facsimile: (086) 555 9838	

APPENDIX F

ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

WORKING FOR WETLANDS PROGRAMME

CONSTRUCTION ENVIRONMENTAL MANAGEMENT PROGRAMME

Date: September 2017
Version: 5

Prepared by:
Aurecon South Africa (Pty) Ltd
PO Box 494
Cape Town
8000

Prepared for:
Working for Wetlands Programme
Department of Environmental Affairs:
Natural Resource Management
Private Bag X447
0001

REPORT CONTROL

Document control					
Report title	Working for Wetlands Programme: Construction Environmental Management Programme				
Prepared by	Aurecon South Africa (Pty) Ltd PO Box 494 Cape Town 8000				
On behalf of	Working for Wetlands Programme (WfWetlands) Department of Environmental Affairs: Natural Resource Management Private Bag X447 0001				
Client contact	Ms Franci Gresse Tel: 021 526 9400		**WfWetlands contact**	Dr Farai Tererai Tel: 012 399 8970	
Rev	**Date**	**Author**	**Reviewer**	**Verifier**	**Approver**
1	Sept. 2010	SANBI	N/A	N/A	SANBI
2	Oct. 2012	A. Beetge	A. Beetge	A. Beetge	U. Bahadur
3	July 2015	Z. Palmer	F. Gresse	A. Beetge	F. Tererai
4	Nov. 2015	Z. Palmer	F. Gresse	A. Beetge	F. Tererai
5	Sept. 2017	M. Lowies & F. Gresse	F. Gresse	A. Beetge	F. Tererai
Approval					
Author signature			**Approver signature**		
Name			**Name**		
Title			**Title**		
Date			**Date**		

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ACRONYMS

BAR	Basic Assessment Report
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EMPr	Construction Environmental Management Programme
EPWP	Expanded Public Works Programme
GPS	Global Positioning System
IE	Implementing Entity
NEMA	National Environmental Management Act (Act 107 of 1998)
NRM	Natural Resource Management
PC	Provincial Coordinator[1]
PDP	Professional Driving Permit
PIP	Project Implementation Plan
PPE	Personal Protective Equipment
PPR	Project Progress Report
SABS	South African Bureau of Standards
SAHRA	South African Heritage Resources Agency
SEP	Site Environmental File
SETA	Sector Education and Training Authority

[1] Also referred to as Assistant Director: Wetlands Programme.

DEFINITIONS

Alien species[2]:

(a) a species that is not an indigenous species; or

(b) an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

Approved: Means approved in terms of the applicable legal requirements (e.g. NEMA approval/ Environmental Authorisation) and/or has been approved by the WfWetlands Programme's Deputy Director: Planning, Monitoring and Evaluation and/or an authorised representative of the WfWetlands Programme.

Archaeological[3]:

(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 artefacts, 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;

(c) 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 respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which the South African Heritage Resource Agency (SAHRA) considers to be worthy of conservation; and

Auditing[4]: A systematic, documented, periodic and objective evaluation which provides verifiable findings, in a structured and systematic manner, on:

(a) the level of performance against and compliance of an organisation or project with the provisions of the requisite environmental authorisation or Environmental Management Programme (EMPr) and, where applicable, the closure plan; and

(b) the ability of the measures contained in the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.

Authority*:* National, regional or local authority, that has a decision-making role or interest in the project.

Basic Assessment Report (BAR): A report as described in Regulation 19 of GN R982 (2014, as amended) of the National Environmental Management Act (No. 107 of 1998, as amended) (NEMA).

Best Management Practice (BMP): Procedures and guidelines to ensure the effective and appropriate implementation of wetland rehabilitation by WfWetlands implementers.

[2] National Environmental Management: Biodiversity Act (No. 10 of 2004)
[3] National Heritage Resources Act (No. 25 of 1999)
[4] Regulation 34 of GN R982 (2014, as amended) of NEMA

Cement laden water: Means water (fresh or wash water) which has been in contact with partially cured concrete/mortar or raw cement product and which contains suspended and dissolved cement solids.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Contaminated water: Means water contaminated by the Implementing Entity's activities such as with hazardous substances, hydrocarbons, paints, solvents and runoff from plant, workshop or personnel wash areas but excludes water containing cement/ concrete or silt.

Corrective (or remedial) action*:* Reactive response required to address an environmental problem that is in conflict with the requirements of the EMPr. The need for corrective action may be determined through monitoring, audits or management review.

Dam[5]: Any barrier dam and any other form of impoundment used for the storage of water, excluding reservoirs.

Dangerous goods: Goods containing any of the substances as contemplated in South African National Standard No. 10234, supplement 2008 1.00: designated "*List of classification and labelling of chemicals in accordance with the Globally Harmonized Systems (GHS)"* published by Standards South Africa, and where the presence of such goods, regardless of quantity, in a blend or mixture, causes such blend or mixture to have one or more of the characteristics listed in the Hazard Statements in section 4.2.3, namely physical hazards, health hazards or environmental hazards.

Decommissioning[6]: To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.

Dust[7]: Any material composed of particles small enough to pass through a 1 mm screen and large enough to settle by virtue of their weight into the sampling container from the ambient air.

Eco-log: A cylindrical sleeve made from, for example wire mesh, filled with organic material and/or soil used to prevent and/or repair minor erosion.

Ecosystem services or 'eco services': The services such as sediment trapping or water supply, supplied by an ecosystem (in this case a wetland ecosystem).

Endangered species: Means any indigenous species listed as an endangered species in terms of section 56 of the National Environmental Management Biodiversity Act ((No. 10 of 2004).

Endemic: An "endemic" is a species that grows in a particular area (i.e. it is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

[5] GN R983 (2014, as amended) of NEMA
[6] GN R983 (2014, as amended) of NEMA
[7] National Dust Regulations GN R827 (2013)

Environment[8]: Means the surroundings within which humans exist and that are made up of:

i. the land, water and atmosphere of the earth;

ii. micro-organisms, plant and animal life;

iii. any part or combination of i) and ii) and the interrelationships among and between them; and

iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental Assessment Practitioner (EAP): The individual responsible for the planning, management and coordination of the environmental impact assessments, strategic environmental assessments, environmental management plans and/or other appropriate environmental instruments introduced through regulations of NEMA.

Environmental Impact Assessment (EIA): A study of the environmental consequences of a proposed course of action via the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application.

Environmental impact: An environmental change caused by some human act.

Environmental impact: Change in an environment resulting from the effect of an activity on the environment, whether positive or negative. Impacts may be the direct consequence of an individual's or organisation's activities or may be indirectly caused by them (DEAT, 1998).

Erosion: The loss of soil through the action of water, wind, ice or other agents, including the subsidence of soil.

Establishment of grass: Refers to all necessary procedures taken to produce an acceptable cover of specified live grass over an area.

Gabion: A structure made of wire mesh baskets filled with regularly sized stones, and used to prevent and/or repair erosion. They are flexible and permeable structures which allow water to filter through them. Vegetation and other biota can also establish in/around the habitat they create.

Hazard: Means a source of or exposure to danger.

Invasive alien species control:

(a) to combat or eradicate an alien or invasive species; or

(b) where such eradication is not possible, to prevent, as far as may be practicable, the recurrence, re-establishment, re-growth, multiplication, propagation, regeneration or spreading of an alien or invasive species.

Implementing Entity: The entity responsible for the construction of WfWetlands rehabilitation interventions by means of various contracted teams.

Indigenous vegetation[9]: 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.

[8] NEMA
[9] GN R983 (2014, as amended) of NEMA

Interested and Affected Parties (I&APs)[10]:

(a) all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;

(b) all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; c) all organs of state which have jurisdiction in respect of the activity to which the application relates.

Intervention: An engineered structure such as a concrete or gabion weir, earthworks or revegetation that that achieves identified objectives within a wetland e.g. raising of the water table within a drainage canal.

Invasive species[11]: Means any species whose establishment and spread outside of its natural distribution range-

(a) threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; and

(b) may result in economic or environmental harm or harm to human health.

Listed invasive species: Any invasive species listed in terms of sections 66(1), 67(1), 70(1)(a), 71(3) and 71A of the National Environmental: Biodiversity Act (No. 10 of 2004).[12]

Maintenance period: The period after the Establishment Period (Practical Completion), up to and until the end of the Maintenance Period (i.e. a period of 12 months).

Maintenance[13]: Means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.

Mine:

(a) used as a noun-

any excavation in the earth, including any portion under the sea or under other water or in any residue deposit, as well as any borehole, whether being worked or not, made for the purpose of searching for or winning a mineral;

any other place where a mineral resource is being extracted, including the mining area and all buildings, structures, machinery, residue stockpiles, access roads or objects situated on such area and which are used or intended to be used in connection with such searching, winning or extraction or processing of such mineral resource; and

(b) used as a verb-

in the mining of any mineral, in or under the earth, water or any residue deposit, whether by underground or open working or otherwise and includes any operation or activity incidental thereto, in, on or under the relevant mining area.

Mitigation: Actions to reduce the impact of a particular activity.

[10] Regulation 42 GN R983 (2014, as amended) of NEMA
[11] National Environmental Management: Biodiversity Act (No. 10 of 2004)
[12] Also refer to GN 864 (2016): Alien and Invasive Species Lists
[13] GN R983 (2014, as amended) of NEMA

Mitigation[14]**:** Means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible;

Monitoring[15]**:** The repetitive and continued observation, measurement and evaluation of environmental criteria to follow changes over a period of time and to assess the efficiency of control measures.

Nursery conditions: This refers to the necessary conditions that must be in place for maintaining strong healthy growth in all container plant materials on site. This includes for the protection of all container plants against wind, frost, direct sunlight, pests, disease and drought. It also includes for the provision of adequate and suitable water supply, fertilisers and all other measures necessary to maintain strong and healthy plant growth.

Offensive odour: Any smell which is considered to be malodorous or a nuisance to a reasonable person.

Pollution[16]**:** Means any change in the environment caused by substances;

(ii) radioactive or other waves; or

(iii) 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 wellbeing 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.

Post-construction: Refers to the period of 12 months after the completion of the construction works, the onset coinciding with the maintenance period.

Potentially hazardous substance: Any substance or mixture of substances, product or material declared to be a hazardous substance under section 2(1) of the Hazardous Substance Act (1973).

Pre-construction: Refers to the period leading up to the establishment on site by the Implementing Entity.

Project: A defined area for which an approved rehabilitation plan exists for the WfWetlands Programme.

Public Participation Process (PPP): A process of involving the public in order to identify issues and concerns, and obtain feedback on options and impacts associated with a proposed project, programme or development. Public Participation Process in terms of NEMA refers to a process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to specific project matters.

Quaternary Catchment: A fourth order catchment in a hierarchal classification system in which a primary catchment is the major unit and that is also the "principal water management unit in South Africa"[17]

[14] GN R983 (2014, as amended) of NEMA
[15] DEAT, 1998
[16] National Environmental Management Act (No. 107 of 1998, as amended)
[17] DWS Groundwater Dictionary. Available online: http://www.dwaf.gov.za/Groundwater/Groundwater_Dictionary/index.html?introduction_quaternary_catchment.htm

Reasonable: Means, unless the context indicates otherwise, reasonable in the opinion of the relevant environmental authority.

Rehabilitation: Refers to re-instating the driving ecological forces (including hydrological, geomorphological and biological processes) that underlie a wetland, so as to improve the wetland's health and the ecological services that it delivers; and

Restoring processes and characteristics that are sympathetic to and not conflicting with the natural dynamic of an ecological or physical system[18].

Scarifying: Loosening the soil in areas which have become hard and compacted and which need to be loosened in order to facilitate revegetation.

Shaping: Finishing all slopes which do not form part of the permanent works so that they do not exceed the maximum gradient stipulated in the approved rehabilitation plan.

Significant impact: Means an impact that may have a notable effect on one or more aspects of the environment or may result in k with accepted environmental quality standards, thresholds or targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.

Silt laden water: Means water (mostly overland surface runoff) containing a substantial concentration of suspended solids with increased turbidity. Usually occurs as a result of exposed/cleared ground surfaces, concentration of runoff and/or erosion of excavated or imported materials.

Site: This is the area described in the approved/authorised rehabilitation plan for the implementation of the rehabilitation measures. Where the area is not demarcated, it will include all adjacent areas, which are reasonably required for the activities for the Implementing Entity, and approved for such use by the Environmental Control Officer (ECO).

Slope: The inclination of a surface expressed as 1 unit of rise or fall for so many horizontal units.

Subsoil: The soil horizons between the topsoil horizon and the underlying parent rock.

Topsoil: The upper soil profile irrespective of the fertility appearance, structure, agriculture potential, fertility and composition of the soil, usually containing organic material and which is colour specific. Also referred to as the "O" and "A" horizons.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 the National Environmental Management: Waste Act (No. 59 of 2008)[19]. Examples include construction debris, chemical waste, used oils and lubricants, batteries, metal and wood off-cuts, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

Watercourse:

(a) a river or spring;

(b) a natural channel in which water flows regularly or intermitted;

(c) a wetland, pan, lake or dam into which, or from which, water flows

[18] Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 2008
[19] National Environmental Management: Waste Act (No. 59 of 2008, as amended)

A reference to a watercourse includes, where relevant, its bed and banks

Weir: A dam-type structure placed across a watercourse to raise the water table of the surrounding ground and trap sediment on the upstream face without preventing water flow. Weirs are generally used to prevent erosion from progressing up exposed gullies.

Wetland: 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 in normal circumstances supports or would support vegetation typically adapted to life in saturated soils[20] and,

Land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants living there[21].

[20] National Water Act (No. 36 of 1998, as amended)
[21] Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 2008

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1 INTRODUCTION

1.1 Project Overview

Working for Wetlands is a government programme managed by the Natural Resource Management (NRM) Programme of the Department of Environmental Affairs (DEA), and is a joint initiative with the Departments of Water and Sanitation (DWS), and Agriculture and Forestry and Fisheries (DAFF). In this way the programme is an expression of the overlapping wetland-related mandates of the three parent departments, and besides giving effect to a range of policy objectives, it also honours South Africa's commitments under several international agreements, especially the Ramsar Convention on Wetlands.

The programme is mandated to protect pristine wetlands, promote their wise-use and rehabilitate those that are damaged throughout South Africa, with an emphasis on complying with the principles of the Expanded Public Works Programme (EPWP) and using only local Small, Medium and Micro Enterprises (SMMEs). The EPWP seeks to draw significant numbers of unemployed people into the productive sector of the economy, gaining skills while they work and increasing their capacity to earn an income.

1.2 Purpose of the EMPr

An Environmental Management Programme (EMPr) is compiled as part of the requisite submissions contained in a Basic Assessment Report (BAR) or Environmental Impact Report (EIR) in order to obtain an Environmental Authorisation (EA) to proceed with a listed activity(ies) as defined in GN R982 (2014, as amended) of the National Environmental Management Act (No. 107 of 1998), as amended. Upon approval of the BAR or EIR and resultant issuing of the EA, the EMPr becomes a legally binding document of which compliance has to audited by an independent and appropriately qualified auditor as per Regulation 34 of GN R982 (2014, as amended).

The EMPr's main purpose is to document general and specific avoidance, mitigation and termination actions in order to address general and project specific impacts as identified by means of the EIA and/or Phase 2 planning process. Implementation of the actions specified in the EMPr can be contractually delegated to various parties involved in the project execution. However, legal compliance with the EA and EMPr remains with the EA holder and cannot be delegated or transferred. It is therefore of utmost importance that WfWetlands ensures that all parties involved are familiar with the contents and requirements of the EMPr as non-conformances can ultimately have legal and financial consequences to primarily the EA holder but also subsequently all other parties involved.

1.3 Auditing of compliance with the EA and EMPr

Compliance auditing has been transformed from a vague requirement under the 2006 and 2010 EIA regulations to a very specific set of actions and outcomes which are to be achieved under the 2014 EIA regulations. An audit report is now also subject to a specified structure and with specific content requirements (Appendix 7 of GN R982), as amended. According to GN R982 Appendix 7 (Section 2) the objectives of an audit report include *inter alia* the following:

a) to report on—

   i. the level of compliance with the conditions of the environmental authorisation and the EMPr, and where applicable, the closure plan; and

   ii. the extent to which the avoidance, management and mitigation measures provided for in the EMPr, and where applicable, the closure plan achieve the objectives and outcomes of the EMPr, and closure plan;

b) identify and assess any new impacts and risks as a result of undertaking the activity;

c) evaluate the effectiveness of the EMPr, and where applicable, the closure plan;

d) identify shortcomings in the EMPr, and where applicable, the closure plan; and

e) identify the need for any changes to the avoidance, management and mitigation measures provided for in the EMPr, and where applicable, the closure plan.

As per Regulation 34, sub-regulation 4 of GN R982, where the findings of the environmental audit report contemplated in sub- regulation (1) of GN R982 indicate:

(a) insufficient mitigation of environmental impacts associated with the undertaking of the activity; or

(b) insufficient levels of compliance with the environmental authorisation or EMPr and, where applicable the closure plan;

the holder must, when submitting the environmental audit report to the competent authority in terms of sub-regulation (1), submit recommendations to amend the EMPr or closure plan in order to rectify the shortcomings identified in the environmental audit report.

When submitting recommendations in terms of sub-regulation (4), such recommendations must have been subjected to a public participation process, which process has been agreed to by the competent authority and was appropriate to bring the proposed amendment of the EMPr and, where applicable the closure plan, to the attention of potential and registered interested and affected parties, including organs of state which have jurisdiction in respect of any aspect of the relevant activity and the competent authority, for approval by the competent authority.

Given the strict and onerous above-mentioned requirements in terms of compliance with the EA and EMPr as well as auditing thereof, it is therefore of utmost importance that the EMPr specifies realistic and auditable avoidance, mitigation and cessation actions which can be applied across a wide range of project in various geographical settings. The approach to the structure and content of this EMPr is discussed in more detail under Section 1.7 below.

1.4 Frequency of compliance auditing

The ECO and Implementing Entity is responsible for ensuring compliance with the EMPr. The ECO shall inspect the site prior to commencement of any construction activity, at least once per month during construction and on completion of construction to establish the level of compliance with this CEMP. At sensitive sites, bi-weekly inspections shall take place as a minimum.

Monthly site audits shall be undertaken by the ECO and a bimonthly Project Inspection Report submitted to the Working for Wetlands Deputy Director: Planning, Monitoring and Evaluation for review prior to the annual Compliance Audit taking place.

The annual Compliance Audit Report shall be submitted to the DEA collating the year's completed checklists. It is the responsibility of the ECO to report any non-compliance, which is not correctly rectified to the DEA.

1.5 Content of an EMPr

Environmental management programmes are intended to be documents which indicate how the mitigation and management measures proposed for a project can be implemented in practice. As such they should be practical, reasonable and feasible. They must also meet the requirements of the legislation (Table 1), in particular regulation 19 (4) of the 2014 EIA regulations (GN R982).

Table 1: Requirements of an EMPr as per Appendix 4 of the 2014 EIA regulations, GN R982 (2014, as amended)

Section	Description	Heading/ section in this EMPr
(a)	details of- (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Report control sheet Annexure E
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Sections 1.1, 1.2 and 1.7
(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 should be avoided, including buffers;	Chapter 6 Annexure C
(d)	a description of the impact management 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;	Chapters 3-5
(f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, including actions to - (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 provisions for rehabilitation, where applicable;	Chapters 4-5
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapters 4-5
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Chapters 4-5
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 2.1; Chapters 4-5
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Section 2.1

Section	Description	Heading/ section in this EMPr
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Chapters 4-5
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Sections 1.3 and 1.4
(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 3.3 and Chapter 6
(n)	any specific information that may be required by the competent authority.	NA

1.6 Relevant legislation, guidelines and other documents

This EMPr should be read in the context of the following documents:

- Constitution of the Republic of South Africa Act (No. 108 of 1996)
- National Environmental Management Act, (No. 107 of 1998, as amended)
- National Environmental Management: Waste Act (No. 59 of 2008)
- National Forest Act (No. 84 of 1998)
- National Water Act (No. 36 of 1998)
- National Heritage Resources Act (No. 25 of 1999)
- Municipal Systems Act (No. 32 of 2000)
- Occupational Health and Safety Act (No. 85 of 1993)

Note that the EMPr is not intended to replace any of the above, but rather augment them. Compliance with the EMPr does not exempt the EA holder, i.e. WfWetlands, from compliance with the legal or management requirements of any other licence or permit issued in terms of the project.

1.7 The EMPr in the context of the WfWetlands programme

As discussed under the previous sections, an EMPr and compliance with the EMPr (including compliance auditing) is specifically and strictly regulated under the 2014 EIA regulations, as amended. The implementation of a standard EMPr across a programme as diverse as WfWetlands does however pose various challenges as a result of the wide variety of interventions, site conditions, types of wetland systems, ecological integrity and complexity and so forth.

As a result the EMPr has been written with the abovementioned challenges in mind. It therefore focuses on the typical activities and impacts related to a WfWetlands project and generic avoidance, mitigation and termination actions. The EMPr is augmented by a site specific Rehabilitation Plan which includes more site specific mitigation measures and requirements where required. It is recommended that

compliance auditing takes into account the specific mitigation measures recommended in the accompanying Rehabilitation Plan for each individual project as well.

- Allowance will also be made throughout the document for minor deviations to allow for site specific scenarios but with the condition that each deviation be approved by the provincial Programme's Provincial Coordinator (PC) and in the case of major deviations by the DEA (also see Annexure B).

2 IMPLEMENTATION OF THE EMPr

The EMPr is ultimately intended to aid in the implementation of specific actions on site in order to ensure that the impacts of a project are avoided or mitigated during the various project implementation phases. A number of role-players are required to actively participate in the implementation of the EMPr with different roles and responsibilities typically assigned to each. The various roles and responsibilities are outlined below.

2.1 Role-players and their functions/responsibilities

2.1.1 DEA

Responsible Entity: DEA	
• DEA (specifically the Legal Authorisations and Compliance Inspectorate) holds the ultimate authority and mandate in terms of ensuring environmental legislation is adhered to.	
Responsibilities	**Duration**
• Investigate reported non-compliances with EAs and EMPrs either as a result of findings by an ECO/auditor, reporting by the EA holder or public complaints. • Enforce compliance and adherence to the EA, EMPr or any other environmental legislation through a number of administrative and legal procedures should it prove that a person or organisation is in contravention of an EA, EMPr or other environmental authorisation.	Project lifespan

2.1.2 The EA holder

Responsible Entity: WfWetlands		
• Holds sole legal liability in terms of ensuring compliance to the EA and EMPr. • Some responsibilities resulting from the EA or EMPr can be delegated or transferred contractually.		
Responsibilities		**Duration**
Contractual	• Ensure that the EA and EMPr is included in the contract documentation for a project in order to ensure that compliance with the EA and EMPr is contractually binding. • Ensure that current standards and specifications forming part of the standard contract documentation allow for or are aligned to the requirements of the EA and EMPr. • Ensure that all PCs and Implementing Entities are familiar with the requirements of the EA and EMPr.	Appointment; Project lifespan

Responsibilities		Duration
Approvals and licences	• Identify, obtain and comply with all other necessary approvals, permits, authorisations and requirements set by the relevant National and Provincial Departments and Local Authority for the construction of engineering interventions for the rehabilitation of wetlands before any site preparation activities are undertaken.	Pre-construction
Record keeping	• Ensure that a proper record keeping system is in place to keep track of proof that copies of the EA and EMPr were issued to the PCs and Implementing Entities.	Pre-construction; Project lifespan

2.1.3 The PC

Responsible Entity: PC		
• The PC shall be responsible for his/her specific province to ensure compliance with the EMPr.		
Responsibilities		**Duration**
Approvals and licences	• Be fully aware of and understand all the requirements of the EA(s) and EMPr(s) issued for projects in his/her province. • Ensure compliance with the EA and implementation of the EMPr. • Ensure that each Implementing Entity receives a copy of the EA and EMPr for distribution to each contractor, with proof of receipt (e.g. a transmittal note or similar). • Ensure that each Implementing Entity fully understands the contents and requirements of the EA and EMPr and the legal and financial consequences of non-compliance.	Pre-construction; Project lifespan
Communication	• Communicate environmental issues associated with the site to the Implementing Entity, including having adequate environmental knowledge in the field of wetland rehabilitation to understand the detailed environmental issues associated with the project.	Pre-construction; Project lifespan
Site management	• Assist with developing a site environmental file and ensuring all documentation is filed correctly. • Assist with site or project specific challenges or problems which might result in a non-conformance with the EA and EMPr. • Provide guidance to Implementing Entities on practical solutions in achieving the outcomes and requirements of the EA and EMPr.	Pre-construction; Project lifespan

Responsibilities		Duration
Environmental training	• Confirm that Environmental Awareness training has been undertaken on all sites prior to construction commencing.	Pre-construction

2.1.4 The ECO

Responsible Entity: ECO		
• The PC shall perform the duties of the ECO via monthly inspections in order to minimise adverse environmental impacts and effects. • Any changes to any environmental management documentation must be reviewed and understood by the ECO. • The ECO has access to the construction site at all times. • Remain appointed until the site has been rehabilitated as specified in the EMPr.		
Responsibilities		**Duration**
Approvals and licences	• Ensure compliance with the EA, EMPr, permits issued and all the environmental legislation. • Be fully knowledgeable with the contents and the conditions of the EA and all amendments. • Be fully knowledgeable with the contents of the latest revision of the EMPr. • Be fully knowledgeable with the contents of all relevant environmental legislation, and ensure compliance with them.	Pre-construction
Communication	• Ensure that the contents of the EMPr are communicated to the Implementing Entity. • Escalate serious or repeat non-conformances to the relevant competent authority (i.e. DEA, DWS, SAHRA, etc.).	Pre-construction; Project lifespan
Site management	• Approve the site layout plan (showing environmental sensitive/ no-go areas). • Ensure that all relevant activities being undertaken on site are within the scope of the EA and within the boundaries of the approved layout plan.	Project lifespan
Environmental training	• Confirm that Environmental Awareness training has been undertaken on all sites prior to construction commencing.	Pre-construction
Method statements	• Ensure that all method statements required are submitted and approved prior to site establishment.	Pre-construction

Responsibilities		Duration
Record keeping	• Keep and maintain a schedule of current site activities including the monitoring of such activities. • Keep copies of all reports submitted to DEA. • Obtain and keep record of all documentation including: environmental authorisation from DEA, EMPr, basic assessment, site layout plan, method statements, all communication detailing changes that may have environmental implications, site inspection checklist, Environmental awareness training attendance register, Environmental incident report, environmental performance certificates (once a project has been completed) photographic records (before, during and after development), records of non-compliance and corrective action taken to remediate, permits, licenses, and authorisations such as waste disposal certificates, hazardous waste landfill site licenses etc. which are required by this facility.	Project lifespan
Audits	• Compile an audit checklist which complies with the requirements of GN R982 Appendix 7 and is able to measure compliance against the EA, EMPr, other relevant permits and contract environmental specifications (where applicable). • Escalate serious or repeat non-conformances to the relevant competent authority (i.e. DEA, DWS, SAHRA, etc.). • Work with the Implementing Entity and relevant stakeholders to resolve any areas of non-compliance with appropriate corrective action. • Assist the Implementing Entity in finding environmentally responsible solutions to problems. • Giving a report back on the environmental issues at the monthly site meetings and other meetings that may be called regarding environmental matters. • Submit final audit report to DEA upon project closure in accordance with the requirements of the EA and EMPr.	Project lifespan; Project closure

2.1.5 The Implementing Entity

Responsible Entity: Implementing Entity
• The Implementing Entity will be acting as the Project Manager and is responsible for complying with the EMPr during the construction phase of the development on a day-to-day basis. • The Implementing Entity will be responsible for any non-compliance with the EMPr and will pay for any remedial work that may result from non-compliance resulting directly from his/her negligence. Failure to comply with the EMPr is addressed in Section 2.2.3.

Responsibilities		Duration
Approvals and licences	• Ensure that a copy of the EMPr, EA and any other applicable permit/licence are available on site.	Pre-construction; Project lifespan
Communication	• Submit all required documentation (e.g. proof of training, method statements, layout plans, and requests for deviations) to the ECO on a timely basis. • Communicate any issues or concerns of the surrounding community regarding the development to the ECO or other responsible party and visa-versa. • Ensure that all materials and equipment required for daily environmental compliance is ordered through the correct channels if such is not available.	Pre-construction; Project lifespan
Site management	• Ensure that appointed contractors, participants and sub-contractors are familiar with the EMPr and that they abide by it. • Monitor and verify on a daily basis that the EMPr and specifications (if applicable) is adhered to at all times and taking the necessary action to ensure compliance is achieved where it is lacking. • Ensure that site demarcation and no-go areas are maintained. • Monitor and verify that environmental impacts as a result of construction activities are kept to a minimum. • Ensure that all materials and equipment required for daily environmental compliance are available on site and ensure that the aforementioned is ordered through the correct channels if such is not available. • Inspect the site and surrounding areas regularly with regard to compliance with the EMPr. • Keep a photographic record of progress on site from an environmental perspective.	Project lifespan
Environmental training	• Provide environmental awareness training for all new personnel coming onto site and filing proof of such training in the Environmental File on site.	Pre-construction
Method Statements	• Ensure compliance with approved Method Statements.	Pre-construction; Project lifespan

Responsibilities		Duration
Record keeping	• Submit all required documentation (e.g. proof of training, method statements, layout plans, and requests for deviations) to the ECO on a timely basis. • File proof of environmental awareness training in the Environmental File kept on site. • Keep and maintain a detailed incident (including spillage of fuels, chemicals, or any other material) and complaints register on site indicating how these issues were addressed, what rehabilitation measures were taken and what preventative measures were implemented to avoid re-occurrence of incidents/complaints. • Ensure that all relevant documentation illustrating or proving environmental compliance are filed on site in the Environmental File for inspection by the ECO or Competent Authority. • Keep a photographic record of progress on site from an environmental perspective.	Project lifespan
Audits	• Complete start-up and site closure checklists on a weekly or monthly basis or as otherwise specified.	Project lifespan

2.2 Record keeping (site related activities)

The development of an EMPr for a project is an important and necessary task that is aimed at assigning responsibilities and mitigation options to a variety of activities. However, it can be an ineffective tool in the absence of auditing or monitoring activities. Auditing or monitoring activities involve the structured observation, measurement, and evaluation of environmental data over a period of time.

2.2.1 Site Environmental File

The Site Environmental File (SEF) is a critical part of compliance record keeping, specifically in terms of proof of activities undertaken on a regular basis on site to ensure compliance with the EA and EMPr. The SEF is further a key component to demonstrate compliance to the ECO or relevant Competent Authority official during a compliance audit. The typical SEF contents should include *inter alia* the following:

1. **Rehabilitation Plan and EMP**

2. **Approvals and licences**
   2.1. EA
   2.2. Section 21(c) and (i) General Authorisation
   2.3. Waste licence (if applicable)
   2.4. Mining permit/licence (e.g. for proof of quarry legitimacy)

3. **Communication**
   3.1. Important correspondence e.g. notice to Competent Authority of commencement of construction
   3.2. Copy of public complaints register

4. Site management
4.1. Approved layout
4.2. Site instructions (or copies thereof)

5. Environmental Training
5.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)

6. Method statements
6.1. Approved method statements

7. Records
7.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)
7.2. Proof of legal/safe waste disposal
7.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)
7.4. Record of water usage (if applicable)
7.5. Log of topsoil samples (if applicable)

8. Audits
8.1. ECO audit reports
8.2. Internal audits/check conducted by the Implementing Entity
8.3. Incident and non-conformance reports

Typical examples of checklists and other types of record keeping are included in Annexure B.

2.2.2 Progress / Site Meetings

Environmental issues shall be put on the agenda as a discussion point during these meetings. The Implementer, or a designated person involved with environmental issues on the project, shall attend the progress and/or site meetings on a regular basis to provide feedback on any outstanding or contentious environmental matter.

2.2.3 Failure to comply with the EA and EMPr

The WfWetlands Programme, as the holder of the Environmental Authorisation, is responsible for ensuring compliance with the conditions by any person acting on their behalf including Implementing Entities. The EA holder must notify the DEA in writing within the period specific in the EA if any condition in the Environmental Authorisation is or cannot be complied with. Upon receiving such notification the DEA (Compliance Directorate) will assess the reported non-conformance and inform the EA holder of further actions and submissions required.

In addition to the above, the ECO may order the Implementing Entity to suspend part or all of the works if, based on the ECO's reasoned opinion, the Implementing Entity has, is in the process of or will cause significant environmental damage and/or cause a non-conformance to the EA and/or EMPr. The ECO shall report this instruction to the WfWetlands' *Deputy Director: Programme Implementation* **within 24 hours** of the instruction being issued. Should the aforementioned suspension of work be as a result of negligence or actions by the Implementing Entity, no extension of time will be granted for such delays and all costs will be borne by the Implementing Entity. Apart from direct non-compliance with the EA or EMPr, the following will be regarded as indirect non-compliance:

- Failure to comply with corrective or other instructions issued by the Implementing Entities, ECO or Competent Authority within a specified time.
- Failure to produce the supporting documentation proving compliance with the EA or EMPr.
- Failure to ensure that sub-contractors appointed by the Implementing Entity comply with the EA and EMPr.

3 PRECONSTRUCTION/PLANNING PHASE

3.1 Compliance with environmental legislation

Ensure relevant approvals from regulatory authorities are obtained, in particular in terms of:

- National Environmental Management Act (No. 107 of 1998) (NEMA), as amended;
- National Water Act (No. 36 of 1998);
- National Environmental Management: Biodiversity Act, 2004 (No. 10 of 2004);
- National Forests Act (No. 84 of 1998);
- National Heritage Resources Act (No. 25 of 1999); and
- Other provincial and local environmental legislation.

3.2 Submission of method statements

- Method Statements must be compiled by the Implementing Entity.
- All Method Statements must be submitted and approved prior to site establishment commencing.
- The content and required actions of the Method Statements must be communicated to site staff through a compulsory environmental induction.
- Approved Method Statements will be dated and signed by all relevant parties (Implementing Entity, ECO, DEA, Engineer).
- Should a Method Statement need to be revised, a formal revision will be issued, signed and dated. The updated Method Statement will be filed in the SEF.
- The submitted Method Statements (see Annexure B) will include but not be limited to:
    - Site division, demarcation and no-go areas (incl. site camp establishment, access, construction working widths).
    - Site clearance and topsoil management.
    - Stockpiling and laydown areas.
    - Solid waste management (general and hazardous, incl. disposal).
    - Hazardous substances storage and management.
    - Contaminated water management and disposal.
    - Cement storage and handling as well as concrete batching.
    - Fuel storage and management.
    - Ablution facilities and eating areas.
    - Dust and noise/nuisance control.
    - Protection of flora, fauna and natural features.
    - Stormwater management and erosion.

- Site de-establishment and rehabilitation.

- The submission of a site layout plan (see Annexure B) by the IE to the ECO for approval is compulsory. The layout plan must indicate all areas of relevance including *inter alia*:
  - The location of the site camp as well as the site camp layout indicating the location of materials storage (general and hazardous), fuel storage, the site office, ablution facilities, vehicle/machinery parking areas.
  - Access to the site camp and intervention sites.
  - Any required stormwater management measures such as diversion berms, cut-off drains, silt fences etc.
  - Stockpiling and laydown areas.
  - Concrete/mortar mixing/batching areas.
  - No-go or sensitive areas.
  - Limit(s) of the construction footprint.

The layout plan must take into consideration the buffer distances and restrictions as specified in the EMPr. Where applicable[22] the IE must make use of multiple layout plans to indicate the location of the abovementioned areas.

3.3 Environmental induction/training

Training and induction forms an integral part of ensuring and maintaining compliance with the EA and EMPr. Every person on site needs to understand the importance of compliance with the EA and EMPr and their specific role(s) in achieving this. Environmental induction and/or training must be specific or relevant to the level of responsibility of the person receiving the training. Environmental training and/or induction shall comply with the following requirements:

- The Implementing Entity and any other staff with management responsibilities (e.g. HSE officer and the foreman) will undergo environmental compliance training prior to construction commencing. The induction/training shall include project specific requirements for compliance with the EA and EMPr and responsibilities assigned to each party.
- Once the Method Statement is approved, a copy of the Method Statement must be circulated and communicated to the responsible parties (see Section 3.2).
- General staff will receive a simplified environmental induction and/or training before the commencement of construction (i.e. site establishment). The induction/training shall address, but not be limited to, basic environmental awareness, basic health and safety awareness, prevention of water, soil, and air pollution, prevention of soil erosion and sedimentation, basic principles of materials handling and storage, fire risks, protection of fauna and flora, removal of invasive alien species (if relevant), emergencies and incident responses, spill response provisions, social responsibility, and administrative and reporting procedures.
- All project personnel shall further be trained in basic wetland awareness, including a basic understanding of the components of wetlands, how wetlands function, the benefits they provide,

[22] Where the “site” covers an extensive area or where a large number of interventions are to be constructed.

why they need to be conserved and used sustainably, and the importance of rehabilitation in contributing to wetland conservation and sustainable use.

- Where work takes place in areas containing dangerous game, especially nature reserves and national parks, participants shall receive training in basic animal behaviour. A person trained in dangerous animal behaviour shall be present and suitably equipped to deal with such threats at all times. Before work commences each day, the site shall be checked for dangerous animals by the trained person. First aid training shall include current treatments for snakebites.
- Provision must be made for quarterly refresher environmental training to be undertaken during the course of the contract. The Implementing Entity shall ensure that all attendees sign an attendance register, and shall provide the Implementer with a copy of the attendance register the day after each course.
- Daily/weekly *Toolbox Talks* should include an environmental topic/issue in addition to a Health and Safety topic/issue.
- Proof (training material, attendance registers, photos) of training and attendance to be filed in SEF.
- Include environmental considerations as an item on the agenda of the monthly site meetings.

4 CONSTRUCTION PHASE

4.1 Compliance with the EA and successful implementation of EMPr, environmental specifications and other permits/licences

Identified impacts: The EA, EMPr and other relevant permits and licences are only of value if the conditions/requirements contained in them are adhered to. As these documents are legal documents, non-conformance in terms of adherence/implementation may constitute an offence and be subject to suspension of the authorisation/permit/licence and possible penalties or fines.

Objective of improved management:

- Continued and consistent compliance with the EA and EMPr as well as environmental specifications and other permits/licences

Specifications:

- The ECO shall be responsible for the implementation of this EMPr for the duration of the construction phase and until rehabilitation is completed.
- The ECO shall have full access to the site at all times.
- Audits[23] undertaken by the ECO shall comply with the requirements of GN R982 (2014, as amended).
- Although the EA/licence/permit holder can transpose contractual liabilities to the Implementing Entity in terms of compliance with the EA, EMPr, Environmental Specification and any other relevant permits/licenses, the EA/licence/permit holder will remain legally liable in terms of compliance.

Table 2: Compliance with the EA and successful implementation of EMPr, environmental specifications and other permits/licences

Management Measure	Detailed Description	Responsibility
Avoidance	• A copy of the EA, EMPr, Environmental Specifications and any other relevant permits/licenses will be kept in the SEF on site. • The Implementing Entity will familiarise himself/herself with the contents and requirements of the EA, EMPr, Environmental Specifications and any other relevant permits/licenses.	Implementing Entity, EA holder, ECO

[23] The ECO is responsible for providing an independent evaluation of compliance with the EMPr and not for enforcement of the conditions of the EMPr. The responsibility of enforcement of the conditions of the EMPr lies with the EA holder.

Management Measure	Detailed Description	Responsibility
	• The Implementing Entity and/or EA holder will not knowingly proceed with any action which might compromise compliance with the EA, EMPr, Environmental Specifications or any other relevant permits/licenses.	
Mitigation	• Should a situation arise where compliance with the EA, EMPr, Environmental Specifications or any other relevant permits/licenses is likely to be compromised/deviated from due to exceptional circumstances or a change in scope of work, the Implementing Entity will notify the ECO immediately. The ECO will assess the type of deviation and its significance and will advise the Implementing Entity whether the deviation requires an amendment to the EA, EMPr, Environmental Specifications or any other relevant permits/licenses.	Implementing Entity, EA holder, ECO
Stop work	• Should a situation arise where there is accidental or intentional non-conformance with the EA, EMPr, Environmental Specification and any other relevant permits/licenses, the ECO may order all work to stop until such non-conformance has been assessed, reported to the relevant authority (if necessary) and appropriately mitigated • A non-conformance will be recorded in writing by the ECO with a description (and photographic evidence where applicable) of the incident/non-conformance. A non-conformance report will contain detailed actions and action dates for each responsible party and will be signed off by the ECO and IE once completed/closed out.	Implementing Entity, EA holder, ECO
Monitoring method and frequency	• Daily/weekly monitoring by Implementing Entity. • Formal monthly audits by ECO.	Implementing Entity, EA holder, ECO
Management outcomes	• Full and continued compliance with the EA, EMPr, Environmental Specifications and any other relevant permits/licenses. • Identification of possible deviations in advance to avoid non-conformances. • Independent and impartial monitoring of compliance by the ECO.	Implementing Entity, EA holder, ECO

4.2 Site establishment

Identified impacts: Site establishment can often have a significant environmental impact in terms of vegetation clearance and/or the construction footprint and therefore needs to be carefully managed. It is also usually during site establishment that the site camp and laydown areas are identified and demarcated. If the aforementioned is not properly planned, it could have several secondary impacts such as water pollution, soil contamination, erosion and excessive dust.

Objective of improved management:

- To avoid excessive disturbance in terms of vegetation clearance and the construction footprint.
- Ensure that activities/facilities/site structures with pollution potential are located outside buffer zones and no-go areas, preferably in already disturbed or transformed areas. Examples include the site camp, material laydown areas, concrete batching plant, ablution facilities etc.
- Ensure that all activities remain within the approved construction footprint.

Specifications:

- Site establishment will not commence until such time that the EA appeal period has passed and will further be subject to the approval of the required method statements by the ECO.
- The wetland boundary shall be demarcated on the site plan and on site.
- Demarcation will be by means of brightly painted/white pegs/poles at least 1.5m in height and placed at regular (10m for linear of on every corner for non-linear) intervals on both sides of the approved construction footprint. **Demarcation shall be maintained for the duration of construction.**
- Danger tape and/or snow/barrier netting shall only be used for health and safety requirements along excavations or high risk areas.
- All areas outside approved and demarcated footprint are to be treated as no-go areas.

Table 3: Specific avoidance, mitigation and cessation management measures related to impacts identified with site establishment

Management Measure	Detailed Description	Responsibility
Avoidance	• The Implementing Entity must prioritise the use of disturbed areas for site camp establishment, laydown areas and stockpile areas. • The site camp shall be clearly demarcated and fenced subsequent to approval of the ECO.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• The site camp, laydown and stockpile areas may not be established within any environmentally sensitive area. Refer to Annexure C for sensitivity and wetland boundary map. • Should an extension/amendment to the construction footprint be required, the Implementing Entity must submit such a request to the ECO for approval prior to extending the construction footprint. • All work will be executed within the approved working area. • Temporary laydown areas will not be used for a period exceeding four (4) weeks and must be approved by the ECO prior to being used. • Temporary laydown areas must be demarcated should it fall outside the approved construction footprint. • The Implementing Entity is to ensure that all staff (e.g. plant operators, general workers) are informed of no-go areas as part of the induction/environmental awareness training.	
Mitigation	• Should the Implementing Entity disturb an area outside the approved footprint, then the Implementing Entity will be held liable to reinstate the impacted area to its original condition. • All temporary footprint areas must be reinstated/rehabilitated at the end of construction.	Implementing Entity
Stop work	• Should the Implementing Entity fail to remain within the approved construction footprint or intentionally/negligently cause damage to a natural feature in a no-go area, the ECO reserves the right to suspend or partially suspend construction via written instruction in order to allow for the assessment, reporting and rectification of the impact. • The aforementioned will be determined by the type and significance of the non-conformance and the risk of it reoccurring should construction proceed.	ECO, Engineer
Monitoring method and frequency	• Daily and weekly monitoring/inspections by the Implementing Entity. • Formal monthly audits by the ECO.	ECO, Implementing Entity

Management Measure	Detailed Description	Responsibility
Management outcomes	• Method Statements are submitted at least 14 days prior to the commencement of site establishment. • Site establishment only commences after approval of the Method Statements. • Already disturbed areas are prioritised for site camp, laydown and stockpile areas. • Construction footprint and vegetation clearance is controlled and kept to a minimum. • Activities are restricted to within the approved construction footprint. • Demarcation remains visible and in place for the duration of construction.	Implementing Entity, EA holder, ECO

4.3 Channels of communication for public complaints

Identified impacts: The construction activities could lead to nuisance impacts and impacts on the adjacent properties. This may result in complaints from the public and/or adjacent landowners

Objectives of improved management:

- To record and address (within a reasonable timeframe) any complaints by the public arising from the construction activities and the impacts thereof.

Specifications: None

Table 4: Specific avoidance, mitigation and cessation management measures related to impacts identified with public complaints

Management Measure	Detailed Description	Responsibility
Avoidance	• The IE must contact the landowner and/or occupier of the land where the construction is to take place at last 10 working days prior to moving onto site. • The IE must confirm the procedure to be followed for access including gates which must remain locked or open. • The Implementing Entity must ensure that the site remains neat and that no littering occurs. • Ensure that the public and adjacent landowners are informed well in advance of any construction activities to take place in the vicinity of their properties. • Where the site is located in a nature reserve/park, the Implementing Entity must familiarise him/herself with the rules and regulations of the reserve/park and where necessary include such information in the environmental induction and training. • Where the site is frequently visited by tourists, the Implementing Entity must ensure that his/her site does not cause a visual or noise disturbance. • Also refer to the Code of Conduct attached under Annexure A.	Implementing Entity
Mitigation	• Provide a contact number of person responsible for the site on the site signage. • Maintain a complaints register on site to allow public complaints to be recorded.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• Verbal complaints must be recorded within 24 hours of being received with a copy provided to the complainant. • Actions to address the complaints must be recorded in writing with sign-off by the ECO once the actions have been completed. • Address all complaints within a reasonable timeframe (24 hours for initial contact and 5 working days to resolve minor issues or complaints). • Ensure that actions are recorded in the SEF and the actions are implemented to avoid the future complaints regarding the same issue.	
Stop work	• Should a complaint relate to an action by the Implementing Entity which can cause/has caused a serious health and safety or environmental impact, the ECO may suspend or partially suspend work via instruction from the Engineer in order to assess the impact/complaint and identify any remedial actions required.	ECO
Monitoring method and frequency	• Reporting of serious complaints within 24 hrs to the ECO. • Address all complaints within a reasonable timeframe (24 hours for initial contact and 5 working days to resolve minor issues or complaints). • Ensure that all complaints are recorded in the complaints registered and that remedial actions are recorded, implemented and maintained. • Daily and weekly monitoring/inspections by the Implementing Entity. • Formal monthly audits by the ECO.	Implementing Entity, ECO
Management outcomes	• The public is timeously informed of construction activities which might impact them. • Contact details of the Implementing Entity is visible on site signage at the site camp. • A register is available at the site camp to record any community/public complaints.	Implementing Entity, ECO

Management Measure	Detailed Description	Responsibility
	• All public complaints are recorded and closed out within a reasonable timeframe (24 hours for initial contact and 5 working days to resolve minor issues or complaints). • Repeat complaints regarding the same matter/issue are avoided.	

4.4 Vegetation clearance

Identified impacts: Various activities that take place during the construction phase require the removal of vegetation, including clearing of the construction footprint for construction activities, site camp establishment, laydown and stockpile areas and access roads.

Objective of improved management:

- To retain natural vegetation in terrestrially sensitive areas.
- To minimise the extent of disturbance of vegetation/habitats on-site.
- Avoid the loss of species of conservation concern.

Specifications:

- Vegetation clearance must be restricted to the approved construction footprint.
- Removal of vegetation must occur at increments and must only be done up to two weeks ahead of actual construction commencing in an area.
- No burning of vegetation will be allowed.
- Where vegetation consists of grasses, bulbs and shrubs, it will be cleared (i.e. complete removal of the vegetation with its root system) as part of the removal of topsoil (i.e. to a maximum depth of 30cm) in order to maximise organic content and the available seedbank in the topsoil.
- Where vegetation consists predominately of reeds, the reeds will be slashed/cut to 30cm in height, measured from ground level, with the remainder of the plant and its root/rhizome system removed with the topsoil layer (i.e. at a maximum depth of 30cm).
- Vegetation/ plant material is not allowed to be disposed of as waste at a landfill site and should be stored for mulching purposes upon completion of the construction works.

Table 5: Specific avoidance, mitigation and cessation management measures related to impacts identified with vegetation clearance

Management Measure	Detailed Description	Responsibility
Avoidance	• Limit vegetation clearance in “sensitive areas” as identified in the BAR and as indicated on the maps under Annexure C. • Prioritise the use of already disturbed and degraded areas for site camps, laydown and stockpiling areas.	Implementing Entity, ECO

Management Measure	Detailed Description	Responsibility
	• Do not remove/clear vegetation outside the approved construction footprint. • Ensure that site demarcation is maintained throughout the construction phase. • Clearly mark shrubs and trees which should not be disturbed/damaged during construction. • Remove/relocate species of conservation concern where possible and practical.	
Mitigation	• Ensure that all temporary footprint areas are rehabilitated at the completion of construction in a specific area. • Ensure that topsoil is removed and conserved in order to ensure successful revegetation/rehabilitation (also see Section 4.5). • Any area disturbed outside the approved construction footprint must be reinstated at the Implementing Entity's cost to the satisfaction of the ECO. • Ensure that sufficient funds are allocated in the BoQ for rehabilitation of temporary footprints.	Implementing Entity, ECO, Engineer
Stop work	• Should the Implementing Entity fail to remain within the approved construction footprint or intentionally/negligently cause damage to a natural feature/vegetation in a no-go area, the ECO reserves the right to suspend or partially suspend construction via instruction from the EA holder in order to allow for the assessment, reporting and rectification of the impact. • The aforementioned will be determined by the type and significance of the non-conformance and the risk of it reoccurring should construction proceed.	ECO, Engineer
Monitoring method and frequency	• Daily and weekly monitoring/inspections by the Implementing Entity. • Formal monthly audits by the ECO.	Implementing Entity, ECO
Management outcomes	• Work is contained to the approved construction footprint. • Site demarcation is maintained for the duration of construction.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• Vegetation clearance is limited in sensitive areas. • No site camps, laydown or stockpile areas in sensitive areas. • Plants of conservation concern are relocated where possible and feasible (with the necessary permits/licences/approvals in place). • Temporary footprint areas are rehabilitated once work in an area has been completed. • Topsoil is removed and managed properly (see Section 4.5 below) to aid in successful rehabilitation.	

4.5 Topsoil management

Identified impacts: Topsoil is an essential component to achieve successful rehabilitation/revegetation of a disturbed area. Poor topsoil management practices such as double handling, compaction, contamination, erosion and failing to control weeds/alien invasive species on stockpiles all contribute to the degradation and loss of topsoil. This in turn compromises the success of rehabilitation or results in additional costs to improve or import topsoil.

Objective of improved management:

- To ensure that topsoil is properly removed and managed during construction in order to enable successful rehabilitation at the completion of construction.

Specifications:

- Topsoil must be removed to a maximum depth of 30cm.
- Where the topsoil layer is shallow or alternating in depth, it must be removed to the maximum depth possible.
- Topsoil removal must occur at increments and will only be done up to two weeks ahead of actual construction commencing in an area.
- Topsoil will be removed with the appropriate equipment i.e. pointed or flat tip shovel/spade and a wheelbarrow.
- Topsoil stockpiles must be stored on level areas to a maximum height of 1.5m. The stockpile areas will be properly planned and will be approved as part of the site demarcation process and will be indicated on the site layout plan.
- Stockpiles will not block access routes or endanger any person or animal.
- The stockpiles must be protected from erosion and contamination by subsoil or imported materials.
- Topsoil will not be driven over or compacted and stockpiles will not be reworked or moved unnecessarily.
- Topsoil stockpiles must be kept free of weeds for the duration of construction until reapplied during rehabilitation.
- Topsoil will only be reapplied after all civil work has been completed in order to avoid compaction.

Working in peat wetlands:

Some of the wetlands identified for priority rehabilitation may occur in soils with a high organic composition, known as peat. These soils hold huge importance globally due to their nature to hold high levels of carbon (known as carbon sequestration). The following considerations should be made for site clearance in peatlands:

- Work shall only be done in periods with low rainfall (Winter rainfall areas - November to March and Summer rainfall areas - May to September).
- No material will be removed from the peatland for construction purposes e.g. boulders, rocks, sand.
- All access to the intervention site in the peatland will be by foot, no vehicles will be allowed in the peatland.
- Where materials need to be transported into the peatland, it will be done by means of wheelbarrows on demarcated walkways lined by wooden planks, geotextile or similar material.
- The Implementing Entity will use only one access path/point per Intervention Point and will not create multiple access paths or points.
- No foreign vegetable matter (e.g. mulch) may be brought into the wetland area (especially from alien species).
- Topsoil shall be removed specifically in the form of sods (20 to 20cm (length) x 20cm (width) x 20cm (depth)):
    - The first sod shall include the roots/rhizome layer (i.e. the rootstalks and their associated nodes/tubers)
    - The sods shall be stored in a wet area, on site, in their original orientation and order.
    - Vegetation can be cut short if it will make it easier to handle the sods.
    - Soil shall be stockpiled according to the different soil layers (i.e. in separate stockpiles) as per the soil profile. Where possible, soils shall be stockpiled as high as possible to retain moisture, but not higher than 0.5m.
    - Stockpiles will be located in a saturated area with shallow surface water immediately adjacent to the Intervention Point. Sods will be placed on the existing vegetation. Where vegetation height exceeds 30cm, the vegetation can be cut and used as mulch/cover layer.
    - The stockpile area will be indicated by means of painted pegs at each corner.
    - Stockpiles shall only be handled twice i.e. during removal and during placement for rehabilitation.
    - Stockpiles shall be covered with 10cm mulch or cloth (geotextile with <0.5cm aperture) to ensure that the moisture content is maintained by restricted evaporation and evapotranspiration.

Table 6: Specific avoidance, mitigation and cessation management measures related to impacts identified regarding topsoil management

Management Measure	Detailed Description	Responsibility
Avoidance	• Ensure topsoil is stockpiled in areas on site where opportunity for compaction and contamination due to other construction activities are limited. • Avoid moving/handling the topsoil more than twice (i.e. restricted to initial stripping and final reapplication). • Ensure weeds and alien invasive species are removed from the stockpiles prior to reaching seed formation stage. • Do not move topsoil between different areas on site i.e. it should be reapplied in the same area that it was removed from.	Implementing Entity
Mitigation	• Remove more than 15cm of topsoil where possible to compensate for areas of shallow/no topsoil as well as topsoil loss due to mismanagement. • Apply mulch to the topsoil if the topsoil quality has been impacted significantly and will compromise the success of revegetation (based on the reasoned opinion of the ECO or wetland specialist). • Enforce a stricter and more frequent weeding/alien invasive removal regime where there was failure to remove weeds/alien invasive species from topsoil stockpiles prior to seed formation stage.	Implementing Entity, ECO, Engineer
Stop work	N/A	
Monitoring method and frequency	• Use of approved site layout to confirm correct location of topsoil stockpiles. • Continuous monitoring during initial topsoil removal/stripping. • Weekly to bi-weekly monitoring of stockpiles for signs of erosion and weeds. • Monthly audits for general topsoil management practices.	Implementing Entity, ECO
Management outcomes	• Topsoil is removed to a minimum depth of 15cm. • Topsoil is not contaminated by other materials.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• There is no compaction of topsoil. • Topsoil is not eroded or washed away. • Handling of topsoil is restricted to initial removal and final reapplication. • The topsoil applied during rehabilitation matches the quality and thickness of topsoil removed during site clearance. • Weeds and alien invasive species on topsoil stockpiles are removed on a regular basis prior to the plants reaching seed formation stage.	

4.6 Materials management (non-hazardous)

Identified impacts:

- Material delivered to areas not approved by the ECO and Engineer e.g. outside the approved construction footprint, on steeply sloped areas, etc.
- Imported materials introduce new alien invasive species to site.
- Materials spilling from vehicles causing a safety or pollution risk.
- Materials are eroded and washed into wetland systems as a result of being stockpiled in areas with concentrated stormwater runoff or on sloped areas.
- Materials are mixed with the underlying natural ground surface causing contamination of soil, excessive quantities of material remaining on site after construction, localised plant die-off, increase in sedimentation etc.
- Wetland systems are impacted and/or polluted due to an insufficient buffer width between site camps, laydown and stockpile areas and water resource.
- Materials susceptible to wind erosion results in a dust nuisance and contamination of surrounding areas.
- Materials are stored on site for extended periods leading to the need for increased storage area due to materials not being used.

Objectives of improved management:

- Ensure material delivery and storage takes place in such a manner that it does not cause pollution or degradation of the surrounding environment.
- Plan material use and delivery in order to ensure that material storage on site does not take place for extended periods of time (i.e. > 4 weeks).
- Minimise the use of intact/undisturbed areas for material stockpiling/storage.
- Minimise exposure of materials to wind and water erosion.
- Ensure that materials are stored on site for the shortest possible period to limit the extent of areas required for storage and stockpiling.

Specifications: None

Table 7: Specific avoidance, mitigation and cessation management measures related to impacts identified with materials management (non-hazardous)

Management Measure	Detailed Description	Responsibility
Avoidance	• It will be the Implementing Entity's responsibility to ensure that delivery drivers/suppliers are aware of the relevant EMPr requirements. • The Implementing Entity shall ensure that materials are sourced from legal and approved sources. If unsure the Implementing Entity will obtain permission from the ECO prior to using a certain material resource. • Imported materials shall be free of weeds, litter and contaminants. • Materials shall be appropriately secured to ensure safe passage between destinations. Loads including, but not limited to, sand, stone chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them spilling from the vehicle during transit. The Implementing Entity shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials. • The Implementing Entity will identify appropriate storage and laydown areas prior to delivery to site. The areas will be approved by the ECO either as part of the required Method Statement or on an *ad hoc* basis. • Open, disturbed areas will be prioritised for stockpiling and laydown areas. • Bulk stockpile areas will be outside the wetland boundary and any other areas prone to seasonal flooding unless otherwise approved by the ECO. • The Implementing Entity will schedule the delivery of materials in such a manner that it does not require excessive periods (>4 weeks) of on-site storage unless otherwise approved by the ECO e.g. where delivery/source distances are excessive. • Minor stockpiles (not covering an area exceeding 4m^2 unless otherwise approved by the ECO) will be allowed next to an Intervention Point for specific use at the Intervention Point. • Minor stockpiles next to intervention sites will be utilised within 2 weeks of the material being stockpiled i.e. it will not be left adjacent to a planned or completed Intervention Point for an excessive period of time.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• Laydown and storage areas where such occurs on vegetation, topsoil or in a wetland shall be on hessian, PVC sheeting or a similar material in order to separate the imported material from the vegetation/topsoil and to ensure easy and proper removal of excess material. • Stockpile heights will be limited to 1.5m where the material is fine (i.e. susceptible to wind erosion) or in areas known to regularly (weekly to fortnightly basis) experience wind speeds exceeding 20km/h. Alternatively, material which can be windblown will be covered with shade cloth, PVC sheeting, hessian or similar suitable material. • Stockpile areas will be flat and not subject to concentrated stormwater runoff or surface water flow. • Materials such as precast pipes and culverts, gabions baskets, MacMat-R, hessian etc. can be placed directly on vegetated areas to avoid the disturbance and clearance of vegetation and topsoil. This will be at the discretion of the ECO based on the merits of avoiding vegetation and topsoil removal.	
Mitigation	• Should material be washed or blown into the surrounding environment, the Implementing Entity will be responsible for the removal/recovery of such material. Whether removal/recovery is required will be determined by the ECO based on the type of material, volume of material and whether the material can be recovered/removed without causing substantial additional degradation of the surrounding environment. • Materials not used at a specific Intervention Point will be removed once the activity requiring the material has been completed e.g. stones for gabions. • Where sand/fill material is legally sourced from a dam, existing borrow pit or similar with clear presence of invasive alien species, the Implementing Entity will allow for a weeding programme at the on-site stockpile area and Intervention Point. The weeding programme will span a winter and summer period consecutively to ensure that introduced invasive alien and weed species are removed prior to seed formation stage. • All remaining/waste material will be removed off-site before or by the end of construction.	Implementing Entity
Stop work	N/A	

Management Measure	Detailed Description	Responsibility
Monitoring method and frequency	• Daily and weekly monitoring/inspections by the Implementing Entity. • Formal monthly audits by the ECO.	Implementing Entity, ECO
Management outcomes	• Imported materials are stored/stockpiled on already disturbed areas within the approved construction footprint. • Material delivery and storage takes place as in such a manner that it does not cause pollution or degradation of the surrounding environment. • Materials are not eroded and/or deposited in the surrounding environment. • Materials are used within four weeks of delivery. • No new or additional alien invasive species are introduced via imported material. Where such are imported, the Implementing Entity implemented a weeding programme spanning at least one winter and one summer i.e. a year. • All imported material is removed from site at the completion of construction.	

4.7 Hazardous chemicals and potential hazardous substances

Identified impacts:

- Includes, but are not limited to: drums of fuel, grease, oil, brake fluid, hydraulic fluid, paint, batteries and herbicides (for alien plant clearing), etc.
- Spills resulting in pollution of nearby aquatic systems and water resources.
- Spills resulting in soil contamination and degradation.
- Fauna and/or (indigenous) flora fatalities/die-off.
- Illegal/improper disposal of materials contaminated with hazardous product/spill.

Objectives of improved management:

- Ensure the controlled and documented management of hazardous chemicals and substances.
- Avoid and minimise spillages through proper storage and dispensing practices.
- Ensure that the appropriate mitigation measures are in place in the event of a spill.
- Ensure that hazardous materials are stored in designated/approved areas away from sensitive receptors/environments.

Specifications:

- The Implementing Entity must supply the ECO with a list of all hazardous materials that would be present on site during the construction period.

Table 8: Specific avoidance, mitigation and cessation management measures related to impacts identified with hazardous materials management

Management Measure	Detailed Description	Responsibility
Avoidance	• All hazardous materials and products must be stored in containers marked as per SANS 10234 requirements i.e. in its original container. • All containers will have lids and stored in a covered and bunded area or in a flammables/hazardous store with a metal drip tray able to contain 110% of the volume of the largest container.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• A register of hazardous materials and products will be kept at the site officer or flammables/hazardous store together with up to date Material Safety Data Sheet (MSDS). • Containers with a volume of more than 20ℓ will have proper dispensing equipment. • Dispensing of hazardous materials into smaller containers or equipment will only occur at the site camp on a lined or impermeable surface. • Hazardous materials and products will only be stored at the site camp.	
Mitigation	• The Implementing Entity must ensure that there is an emergency procedure in place to deal with accidents and incidents (e.g. spills) arising from hazardous substances. • The Implementing Entity must ensure that all personnel on site are properly trained concerning the proper use, handling and disposal of hazardous substances. • The Implementing Entity must report major incidents to the ECO immediately. Any spill incidents must be cleaned up immediately and in according with the emergency procedure	Implementing Entity
Stop work	• Should the Implementing Entity through negligent or wilful action/behaviour cause a significant/major spill or dispose of hazardous materials illegally, the ECO reserves the right to suspend or partially suspend construction via instruction from the EA Holder in order to allow for the assessment, reporting and rectification of the impact. • Depending on the severity of the non-conformance, the ECO will also inform the relevant competent authority to confirm the Implementing Entity's liability to be prosecuted and/or fined.	ECO, EA Holder
Monitoring method and frequency	• Visual inspection. • Immediate response to spillage. • Completion of an incident form for major spillages (>5ℓ). • Reporting of major spills within 24 hrs to the ECO.	Implementing Entity, ECO

Management Measure	Detailed Description	Responsibility
	• Daily and weekly monitoring/inspections by the Implementing Entity. • Formal monthly audits by the ECO.	
Management outcomes	• Hazardous materials are properly managed including recording keeping, storage, dispensing and disposal. • Spillages are avoided and minimised through proper storage and dispensing practices. • All personnel on site are properly trained concerning the proper use, handling and disposal of hazardous substances. • The Implementing Entity has a designated and trained individual on-site to respond to spills on site. • Spillages are removed/cleaned/treated immediately after occurring. • Ensure that the appropriate mitigation measures are in place and implemented in the event of a spill. • Hazardous materials are stored in designated/approved areas away from sensitive receptors/environments. • Spills are reported to the ECO within 24hrs of occurring. • Spilled hazardous product and materials used for clean-up are stored and disposed of as hazardous waste or collected by a registered service provider.	Implementing Entity, ECO

4.8 Contamination of soils and water

Identified impacts: Soil and water can be contaminated or polluted by construction activities via several pathways. In terms of soil contamination, pollution can result in the soil being unsuitable for certain land uses and it can also indirectly contribute to sustained pollution of both surface and groundwater resources. The pollution of water resources can lead to numerous direct and indirect impacts including the following:

- Water becoming unsuitable for certain uses such as human consumption and certain agricultural activities due to a decline in water quality.
- A loss of aquatic biodiversity through a change in species composition and diversity and/or species die-off in reaction to a decline in water quality.
- An increase in alien invasive fauna and flora species as a result of higher tolerance capacity in terms of water quality changes/deterioration.
- Increased costs of treating contaminated water for human consumption.

Objective of improved management:

- To conduct/manage construction activities in such a manner that the contamination of soil and water resources is avoided and/or minimised.

Specifications: None

Table 9: Specific avoidance, mitigation and cessation management measures related to impacts identified regarding contamination of soil and water

Management Measure	Detailed Description	Responsibility
Avoidance	• Ensure that all equipment, machinery and vehicles are in good working order. • No maintenance will take place on site and broken equipment, machinery and vehicles must be removed off-site within 24 hours of the breakdown. • Use drip trays for all stationary or parked equipment, machinery and vehicles showing signs of leakage. • Ensure that substances that pose a risk of water/soil contamination are appropriately stored and disposed of (also refer to Section 4.7). • Site camps are not allowed in a wetland. • Hazardous materials storage areas are not allowed within 100m of watercourses.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• Concrete mixers may only operate on a stable, level site. • Concrete shall be mixed on trays or other suitable lining material to prevent contamination of the soil and/ or waterbodies. • Ensure that minor mixing of concrete and mortar is done on impermeable surfaces or in wheel barrows. • Store chemicals in clearly marked, sealable containers in bunded areas as approved by the ECO. Inspect the containers at regular intervals for any leaks. • Use proper dispensing equipment on containers for hazardous products and store the dispensing equipment in weatherproof containers when not in use. • Ensure that equipment and plant is in proper working condition and do not leak fuel or oil, especially during work in or near watercourses. • Ensure designated staff are trained in the prevention and mitigation of spills. • The construction camp and any major stockpiling or storage areas should be outside any watercourse unless otherwise approved by the ECO. • Stormwater runoff must be diverted around the site camp and stockpile areas (material susceptible to erosion) by means of cut-off berms or trenches to avoid contamination of clean overland runoff. • Stockpiles (topsoil, subsoil and imported materials such as sand and fill material) must be on flat surfaces in areas which are not susceptible to concentrated stormwater runoff or flow. • Ablution facilities must be located outside the boundary of any watercourse unless otherwise approved by the ECO. Workers should not be allowed to urinate or defecate near or in bushes or rivers/streams.	
Mitigation	• All spills to be contained and adequately cleaned-up or treated *in situ.* • Conduct activities with high pollution potential in the low rainfall months.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• Use designated washing areas for all equipment used for concrete work with the necessary mechanisms in place to retain contaminated runoff and allow for the necessary treatment/filtering of polluted water.	
Stop work	• Should a major spill occur (as per Section 4.7), the ECO reserves the right to suspend or partially suspend construction via instruction from the EA Holder in order to allow for the assessment, reporting and rectification of the impact. • Depending on the severity of the non-conformance and degree of negligence on the Implementing Entity's part, the ECO will also inform the relevant competent authority to confirm the Implementing Entity's liability to be prosecuted and/or fined.	ECO, EA Holder
Monitoring method and frequency	• Daily visual inspection of equipment, vehicles and machinery for signs of leaks. • Immediate response to spillage of product or material with pollution potential. • Completion of an incident form for major spillages (>5ℓ). • Reporting of major spills within 24 hrs to the ECO. • Daily and weekly monitoring/inspections by the Implementing Entity. • Formal monthly audits by the ECO.	Implementing Entity, ECO
Management outcomes	• All activities and materials with a notable pollution potential or located away from any watercourse unless otherwise approved by the ECO. • All the necessary pollution prevention measures are in place. • Plant is in good and working condition with leaks repaired immediately or the plant removed from site where more extensive repairs are required. • All hazardous products/materials are handled/managed correctly as per Section 4.7. • All hazardous liquid product spills are cleaned/treated/removed immediately as per procedure under Section 4.7.	Implementing Entity

4.9 Concrete mixing and cement handling

Identified impacts: Concrete batching/mixing operations can have several impacts, most notably soil and water pollution (increase in pH, TSS, TDS and minor levels of Aluminium, Iron and Magnesium oxides) as a result of cement laden runoff not being properly contained or purposeful discharge of cement laden runoff. Poor cement handling, storage and disposal practices can also contribute to the aforementioned impacts. Hardened concrete is however stable and inert as a waste.

Objective of improved management:

- Ensure proper cement handling, storage and disposal, avoiding discharge or disposal into the environment.
- Ensure that cement laden water/runoff from concrete/mortar mixing and application activities is collected and retained on site to allow for reuse in construction activities, avoiding discharge into the environment.

Specifications:

- A concrete batching plant/portable mixer will not be allowed to operate until a temporary washwater and runoff containment system has been constructed/established.

Table 10: Specific avoidance, mitigation and cessation management measures related to impacts identified in terms of concrete batching and cement handling

Management Measure	Detailed Description	Responsibility

Avoidance	• Where concrete is mixed in bulk (i.e. portable concrete mixer), the following will apply:
	  ○ The mixer will be placed on a level, surfaced/lined area.
	  ○ Bulk mixing will not occur in the wetland unless the distance from the wetland boundary to the Intervention Point necessitates *in situ* mixing. This must be approved in all instance by the PC/ECO prior to the commencement of bulk mixing concrete.
	• Cement storage will be in a closed container.
	• Waste or contaminated cement powder will be stored in a marked container with a lid until disposal or reuse.
	• Cement bags must be emptied properly and stored in a weatherproof container until disposal.
		Implementing Entity, ECO

Management Measure	Detailed Description	Responsibility
	• Minor concrete and mortar mixing will be done on an impermeable surface such as a wooden board, wheelbarrow, metal tray etc.	
Mitigation	• Equipment and containers used for minor concrete/mortar work and mixing will be washed in a designated container and the contents disposed of in the settling system at the concrete batching plant. Washwater can alternatively be reused in concrete/mortar mixing or application, but may not be disposed of onto the ground surface or into a water resource. • Concrete (not cement) spills will be allowed to harden and removed within 2 days for reuse or disposal as a Type 4 waste to a Class D landfill.	Implementing Entity
Stop work	• Mismanagement of waste concrete and/or cement laden runoff can result in the suspension of bulk concrete mixing activities via instruction from the ECO until non-conformances have been rectified to the ECO's satisfaction.	Implementing Entity, ECO, Engineer
Monitoring method and frequency	• Daily visual inspection of areas where concrete/mortar work is taking place (Foreman). • Weekly inspection of settling system at batching plant (Foreman). • Reporting of major spills within 24 hrs to the ECO. • Formal monthly audits by the ECO.	Implementing Entity, ECO
Management outcomes	• Cement laden runoff is contained to site in an appropriately sized settling system. • Cement product is properly handled and stored and does not result in pollution of soil or water resources. • No equipment or plant used for concrete/mortar mixing or application is washed in a watercourse. • The settling system at the batching plant/portable mixer is maintained and does not overflow. • Waste concrete is removed within 2 days and reused or disposed of as inert waste.	Implementing Entity

4.10 Stormwater management, erosion and sedimentation

Identified impacts: The clearance of vegetation and earthworks associated with construction usually results in an increase in stormwater runoff volume and velocity. This in turn results in an increase in erosion and sedimentation, impacting both terrestrial and aquatic systems. Temporary structures, stockpiles and access roads can also further contribute to a concentration of runoff and resultant increase in erosion and sedimentation on site.

Objective of improved management:

- To avoid and mitigate the increase in stormwater volumes and velocity, thereby reducing erosion and sedimentation on site.

Specifications: None

Table 11: Specific avoidance, mitigation and cessation management measures related to impacts identified in terms of stormwater management, erosion and sedimentation

Management Measure	Detailed Description	Responsibility
Avoidance	• Vegetation and topsoil clearance will occur at increments and will only be done up to two weeks ahead of actual construction (i.e. excavation) commencing in an area. • Material (excavated and imported) stockpiles will not be located in areas of concentrated runoff/flow.	Implementing Entity
Mitigation	• Stormwater generated on the cleared construction footprint will be allowed to discharge into the surrounding vegetation at regular intervals and will not be allowed to collect and concentrate in large volumes or discharge at high velocities. • Disturbed areas must be rehabilitated as soon as possible after construction has been completed in order to stabilise exposed surfaces which are susceptible to erosion. • Implement temporary stormwater management and erosion prevention measures in areas with high erosion potential (in consultation with the ECO).	Implementing Entity
Stop work	N/A	

Management Measure	Detailed Description	Responsibility
Monitoring method and frequency	• *Ad hoc* visual inspections of site by the Implementing Entity after rainfall exceeding 15mm per day. • Formal monthly audits by the ECO.	Implementing Entity, ECO
Management outcomes	• Exposed ground surfaces are limited and rehabilitated immediately after completion of construction activities in an area. • Stormwater runoff is dissipated and allowed to discharge at regular intervals. • Erodible stockpiles are located outside areas of stormwater concentration. • The construction site does not contribute notably to erosion on-site and in the immediate vicinity of the site. • Erosion is detected/identified and addressed/mitigated within 14 days of occurring. • Temporary stormwater management and erosion prevention measures are implemented in areas with high erosion potential of signs of extensive erosion occurring.	Implementing Entity, ECO

4.11 Dust nuisance

Identified impacts: Construction activities will typically lead to dust generation and general exhaust emissions from vehicles and construction plant. Given the limited extent of vegetation clearance and low number of vehicles and construction plant used on a typical WfWetlands site, dust generation is expected to generally be minimal and restricted to mostly a nuisance impact.

Objective of improved management:

- To limit the generation of dust and where needed mitigate dust nuisance.

Specifications:

- Watering for dust suppression purposes is only recommended in instances where dust will create a significant health and/or safety hazard.

Table 12: Specific avoidance, mitigation and cessation management measures related to impacts identified regarding dust nuisance

Management Measure	Detailed Description	Responsibility
Avoidance	• As far as possible stockpile materials which are prone to become airborne away from areas where dust will be a nuisance or a hazard. • Limit the height of stockpiles which could cause a dust nuisance to 1m. • Where the abovementioned cannot be achieved, cover stockpiles consisting mostly of fine material with shade cloth, hessian or a similar acceptable cover. • Limit earthworks in during windy conditions (i.e. winds above 40 km/h). • Limit vehicle travelling speeds on unsurfaced roads to 40 km/h.	Implementing Entity
Mitigation	• Where dust poses a notable health and/or safety hazard, implement a watering schedule to address the particular area of concern. • Ensure that a watering schedule is maintained over weekends and holidays where a dust nuisance could pose a health and/or safety hazard to the public using the road. • Record and address any public/community complaints regarding dust generation in the Complaints Register.	Implementing Entity

Management Measure	Detailed Description	Responsibility
Stop work	• Work causing excessive dust will be halted at wind speeds exceeding 40km/h. • Where dust generation leads to/results in a complaint by the public or landowner, the ECO reserves the right to suspend or partially suspend work on site until the source of dust is identified and mitigation measures implemented.	Implementing Entity, ECO
Monitoring method and frequency	• Daily visual monitoring. • Recording of public complaints regarding dust generation in Complaints Register.	Implementing Entity
Management outcomes	• The dustfall rate as specified under regulation 3 of GN R827 (National Environmental Management: Air Quality Act (No. 39 of 2004) - National Dust Control Regulations, 2013) is not exceeded. • Stockpiles which could cause a dust nuisance are limited to 1m in height or covered with a suitable material. • No public complaints are received regarding dust nuisance and/or health and safety hazard. • Where required, a watering schedule is implemented where required i.e. where dust causes a health and/or safety hazard. • Alternative dust binding products are used where long-term watering (> 4 weeks) over an extensive area (>1ha) is required. • Vehicle travelling speed is limited to 40km/h on unsurfaced roads.	Implementing Entity, ECO

4.12 Noise nuisance

Identified impacts: Typical construction activities can lead to excessive noise which could cause a disturbance or nuisance to neighbouring land uses/receptors. Typical construction related noise which would usually be regarded as permissible in urban areas might also be regarded as a disturbance in areas such as nature reserves or on farms.

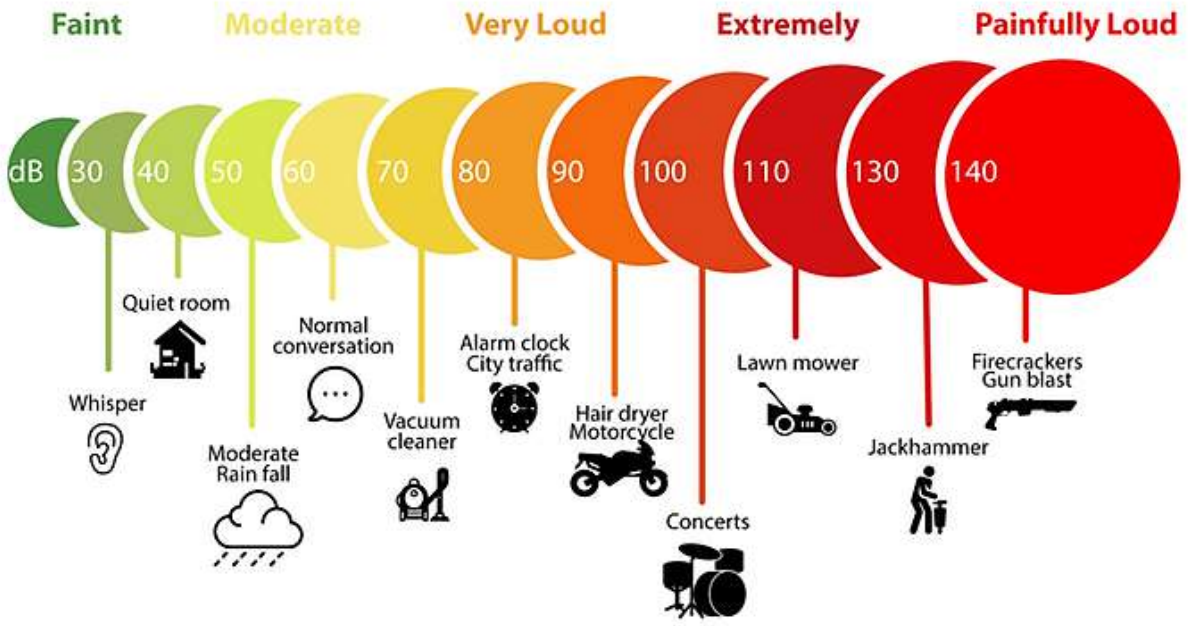

Figure 1: Example of typical everyday noises and related dB values[24]

Objective of improved management:

- Manage the level and duration of excessive noise generated as a result of construction activities and avoid resultant public complaints. Also ensure that sensitive receptors are notified in advance where excessive noise cannot be avoided for a certain period of time or activity.

Specifications: None

[24] http://ototronixdiagnostics.com/images/decibelthermometer-horizontal.jpg

Table 13: Specific avoidance, mitigation and cessation management measures related to impacts identified regarding noise nuisance

Management Measure	Detailed Description	Responsibility
Avoidance	• Fit silencers to equipment as required. • Ensure equipment and vehicles are properly maintained and in working order. • The Implementing Entity shall limit noise levels (e.g. install and maintain silencers on machinery). The provisions of SANS 1200A Sub-clause 4.1 regarding "built-up areas" shall apply to all areas within audible distance of residents whether in urban, peri-urban or rural areas. • Appropriate directional and intensity settings are to be maintained on all hooters and sirens.	Implementing Entity
Mitigation	• Limit working hours with noisy equipment to weekdays between 07H00 and 18H00. • Inform sensitive receptors in advance of construction activities. • Construction activities generating output levels of 50dB (A) or more, in peri-urban areas, shall be confined to the hour's 08h00 to 17h00 Mondays to Saturdays. • Record and address any public/community complaints regarding noise generation in the Complaints Register. • Request formal approval of extension of working hours by the ECO prior to implementing extended hours or working over weekends.	Implementing Entity, ECO
Stop work	N/A	
Monitoring method and frequency	• Daily monitoring (by means of a dB meter application on a cell phone) should any laud activities take place. • Recording of public complaints regarding noise generation in Complaints Register.	Implementing Entity

Management Measure	Detailed Description	Responsibility
Management outcomes	• Compliance with the Environment Conservation Act (No. 73 of 1989): Regulations in terms of Section 25 - Noise Control (GN R154, 1992)[25]. • No public complaints are received regarding noise generation and/or health and safety hazard.	Implementing Entity, ECO

[25] Please note: These regulations have been repealed in Gauteng by Gen N 5479 / PG 75 / 19990820; in the Free State by Gen N 24 / PG 35 / 19980424 and in the Western Cape by RN 627 / PG 5309 / 19981120. Proposed Noise Control Regulations have been published for Eastern Cape under Gen N 181 / PG 824 / 20011210. Please also note that various municipalities have their own By-Laws regarding noise control.

4.13 Ablution

Identified impacts: A lack of proper and well placed ablution facilities can result in poor working conditions, health risks as well as environmental pollution.

Objective of improved management:

- To provide sanitary working conditions and avoid heath risks and environmental pollution as a result of a lack of ablution facilities.

Specifications: None

Table 14: Specific avoidance, mitigation and cessation management measures related to impacts identified in terms of ablution

Management Measure	Detailed Description	Responsibility
Avoidance	• Prior to construction commencing the Implementing Entity must provide sanitation for Contractors at a ratio of one (1) toilet for every 15 workers. • Toilets should preferably be located outside the wetland boundary and must be approved by the ECO. • Toilets shall be placed on level surfaces and secured to the ground outside areas susceptible to potential flooding. • The Implementing Entity shall supply toilet paper at all toilets at all times. The Implementing Entity shall ensure that the workers make use of the toilets provided. • The Implementing Entity shall be responsible for the cleaning, maintenance and servicing of the toilets. • The Implementing Entity shall ensure that the toilets are protected from vandals. No litter or general waste shall be placed in the toilets. • Upon completion of the contract, the pit latrines shall be filled in and all structures shall be removed from site. • Washing areas with soap and sufficient clean water shall be provided for hand washing after use of ablutions.	Implementing Entity
Mitigation	N/A	
Stop work	N/A	

Management Measure	Detailed Description	Responsibility
Monitoring method and frequency	• Daily inspection (by the Implementing Entity) to allow for timely removal/servicing of the ablution facilities. • Monthly compliance audits (including checking of disposal slips where relevant) by the ECO.	Implementing Entity, ECO
Management outcomes	• A sufficient number of ablution facilities is provided at locations approved by the ECO. • Toilets are placed on level areas and secured to the ground. • Toilets are provided at a ratio of one (1) toilet for every 15 workers.	Implementing Entity

4.14 Waste management

Identified impacts: The construction phase will produce typical construction waste such as general waste, waste containers, cement bags, off-cuts etc. The volumes of waste to be generated on a typical WfWetlands site are expected to be low.

Objective of improved management:

- To prevent general littering and to ensure that waste is correctly stored on-site and disposed of off-site. Licenced waste disposal facilities (landfill, transfer, recycling) can be found using the search function at the following link http://sawic.environment.gov.za/?menu=88.

Specifications: None

Table 15: Specific avoidance, mitigation and cessation management measures related to impacts identified in terms of waste management

Management Measure	Detailed Description	Responsibility
Avoidance	• Waste will not be buried or burned on site. • The quantity of materials and product brought to site will not be in notable excess of what is required for construction. • Waste from other construction sites where the Implementing Entity is working will not be brought onto site or stored on site. • Waste storage facilities will outside the wetland boundary or other sensitive areas. • Waste storage facilities and containers will be weather and scavenger proof with sufficient capacity to avoid waste accumulating outside of the facility or containers. • The Implementing Entity shall ensure that general and inert waste does not become contaminated by hazardous waste thereby generating larger volumes of hazardous waste requiring disposal at a Class A landfill.	Implementing Entity
Mitigation	• The Implementing Entity shall, in conjunction with the ECO, designate restricted areas for eating. The feeding, or leaving of food, for stray or other animals in the area is strictly prohibited.	Implementing Entity

Management Measure	Detailed Description	Responsibility

	• Waste generated on site will be collected and transported to the waste storage area at the site camp on a daily basis.
	• Each foreman will do a daily inspection/walkthrough of his area and ensure that it is litter free.
	• Waste storage areas will be restricted to the site camp.
	• Hazardous and general waste will be separated and designated and marked bins/containers provided for each.
	• In the case of skippy bins being used, the bins will be covered with secured shade cloth or other cover approved by the ECO. Skippy bins are only allowed for storage of inert waste such as wood off-cuts, hardened concrete etc.
	• Waste transport will be by means of an appropriate vehicle with containers and/or bags secured and covered to prevent waste being blown from the vehicle during transport.
	• Used oil will be collected and taken to or collected by a registered oil recycling company.
	• Other hazardous waste as per Schedule 3 of NEM:WA and Annexure 1 of GN R634 (2013) will be disposed of at a Class A landfill or collected by an approved service provider. Proof of safe transfer/disposal will be filed in the SEF.
	• Waste disposal restrictions as per GN R636 (2013) shall apply. Of specific relevance is:
	  ○ Lead acid batteries, corrosive or oxidizing products.
	  ○ Waste which is flammable with a flash point lower than 61°C.
	  ○ Waste compressed gases.
	  ○ Re-usable, recoverable or recyclable used lubricating mineral oils, as well as oil filters, but excluding other oil containing wastes.
	  ○ Re-usable, recoverable or recyclable used or spent solvents.	

Management Measure	Detailed Description	Responsibility
	○ Lamps. ○ Tyres (whole or quartered). ○ Liquid waste or waste with a moisture content of >40%.	
Stop work	N/A	
Monitoring method and frequency	• Daily inspection of working area for any litter/waste. • Weekly checking of waste storage area to ensure timeous removal of waste off-site prior to storage areas becoming overfull. • Proof of safe disposal filed in Environmental File and audited monthly by ECO.	Implementing Entity, ECO
Management outcomes	• No waste disposed of or burned on site. • No visible littering. • Waste transport does not result in waste being blown from the vehicle along the route. • Appropriate and separate storage of different types of waste in approved locations. • Proper record keeping of hazardous waste generated and safe and legal disposal thereof.	Implementing Entity

4.15 Removal of alien invasive species

Identified impacts: The WfWetlands programme often involves the removal of alien invasive species as part of an intervention(s) to improve wetland functioning. The method for removal is usually specified in the aforementioned situation. A construction site, due to its inherent disruptive nature, does however also lead to conditions ideal for the establishment of weeds/pioneer species and alien invasive species (hereafter collectively referred to as "weeds") which could compromise the habitat integrity and ecological functioning of the wetland system as well as downstream systems. It is therefore important to implement strict control measures to ensure that alien invasive species are not introduced into a system or/and are not allowed to dominate an area post-construction.

Objective of improved management:

- No new alien invasive/pioneer species are introduced into the wetland system and catchment.
- Emerging weeds are removed prior to seed formation stage.

Specifications:

- Where project activities include the eradication of invasive alien plants, Working for Water guidelines and policies shall be adhered to.
- Weeds will be removed prior to reaching seed formation stage.
- Prior to construction, the Implementing Entity shall ensure that invasive alien vegetation is cleared from the entire site in accordance to the applicable Working for Water guidelines and policies. Follow up clearing may be necessary if the species re-establish following the initial clearing.
- Species that are declared invasive species (according to NEMBA's Alien and Invasive Species Regulations, 2014 (GN R598)) must be recorded and polygons of the affected area must be submitted to the Working for Water national alien invasive plant database.
- The Alien and Invasive Species Lists 2016 (GN 864) will apply when identifying species which require removal/eradication.
- No trees within the environmentally sensitive areas may be removed, whether alien species or not, unless permitted by the ECO.
- Other alien species (non-listed) occurring on site may not be used in the landscaping and should be removed from site where possible.
- Where an individual or group of an invasive alien specimens/plants has potential cultural or heritage value e.g. a blue gum lane, tree at a grave site, the landowner and/or community will be consulted prior to the removal of the specimen(s). The aforementioned might also be protected under the NHRA, in which case removal might not be allowed.

Table 16: Specific avoidance, mitigation and cessation management measures related to the removal of Alien Invasive/pioneer species

Management Measure	Detailed Description	Responsibility
Avoidance	• Imported material shall be free of weeds. • Stockpiles (topsoil and subsoil) will be checked for emerging weeds on a fortnightly basis. • Topsoil sourced from areas with notable weeds infestation will not be used in other areas for rehabilitation or fill purposes.	Implementing Entity
Mitigation	• Where sand/fill material is legally sourced from a dam, existing borrow pit or similar with clear presence of invasive alien species, the Implementing Entity will allow for a weeding programme at the on-site stockpile area and Intervention Point.	Implementing Entity
Stop work	N/A	
Monitoring method and frequency	• Fortnightly inspections of disturbed/cleared areas and stockpiles for signs of emerging weeds. • Monthly audit/visual inspection by ECO.	ECO
Management outcomes	• Construction activities are restricted to the approved construction footprint. • The Implementing Entity's activities does not lead to the negligent or wilful damage to a natural feature.	Implementing Entity

4.16 Impact on fauna

Identified impacts: Typical construction activities could lead to fatalities of small fauna e.g. birds, reptiles, rodents through direct impact and the destruction of habitat. The proposed project will however be limited to the road reserve which is already completely transformed and subject to daily traffic. The upgrade/replacement of culverts and bridges might result in the destruction of a number bird nests attached to the structures.

Objective of improved management:

- Protect fauna in the study area, preserve the ecological functioning along the development footprint as much as is possible.

Specifications: None

Table 17: Specific avoidance, mitigation and cessation management measures related to impacts on fauna

Management Measure	Detailed Description	Responsibility
Avoidance	• Do a site walkthrough prior to construction commencing to remove any slow moving animals and to identify nesting sites, burrows etc. • Demarcate nesting sites which should be avoided as no-go areas by means of painted pegs. • Avoid disturbance of burrows, nests etc. where possible. • Create awareness of conservation of fauna during environmental induction and toolbox talks. • Fauna may not be captured, poisoned, trapped or killed. • Do not feed wildlife. • Where working in a nature reserve with potentially dangerous animals present, ensure that the team is accompanied by a suitably qualified game ranger at all times. • A speed limit of 20 km/h in nature reserves will apply unless otherwise indicated by the reserve road signage. • Inspect excavations for trapped animals prior to work commencing each day. • Do not use pesticides on site.	Implementing Entity

Management Measure	Detailed Description	Responsibility
	• Do not burn vegetation. • Store waste in weather and scavenger proof bins to avoid ingestion of waste by wildlife.	
Mitigation	• Limit the construction footprint. • Reinstate temporary footprints after construction has been completed. • Report any animal fatalities of significance to the ECO and relevant reserve management (where applicable) and identify measures to avoid reoccurrence.	Implementing Entity, ECO
Stop work	N/A	
Monitoring method and frequency	• Daily inspections of trenches and excavations prior to construction commencing. • Weekly inspections of demarcated no-go areas. • Recording of incidents and near misses (e.g. vehicle-antelope collision) in the site diary and at site meetings. • Disciplinary action against any construction staff guilty of purposefully capturing, poisoning, trapping or killing wildlife.	Implementing Entity
Management outcomes	• No unnecessary fauna fatalities. • Limited habitat disturbance and reinstatement of temporary construction footprints.	Implementing Entity

4.17 Protection of natural features

Identified impacts: Construction activities could result in damage to natural features such as rock outcrops and exposed rock faces/cliffs. The project is not located in an area associated with rock paintings, caves, waterfalls, trees of historical or cultural significance etc. and the risk of damage to natural features is generally considered low.

Objective of improved management:

- No damage to natural features due to negligent or purposeful action during construction.

Specifications:

- Demarcation will be by means of brightly painted/white pegs/poles at least 1.5m in height and placed at regular (10m for linear of on every corner for non-linear) intervals on both sides of the approved construction footprint.
- Danger tape and/or snow/barrier netting shall only be used for health and safety requirements along excavations or high risk areas.
- All temporary barriers and signage must be removed and the site restored on completion of the project.

Table 18: Specific avoidance, mitigation and cessation management measures related to impacts on natural features

Management Measure	Detailed Description	Responsibility
Avoidance	• Construction activities shall be restricted to the approved construction footprint. • Sensitive or no-go areas in close proximity (<100m) to the construction site will be demarcated with painted pegs and marked as no-go areas. • The Implementing Entity shall not deface, paint, damage or mark any natural features (e.g. trees or rock formations) situated in or around the site for survey or other purposes unless agreed beforehand with the ECO and Engineer.	Implementing Entity
Mitigation	• Any features affected by the Implementing Entity as a result of negligence or wilful conduct shall be restored/ rehabilitated to the satisfaction of the ECO and/or relevant competent authority.	Implementing Entity
Stop work	N/A	

Management Measure	Detailed Description	Responsibility
Monitoring method and frequency	• Monthly audit/visual inspection by ECO.	ECO
Management outcomes	• Construction activities are restricted to the approved construction footprint. • The Implementing Entity's activities does not lead to the negligent or wilful damage to a natural feature.	Implementing Entity

4.18 Protection of heritage resources (including palaeontological objects)

Identified impacts: The nature and location of typical WfWetlands interventions seldom have the potential to cause the destruction or lead to the discovery of palaeontological objects such as fossils. An exception is peat wetlands which can contain fossils at usually substantial depth. Heritage resources are identified during the EIA phase and indicated as no-go areas. There is however still the opportunity for the discovery or damage to new objects during the construction phase.

Objective of improved management:

- To avoid damage to known heritage objects and to ensure a protocol is in place in the case of discovery of an unknown heritage or palaeontological object.

Specifications: None

Table 19: Specific avoidance, mitigation and cessation management measures related to impacts on heritage resources (including palaeontological objects)

Management Measure	Detailed Description	Responsibility
Avoidance	• The Implementing Entity shall avoid all “no-go” areas as identified during the EIA. • General staff awareness training in terms of the protection and conservation of heritage resources during the environmental induction and toolbox talks.	Implementing Entity
Mitigation	• Should any cultural, archaeological or palaeontological artefacts/objects or evidence be discovered at any stage during construction, the Implementing Entity will cease work in the vicinity of the artefact/object and inform the ECO who will in turn inform the relevant specialists and authorities. • Site staff is not allowed to collect or keep on artefact or object of cultural, archaeological or palaeontological significance.	Implementing Entity, ECO, Specialist
Stop work	• Should any cultural, archaeological or palaeontological artefacts/objects or evidence be discovered, partial suspension of construction activities in the immediate vicinity of the object might need to be required until the object can be evaluated and/or removed.	Implementing Entity, ECO, Specialist

Management Measure	Detailed Description	Responsibility
Monitoring method and frequency	• Continuous during construction. • Monthly audit by ECO in terms of no-go areas being maintained.	Implementing Entity
Management outcomes	• No-go areas (i.e. all areas outside the approved construction footprint) are treated as no-go areas with no disturbance of heritage/cultural objects on private land adjacent to the construction site. • Proper procedure followed should any object or artefact be discovered during construction.	Implementing Entity

4.19 Visual impact

Identified impacts: The nature of a typical WfWetlands project is seldom such that it causes significant visual disturbance, with the visual impact of the operational outcome usually being positive. Construction activities can however lead to temporary and permanent landscape scarring and impacts, which can be excessive if not controlled and mitigated properly.

Objective of improved management: Ensure that visual impacts caused by landscape scarring are minimised through proper planning and mitigated through successful rehabilitation.

Specifications: None

Table 20: Specific avoidance, mitigation and cessation management measures related to visual impacts

Management Measure	Detailed Description	Responsibility
Avoidance	• Avoid excessive vegetation clearance. • Ensure construction remains within the approved construction footprint. • Do not paint or deface any natural feature.	EAP, ECO, Implementing Entity
Mitigation	• Ensure that materials used for construction limits visual impacts e.g. use natural colours where possible. • Ensure that the site remains neat and tidy with no littering etc. • Use shade cloth or construction cordon in areas specifically sensitive to visual disturbances e.g. areas frequented by tourists or the public. • Record and address community complaints as per procedure specified under Section 4.3. • Ensure rehabilitation is successful as specified under Section **5**.	Implementing Entity
Stop work	N/A	
Monitoring method and frequency	As specified for rehabilitation under Section **5**.	ECO

Management Measure	Detailed Description	Responsibility
Management outcomes	• Visual impacts are minimised and managed. • The extent of disturbance is minimised and limited to the approved construction footprint. • The extent of intervention infrastructure remaining bare i.e. no vegetated is limited as best as possible. • Rehabilitation meets the requirements and targets as per Section **5**.	Implementing Entity, ECO

5 REHABILITATION PHASE

Identified impacts: Poor rehabilitation can often lead to secondary impacts such as erosion, an increase in alien invasive species, decreased biodiversity, decreased habitat connectivity, poor ecological integrity and functioning and so forth. Given the core focus of the WfWetlands programme, successful rehabilitation is also a key factor, but should entail more than the functioning of an intervention with focus on ensuring that the permanent footprint of the construction site and actual structure is minimal.

Objective of improved management:

- To ensure that construction footprints are rehabilitated and that site rehabilitation is undertaken in such a manner that the permanent footprint of the construction site of the Intervention Point is minimal.

Specifications:

- All working areas shall be rehabilitated once work has been completed and before the team leaves the site. This includes closure and rehabilitation of temporary access routes.
- All foreign material not utilised in the rehabilitation activities shall be removed from the site.
- Re-vegetation of all exposed soils, and measures to address any potential erosion risk shall be done before the team leaves the site.
- Where project activities include the eradication of invasive alien plants, Working for Water guidelines and policies shall be adhered to.
- All rehabilitated areas shall be considered “no-go” areas upon completion and the Implementing Entity shall ensure that none of his staff or equipment enters these areas.
- Specific Site Rehabilitation measures have been included in the project specific Rehabilitation Plans and shall be referred to for site closure. Due notice of the conditions of Environmental Authorisation and requirements of the General Authorisation for water uses (Annexure B) must be complied with.
- Specifically, on the completion of the construction activities:
    - All disturbed areas must be re-vegetated with local indigenous vegetation suitable to the area.
    - An active campaign for controlling new exotic and alien vegetation must be implemented within the disturbed areas.
    - Structures must be inspected after a major rain event (i.e. more than 50mm rainfall) or annually for the accumulation of debris, blockages, instabilities and erosion with concomitant remedial and maintenance actions.

Table 21: Specific avoidance, mitigation measures related to rehabilitation of the project footprint

Management Measure	Detailed Description	Responsibility
Avoidance	• Manage site demarcation and vegetation clearance as per Sections 4.2, 4.4 and 4.5 respectively. • Ensure that sufficient topsoil is available through proper removal, stockpiling and maintenance procedures as specified under Section 4.5.	Implementing Entity
Mitigation	**General:** • All waste will be collected and removed (also look beyond immediate working area for any waste which might have been blown into the surrounding area). • All spoil and excess material must be removed material. • All spills and waste concrete must be removed. • All temporary markings and site demarcation must be removed. • All temporary construction signage must be removed. • Where temporary access roads cut across contours, diversion berms will be constructed at 30m intervals to avoid erosion and concentration of runoff prior to vegetation establishing. Mulching shall be applied to the decommissioned temporary access road. **Shaping and revegetation:** • Material will be backfilled in the order on which it was removed. • Compacted soil shall be scarified prior to topsoil and seed application. • Topsoil shall be applied at a minimum depth of 75mm. • Where the Implementing Entity failed to manage topsoil properly, the Implementing Entity shall be held responsible to source topsoil of similar quality from a commercial source OR to remediate compromised topsoil by means of compost, fertiliser and seeding as agreed by the ECO.	Implementing Entity, ECO, Engineer

Management Measure	Detailed Description	Responsibility
	• Topsoil shall match the type and quality of topsoil removed from that area. • Special care shall be taken where rehabilitation occurs across several wetland zones and or crossing between wetland and dryland habitats to match the soil removed to the area where it is reapplied. • Seeding/re-seeding should, where possible, be timed to take advantage of the rainy season. • All reinstated slopes will be at a gradient of 1:3 to 1:4. • Slopes of 1:2 and 1:1 shall be stabilised by means of suitable geotextiles, hard structures or any other means as approved by the ECO. • Slopes of 1:2 and 1:1 will be revegetated by means of sods and/or plugs of an approved indigenous grass specie. No Kikuyu shall be used for revegetation purposes. • Local indigenous plants shall be used in the landscaping of the site. Plants that are proclaimed as problem plants or noxious weeds (see Section 4.15) are to be excluded from the landscaping plan and must be removed immediately, should they occur on site. • Plants introduced into the project sites must be guided by ecological rather than horticultural principles. For example ecological communities of indigenous plants provide more biodiversity and habitat opportunities and would blend with natural vegetation. • Where sods are sources from the surrounding environment, the sods must be 30x30cm, sourced in a checkered pattern in a flat area (i.e. not on slopes). The sods must be sourced 1m in radius apart and will be planted within 24 hours of removal unless otherwise approved by the ECO. • Should the reshaping of watercourse banks be required it will match the natural preconstruction geomorphology and slope structure. Extensive reshaping of watercourse banks (and beds if applicable) will be done under close supervision of the ECO or relevant specialist.	

Management Measure	Detailed Description	Responsibility
	• Areas where sods, plugs or seeds have been used as part of slope stabilisation measures will be watered at least every third day for a minimum period of 6 weeks unless the area is in a permanently wet zone of a wetland i.e. no watering required. **Rehabilitation of peatlands**: • Upon rehabilitation, the removed sods and soil stockpiles shall be placed back into the system in the original order/layers (i.e. deeper layers shall be placed first with the rhizosphere layer at ground level), and orientation (according to the natural slope). Should the moisture content of the sods be less than 90% moisture, the Implementing Entity shall be required to peg them with wooden stakes. • The site shall be mulched (alternatively cloth/geotextile may be used) and livestock shall be fenced out for at least two seasons. Alternatively brush packs can be used to keep livestock and/or game away from the site. • If compaction took place, the Implementing Entity shall loosen the soil with a fork on flat surfaces, and create small contour berms on paths with slopes.	
Stop work	N/A	
Monitoring method and frequency	• The Implementing Entity shall notify the ECO once rehabilitation in an area has been completed. The ECO shall be responsible for the technical, not contractual, sign-off of the rehabilitated sections. Only once the rehabilitation has been approved by the ECO, may the contractual sign-off be effected. • The ECO shall conduct monthly inspections of rehabilitated areas for the first three months and then continue with inspections on a quarterly basis until the end of the contract period. • The ECO should audit the site at the end of the Implementing Entity's retention period to establish whether rehabilitation has been successfully carried out. If not, the retention money could be used to implement additional rehabilitation measures.	Implementing Entity, ECO, Engineer
Management outcomes	• Vegetation clearance is limited to the approved construction footprint. • All sloped areas are stable with no sign of slope failure or erosion.	Implementing Entity, ECO, Engineer

6 EMERGENCY REPORTING AND PROCEDURES

The Implementing Entity must ensure that all emergency procedures are in place prior to commencing work. The nearest emergency service provider shall be identified and the up-to-date contact details of this emergency centre, as well as the police and ambulance services shall be displayed on a notice board and shall be made available to staff on-site. Emergency equipment including fire-fighting equipment shall be positioned at accessible locations near to areas where such emergencies may arise.

6.1 Emergency Awareness

The Implementing Entity shall ensure that site staff are aware of the procedure to be followed for dealing with emergencies, which shall include notifying the Implementer and relevant authorities of the event. All site staff shall be briefed regarding the requirements for dealing with potential emergencies including fires, accidental leaks and spillage of pollutants (also see Section 4.7 and 4.8), as well as Health and Safety incidents. Education of site staff shall focus on both preventative and remedial actions in the case of an emergency.

6.2 Incident Recording

The Implementing Entity shall complete an Incident Report (refer to template under Annexure B) in the case of any environmental emergencies, accidents or incidents (including near misses). The ECO shall monitor that the necessary procedures and responses are followed to close out any entries in the Environmental Incident Report. The aforementioned report will be filed in the SEF.

6.3 Fire

The Implementing Entity must take all reasonable measures to ensure that fires are not started as a result of construction activities on site, and shall also ensure that their operations comply with the Occupational Health and Safety Act (Act No. 85 of 1993). Where possible, all work done in the dry season shall be organised in liaison with the landowners so that it fits into their firebreak/ fire protection programme. No large open fires are permitted on site. Smoking on site shall only be permitted in designated areas and in the presence of a fire extinguisher.

Basic functional fire-fighting equipment (one back pack and at least five beaters) shall be made available at each work site at all times. In forestry areas there must also be two rake hoes per team. The Implementing Entity shall appoint a member of his staff to be responsible for the installation and inspection of this equipment. Where work will take place in a peatland or wetland with a high organic soil content, a Method Statement shall be prepared for the ECO's approval, detailing all the actions that will take place should a fire occur, as well as the relevant emergency contacts.

Where fuels and machines are used on site, the prescribed fire extinguishers in working condition must be made available by the Implementing Entity.

Sparks generated during welding, cutting of metal or gas cutting can result in fires. Every possible precaution shall therefore be taken when working with this equipment near potential sources of combustion. Such precautions include having an approved fire extinguisher immediately available at the site of any such activities.

The Implementing Entity is to ensure that he/ she has the contact details of the nearest fire station in case of an emergency.

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Annexure A: Basic Code of Conduct / Implementation

- Private property access is only permitted on previous agreement with the affected landowner, or will be considered trespassing. Trespassing on adjacent properties shall be subject to disciplinary and legal action.
- Ensure that closed gates are kept closed. When in doubt, the landowner should be consulted.
- Teams working outside of the active site, or requiring access to private properties are to carry identification on their persons that includes their name, position, company of employ, and reference to the Working for Wetlands Project. Similarly, such information shall be displayed on vehicle dashboards/exteriors.
- All work shall be based on an approved rehabilitation plan.
- Any deviations from the planned specification need to be approved by the PC and the relevant Engineer.
- A construction supervisor shall be appointed. The appointment letter shall be made available on site.
- Work sites shall be properly planned and marked out, preferably in collaboration with the Implementing Entity. Areas shall be demarcated for vehicle access and parking, off-loading, mixing etc. (refer to Section 4.2).
- No unauthorised person may enter the work site.
- The location and position of all rehabilitation interventions shall be precisely demarcated by the Engineer and the Implementer, according to the rehabilitation plan.
- Dimensions of rehabilitation interventions shall also be marked out where appropriate (e.g. depth of an excavation).
- Implementation of all interventions will be done with a focus on cost-effectiveness and efficiency, while maintaining quality and appropriateness.

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Annexure B: Site Environmental File & Templates

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity **Agreements**	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	**Yes**
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	**Yes**
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	**Yes**
7.2. Additional method statements	**Yes**
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	**Yes**
9. Audits	
9.1. Baseline Audit	**Yes**
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	**Yes**
9.4. Incident and non-conformance reports	**Yes**
9.5. Site closure	**Yes**

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Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	**Yes**
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	Yes
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	Yes
7.2. Additional method statements	Yes
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	Yes
9. Audits	
9.1. Baseline Audit	Yes
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	Yes
9.4. Incident and non-conformance reports	Yes
9.5. Site closure	Yes

2 Implementing Entity Agreements

2.1 Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……

I, _____ (name), ID number _____ hereby confirm the following:

1. I have received a copy of the Environmental Authorisation (EA), Environmental Management Programme (EMPr) and Rehabilitation Plan for this project.
2. I have familiarised myself with the contents of aforementioned documents and understand what is required from me as the Implementing Entity.
3. I understand that I will be audited against the EA, EMPr, Rehabilitation Plan and approved Method Statements.
4. I understand that the EA is legally binding and that a contravention of an EA condition can lead to the suspension of the EA and thus construction.
5. I understand that I am responsible for the actions of my employees and will ensure that all staff on site are aware of the requirements and restrictions as per the EA, EMPr, Rehabilitation Plan and Method Statements.

_____	_____	_____
Signed	Designation	Dated

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	Yes
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	**Yes**
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	Yes
7.2. Additional method statements	Yes
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	Yes
9. Audits	
9.1. Baseline Audit	Yes
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	Yes
9.4. Incident and non-conformance reports	Yes
9.5. Site closure	Yes

4 Communication

4.2 Copy of public complaints register

COMPLAINTS REGISTER

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……
REVISION:	……

Id.	Date	Time	Complainant Name	Address	Contact Details	Path for complaint (Phone, Discussion, email)	Description of complaint	Detail of investigation	Result of investigation	Corrective action	Response to complaint
1											
2											
3											
4											
5											
6											
7											
8											

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	Yes
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	Yes
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	**Yes**
7.2. Additional method statements	Yes
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	Yes
9. Audits	
9.1. Baseline Audit	Yes
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	Yes
9.4. Incident and non-conformance reports	Yes
9.5. Site closure	Yes

7 Method Statements

The Implementing Entity is to complete this section, taking cognisance of the relevant EA, EMP, environmental specifications and SANS.

7.1 Combined method statements

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……
REVISION:	……

ACRONYMS

ECO	Environmental Control Officer
EMPr	Environmental Management Programme
NEMA	National Environmental Management Act (Act 107 of 1998)
SHE	Safety Health Environment

DEFINITIONS

Alien species[1]:

(a) a species that is not an indigenous species; or

(b) an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.

Approved: Means approved in terms of the applicable legal requirements (e.g. NEMA approval/ Environmental Authorisation) and/or has been approved by the WfWetlands Programme's Deputy Director: Planning, Monitoring and Evaluation and/or an authorised representative of the WfWetlands Programme.

Archaeological[2]:

(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 artefacts, 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;

(c) 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

[1] National Environmental Management: Biodiversity Act (No. 10 of 2004)
[2] National Heritage Resources Act (No. 25 of 1999)

Republic, as defined respectively in sections 3, 4 and 6 of the Maritime Zones Act, 1994 (Act No. 15 of 1994), and any cargo, debris or artefacts found or associated therewith, which is older than 60 years or which the South African Heritage Resource Agency (SAHRA) considers to be worthy of conservation; and

Auditing[3]**:** A systematic, documented, periodic and objective evaluation which provides verifiable findings, in a structured and systematic manner, on:

(a) the level of performance against and compliance of an organisation or project with the provisions of the requisite environmental authorisation or Environmental Management Programme (EMPr) and, where applicable, the closure plan; and

(b) the ability of the measures contained in the EMPr, and where applicable the closure plan, to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity.

Authority*:* National, regional or local authority, that has a decision-making role or interest in the project.

Best Management Practice (BMP): Procedures and guidelines to ensure the effective and appropriate implementation of wetland rehabilitation by WfWetlands implementers.

Cement laden water: Means water (fresh or wash water) which has been in contact with partially cured concrete/mortar or raw cement product and which contains suspended and dissolved cement solids.

Commence: The start of any physical activity, including site preparation and any other activity on site furtherance of a listed activity or specified activity, but does not include any activity required for the purposes of an investigation or feasibility study as long as such investigation or feasibility study does not constitute a listed activity or specified activity.

Contaminated water: Means water contaminated by the Implementing Entity's activities such as with hazardous substances, hydrocarbons, paints, solvents and runoff from plant, workshop or personnel wash areas but excludes water containing cement/ concrete or silt.

Corrective (or remedial) action*:* Reactive response required to address an environmental problem that is in conflict with the requirements of the EMPr. The need for corrective action may be determined through monitoring, audits or management review.

Dam[4]**:** Any barrier dam and any other form of impoundment used for the storage of water, excluding reservoirs.

Dangerous goods: Goods containing any of the substances as contemplated in South African National Standard No. 10234, supplement 2008 1.00: designated "*List of classification and labelling of chemicals in accordance with the Globally Harmonized Systems (GHS)"* published by Standards South Africa, and where the presence of such goods, regardless of quantity, in a blend or mixture, causes such blend or mixture to have one or more of the characteristics listed in the Hazard Statements in section 4.2.3, namely physical hazards, health hazards or environmental hazards.

Decommissioning[5]**:** To take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.

[3] Regulation 34 of GN R982 (2014, as amended) of NEMA
[4] GN R983 (2014, as amended) of NEMA
[5] GN R983 (2014, as amended) of NEMA

Dust[6]: Any material composed of particles small enough to pass through a 1 mm screen and large enough to settle by virtue of their weight into the sampling container from the ambient air.

Eco-log: A cylindrical sleeve made from, for example wire mesh, filled with organic material and/or soil used to prevent and/or repair minor erosion.

Endangered species: Means any indigenous species listed as an endangered species in terms of section 56 of the National Environmental Management Biodiversity Act ((No. 10 of 2004).

Endemic: An "endemic" is a species that grows in a particular area (i.e. it is endemic to that region) and has a restricted distribution. It is only found in a particular place. Whether something is endemic or not depends on the geographical boundaries of the area in question and the area can be defined at different scales.

Environment[7]: Means the surroundings within which humans exist and that are made up of:

i. the land, water and atmosphere of the earth;

ii. micro-organisms, plant and animal life;

iii. any part or combination of i) and ii) and the interrelationships among and between them; and

iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.

Environmental impact: An environmental change caused by some human act.

Environmental impact: Change in an environment resulting from the effect of an activity on the environment, whether positive or negative. Impacts may be the direct consequence of an individual's or organisation's activities or may be indirectly caused by them (DEAT, 1998).

Erosion: The loss of soil through the action of water, wind, ice or other agents, including the subsidence of soil.

Gabion: A structure made of wire mesh baskets filled with regularly sized stones, and used to prevent and/or repair erosion. They are flexible and permeable structures which allow water to filter through them. Vegetation and other biota can also establish in/around the habitat they create.

Hazard: Means a source of or exposure to danger.

Invasive alien species control:

(a) to combat or eradicate an alien or invasive species; or

(b) where such eradication is not possible, to prevent, as far as may be practicable, the recurrence, re-establishment, re-growth, multiplication, propagation, regeneration or spreading of an alien or invasive species.

Implementing Entity: The entity responsible for the construction of WfWetlands rehabilitation interventions by means of various contracted teams.

Indigenous vegetation[8]: 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.

[6] National Dust Regulations GN R827 (2013)
[7] NEMA
[8] GN R983 (2014, as amended) of NEMA

Interested and Affected Parties (I&APs)[9]:

(a) all persons who, as a consequence of the public participation process conducted in respect of that application, have submitted written comments or attended meetings with the proponent, applicant or EAP;

(b) all persons who have requested the proponent or applicant, in writing, for their names to be placed on the register; c) all organs of state which have jurisdiction in respect of the activity to which the application relates.

Intervention: An engineered structure such as a concrete or gabion weir, earthworks or revegetation that that achieves identified objectives within a wetland e.g. raising of the water table within a drainage canal.

Invasive species[10]: Means any species whose establishment and spread outside of its natural distribution range-

(a) threaten ecosystems, habitats or other species or have demonstrable potential to threaten ecosystems, habitats or other species; and

(b) may result in economic or environmental harm or harm to human health.

Listed invasive species: Any invasive species listed in terms of sections 66(1), 67(1), 70(1)(a), 71(3) and 71A of the National Environmental: Biodiversity Act (No. 10 of 2004).[11]

Maintenance period: The period after the Establishment Period (Practical Completion), up to and until the end of the Maintenance Period (i.e. a period of 12 months).

Maintenance[12]: Means actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint.

Mine:

(a) used as a noun-

any excavation in the earth, including any portion under the sea or under other water or in any residue deposit, as well as any borehole, whether being worked or not, made for the purpose of searching for or winning a mineral;

any other place where a mineral resource is being extracted, including the mining area and all buildings, structures, machinery, residue stockpiles, access roads or objects situated on such area and which are used or intended to be used in connection with such searching, winning or extraction or processing of such mineral resource; and

(b) used as a verb-

in the mining of any mineral, in or under the earth, water or any residue deposit, whether by underground or open working or otherwise and includes any operation or activity incidental thereto, in, on or under the relevant mining area.

Mitigation: Actions to reduce the impact of a particular activity.

Mitigation[13]: Means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible;

[9] Regulation 42 GN R983 (2014, as amended) of NEMA
[10] National Environmental Management: Biodiversity Act (No. 10 of 2004)
[11] Also refer to GN 864 (2016): Alien and Invasive Species Lists
[12] GN R983 (2014, as amended) of NEMA
[13] GN R983 (2014, as amended) of NEMA

Monitoring[14]: The repetitive and continued observation, measurement and evaluation of environmental criteria to follow changes over a period of time and to assess the efficiency of control measures.

Nursery conditions: This refers to the necessary conditions that must be in place for maintaining strong healthy growth in all container plant materials on site. This includes for the protection of all container plants against wind, frost, direct sunlight, pests, disease and drought. It also includes for the provision of adequate and suitable water supply, fertilisers and all other measures necessary to maintain strong and healthy plant growth.

Offensive odour: Any smell which is considered to be malodorous or a nuisance to a reasonable person.

Pollution[15]: Means any change in the environment caused by substances;

(ii) radioactive or other waves; or

(iii) 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 wellbeing 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.

Post-construction: Refers to the period of 12 months after the completion of the construction works, the onset coinciding with the maintenance period..

Potentially hazardous substance: Any substance or mixture of substances, product or material declared to be a hazardous substance under section 2(1) of the Hazardous Substance Act (1973).

Pre-construction: Refers to the period leading up to the establishment on site by the Implementing Entity.

Project: A defined area for which an approved rehabilitation plan exists for the WfWetlands Programme.

Quaternary Catchment: A fourth order catchment in a hierarchal classification system in which a primary catchment is the major unit and that is also the "principal water management unit in South Africa"[16]

Reasonable: Means, unless the context indicates otherwise, reasonable in the opinion of the relevant environmental authority.

Rehabilitation: Refers to re-instating the driving ecological forces (including hydrological, geomorphological and biological processes) that underlie a wetland, so as to improve the wetland's health and the ecological services that it delivers; and

Restoring processes and characteristics that are sympathetic to and not conflicting with the natural dynamic of an ecological or physical system[17].

Significant impact: Means an impact that may have a notable effect on one or more aspects of the environment or may result in k with accepted environmental quality standards, thresholds or targets

[14] DEAT, 1998
[15] National Environmental Management Act (No. 107 of 1998, as amended)
[16] DWS Groundwater Dictionary. Available online: http://www.dwaf.gov.za/Groundwater/Groundwater_Dictionary/index.html?introduction_quaternary_catchment.htm
[17] Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 2008

and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity and probability of occurrence.

Silt laden water: Means water (mostly overland surface runoff) containing a substantial concentration of suspended solids with increased turbidity. Usually occurs as a result of exposed/cleared ground surfaces, concentration of runoff and/or erosion of excavated or imported materials.

Site: This is the area described in the approved/authorised rehabilitation plan for the implementation of the rehabilitation measures. Where the area is not demarcated, it will include all adjacent areas, which are reasonably required for the activities for the Implementing Entity, and approved for such use by the Environmental Control Officer (ECO).

Slope: The inclination of a surface expressed as 1 unit of rise or fall for so many horizontal units.

Subsoil: The soil horizons between the topsoil horizon and the underlying parent rock.

Topsoil: The upper soil profile irrespective of the fertility appearance, structure, agriculture potential, fertility and composition of the soil, usually containing organic material and which is colour specific. Also referred to as the "O" and "A" horizons.

Waste: Any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered and includes all wastes as defined in Schedule 3 the National Environmental Management: Waste Act (No. 59 of 2008)[18]. Examples include construction debris, chemical waste, used oils and lubricants, batteries, metal and wood off-cuts, excess cement/ concrete, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).

Watercourse:

(a) a river or spring;

(b) a natural channel in which water flows regularly or intermitted;

(c) a wetland, pan, lake or dam into which, or from which, water flows

A reference to a watercourse includes, where relevant, its bed and banks

Weir: A dam-type structure placed across a watercourse to raise the water table of the surrounding ground and trap sediment on the upstream face without preventing water flow. Weirs are generally used to prevent erosion from progressing up exposed gullies.

Wetland: 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 in normal circumstances supports or would support vegetation typically adapted to life in saturated soils[19] and,

Land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants living there[20].

[18] National Environmental Management: Waste Act (No. 59 of 2008, as amended)
[19] National Water Act (No. 36 of 1998, as amended)
[20] Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 2008

SECTION 1: SITE ESTABLISHMENT

Briefly describe where the site camp will be located. Also provide a layout on the next page.
Coordinates:
How will you demarcate the site camp (note no danger tape allowed)
What will the size of the site camp be?
Are there any sensitive areas, trees, shrubs or landscape features (e.g. a heritage site) that must be avoided to prevent disturbances and/or damage? How will disturbances or damage be prevented?

Is the site camp on a flat area (i.e. slope not exceeding 1:3)?	**Y**	**N**
Is the site camp located away from areas of stormwater concentration and areas prone to flooding?	**Y**	**N**
Are there any recently disturbed areas close to the site which can be used as a site camp?	**Y**	**N**
Is there sufficient space available at the identified site to accommodate all site camp components i.e. ablution facilities, eating areas, laydown areas, stockpile areas, vehicle parking area, concrete wash water settling area?	**Y**	**N**
Can the site camp remain at one location? I.e. it does not need to be moved on a regular basis (i.e. every two to four weeks) due to intervention sites being far apart?	**Y**	**N**

If, "No", attach the approved for request for deviation form to the back of this document.

Indicate the following (ignore if not relevant): Ablution facilities, waste storage area (general and hazardous), eating area, laydown area, stockpile area, concrete/mortar mixing/batching area, concrete wash water settling system, site office, access, vehicle parking area, any stormwater diversion measures required, the wetland boundary and sensitive features that must be avoided.

Site camp layout (please use multiple layout plans if required).

SECTION 2: SITE DEMARCATION

Indicate the working area required for each intervention site.

Intervention No	Type of intervention	Area required (incl. temporary laydown and stockpile areas, topsoil stockpiling, equipment etc.)

How will you demarcate the working area required for each intervention?

SECTION 3: ACCESS ROUTES/HAUL ROADS

Length of new access road required for each intervention site.

Intervention No	Existing access (Y/N)?	Length of access road required

Describe how access roads will be made and demarcated (i.e. avoiding unnecessary access roads and the creation of multiple access roads).

**Include a simple layout indicating the proposed access routes as an addendum to this document.*

SECTION 4: MATERIALS HANDLING, USE AND STORAGE

Briefly list the materials (**including volumes**) to be used during construction (e.g. bidim, gabion baskets, stones, gravel, shuttering oil, cement, sand, MacMat-R, geotextile):		
Where will the materials be off-loaded?		
Where are you sourcing the material from?		
If it is not a commercial source, have you written obtained permission from the ECO and any other relevant party e.g. the landowner, provincial roads, Department of Mineral Resources? Please attached a copy of the written permission/consent to the end of this **METHOD STATEMENT**.	**Y**	**N**

Are the areas you've identified for stockpiling of bulk material outside of the wetland? If "No", consult with the ECO.	**Y**	**N**
Are the areas you've identified for stockpiling level (i.e. not steeper than 1:30)? If no, explain the measures which will be implemented to prevent materials washing away during rainfall.	**Y**	**N**
Have you planned how to get the materials from the stockpile/laydown area to the intervention working area? Please provide details on the proposed methodology below. Differentiate between the various materials where required.	**Y**	**N**
Do you have sufficient covered storage space for products such as cement, and shuttering oil? Please provide details of the storage areas to be used and the type of cover e.g. roofed, shade cloth, storage container.	**Y**	**N**
Do you need to stockpile bulk materials e.g. rock, sand next to an intervention? If "Yes", please provide details on the duration of stockpiling, the volume and the measures to be taken to avoid erosion of material and contamination of topsoil.	**Y**	**N**
Have you worked out a delivery schedule to avoid materials being stored on site for longer than 4 weeks?	**Y**	**N**
Is there any material which will be prone to become windblown e.g. sand? If yes, describe how you will contain the material.	**Y**	**N**

SECTION 5: SOLID WASTE MANAGEMENT AND DISPOSAL

What types of waste is expected to be generated during the construction period?		
List any wastes that are potentially hazardous[21] (e.g. empty sealant containers, materials from spill kit used to clean spillages, batteries, contents from portable toilets, herbicide containers):		
How will waste be stored on site (i.e. where and in what)?		
General:		
Hazardous:		
How often, how and where will waste be disposed of?		
General:		
Hazardous:		
Is a substantial quantity of vegetation clearance required?	**Y**	**N**

[21] Refer to National Environmental Management: Waste Amendment Act 26 of 2014 and SANS 10234

If “yes” indicate how vegetation material not removed as part of topsoil stripping will be dealt with e.g. chipping, brush packing, donate to local community.

** Please remember to clearly indicate waste storage areas on the layout plan.*

SECTION 6: HAZARDOUS CHEMICALS AND POTENTIAL HAZARDOUS SUBSTANCES

List potentially hazardous substances to be used on the project. *(Hazardous being defined in terms of Hazardous Substances Act (No.187 of 1993) and associated regulations as well as SANS 10234. Examples include, but are not limited to: drums of fuel, grease, oil, brake fluid, hydraulic fluid, paint, batteries and herbicides (for alien plant clearing)).*

How and where will these substances be stored?

How will these substances be applied or dispensed?

How will spills be prevented?

In the event of a spill, how will it be mitigated?

Procedure:
Materials:
Person responsible and contact details:

**Attach the relevant Material Safety Data Sheet (MSDS) of hazardous materials to be stored on site as an addendum to this document.*

SECTION 7: FUEL

What is the volume of fuel planned to be stored on site?

How and where will fuel be stored?

How will fuel be dispensed?

What precautions will be taken to prevent accidental spills or fires?

In the event of a spill, how will it be mitigated (i.e. cleaned up)?

Procedures:
Materials:
Person responsible and contact details:

How will hydrocarbon contaminated materials be managed and disposed of? Note hydrocarbon contaminated soil is only allowed to go to a Class A landfill (previously H:H landfill site).

SECTION 8: WATER USE

What source will be used to obtain water for construction purposes?

What source will be used to obtain water for drinking and sanitation purposes?

SECTION 9: CONCRETE BATCHING AND CEMENT HANDLING

List activities where concrete or mortar will be used:

If ready mix is not used, where and how will concrete be mixed and how will it be transported to the intervention location?

How will cement laden runoff be managed? Specify for the concrete mixing area as well as washing of equipment.

Where and how will cement be stored?

How and where will cement bags be stored until taken off site?

How will excess concrete and concrete remains be disposed of?

SECTION 10: ABLUTION FACILITIES

How many people will be on site?

How many toilets will be required at a ratio of 1 toilet for every 15 people?

What type of toilet will be used (e.g. chemical or pit latrine) and where will it be located?

If chemical toilets are used, specify how and when they'll be serviced.

SECTION 11: EATING AREAS

Where will the eating area be located?

How will you prevent littering around the eating area?

** Also clearly indicate the designated eating area(s) on the layout plan.*

SECTION 12: VEHICLES AND EQUIPMENT

Describe the number and type of vehicles to be used on site.

Where will vehicles be parked or equipment stored overnight, during weekends and during holidays?

Describe the procedure to be implemented for dealing with vehicles or equipment leaking oil or fuel:

Describe emergency equipment maintenance procedures:

Procedure:
Materials:
Person responsible:

SECTION 13: NOISE

Are there any houses nearby? Do you need inform the landowners of any noisy activities that will take place? How will this be done?

Describe the measures to be implemented to prevent excessive noise disturbance during construction:

SECTION 14: DUST

What is the distance to the closest occupied building and what type of building is it (e.g. house, school, clinic, etc.)

List activities and material that might lead to the generation of dust:

If closer than 100m from a sensitive receptor e.g. occupied building, road, orchard, describe the activities to be implemented to limit and mitigate the generation of dust:

SECTION 15: IMPLEMENTING ENTITY'S SAFETY HEALTH ENVIROMENT (SHE) OFFICER

Who will be responsible to ensure that Health and Safety and Environmental Requirements are implemented on site? Describe responsibilities of the relevant person:

Name:
Responsibilities:
Reporting to:

SECTION 16: ENVIRONMENTAL AWARENESS TRAINING

Describe how environmental awareness and training for senior staff will be addressed:

Describe how environmental awareness and training for general labour will be addressed:

** Please include a copy of the training material and attendance register in the environmental folder.*

SECTION 17: FIRE CONTROL

List activities on site with a fire risk e.g. smoking areas, generators.

How will fires be prevented?

Describe the procedure to be followed in case of a fire on site:

Process:
Materials:

Responsible person:

SECTION 18: COMMUNITY RELATIONS

Who is/are the landowner(s) of the property/properties where work will be conducted?

Has the landowner been contacted and notified of construction commencing and are there any specific concerns or requests which need to be taken into account?

Describe how good community relationships will be ensured (e.g. complaints register, contact details of Implementing Entity on site):

SECTION 19: PROTECTION OF FAUNA AND FLORA

Are you working in a conservancy, nature reserve or biosphere? If, yes, what are the precautions to be taken to avoid the accidental or intentional killing and/or trapping of animals?

Are you aware of any nesting or breeding sites close to any of the interventions?

Describe the procedure to be followed pre-construction to check for slow moving animals in the vicinity of the construction area.

Describe the procedure to be followed to check excavations of 0.5m and deeper for trapped animals.

If you are working in an area with potentially dangerous animals, describe the measures to be taken to ensure the safety of staff.

Are there any trees or shrubs that may not be disturbed or damaged? Have these been clearly marked to prevent disturbances and potential damage?

SECTION 20: STORMWATER MANAGEMENT

Is the site located in floodplain or valley? If “Yes”, have you verified the typical rainfall patterns in the area and when increased flow/flooding can be expected?

Are you aware of any major dams or impoundments upstream of the site? If yes, do you have the contact details of the entity/responsible person in control of releases from the dam or impoundment and have you notified them of work being undertaken downstream?

Are you doing work in the "seasonal" or "permanent zone" of the wetland i.e. an area that is seasonally or permanently wet? If "Yes", describe the dewatering procedures to be followed (i.e. will pumping be required, where will the pumped water be discharged, how will you reduce sediment loads in pumped water, how will you prevent scouring at the pipe outlet?)

Do you need to divert flow to enable construction/work being undertaken? If "Yes", provide details on the type and duration of the diversion.

SECTION 21: EROSION AND SEDIMENTATION CONTROL

How will you prevent the erosion of access roads?

Will there be significant exposed areas (areas exceeding 10m^2) during the rainfall season? If "Yes", how will you protect bare soil surfaces exposed for a month or longer (e.g. stormwater diversion, temporary revegetation, geotextile)?

Do you need to work on steep (1:4) slopes? If "Yes", describe the measures to be implemented to avoid the erosion of exposed ground surfaces, excavated material and construction material.

Are there any known stormwater structures discharging towards the site e.g. culverts, stormwater outlets. If "Yes", is the diversion of the stormwater required to protect the site from erosion and how will it be done?

SECTION 22: PROTECTION OF ARCHAEOLOGICAL AND PALAEONTOLOGICAL SITES

Are you aware of any known heritage artefacts (e.g. old buildings, Stone Age sites, shell middens, caves, historic grave sites, monuments) close to the site? If "Yes", describe how you will protect the site.

Describe the procedure to be followed in the event that an object of heritage, archaeological or paleontological is discovered:

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	Yes
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	Yes
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	Yes
7.2. Additional method statements	**Yes**
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	Yes
9. Audits	
9.1. Baseline Audit	Yes
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	Yes
9.4. Incident and non-conformance reports	Yes
9.5. Site closure	Yes

7 Method Statements

7.2 Additional method statements

INFORMATION ON METHOD STATEMENTS

Method Statements are to be completed by the person undertaking the work (i.e. the Implementing Entity). The Method Statement will enable the potential negative environmental impacts associated with the proposed activity to be assessed.

The Method Statement can only be implemented once approved by the PC in consultation with the ECO.

The Implementing Entity (and, where relevant, any sub-contractors) must also sign the Method Statement, thereby indicating that the works will be carried out according to the methodology contained in the approved Method Statement.

The PC and/or ECO will use the Method Statement to audit compliance by the Implementing Entity with the requirements of the approved Method Statement.

Changes to the way the works are to be carried out must be reflected by amendments to the original approved Method Statement; amendments require the signature of the PC, denoting that the changed methodology or works are necessary for the successful completion of the works, and where applicable the PC will consult with the ECO regarding to environmental concerns. The Implementing Entity will also be required to sign the amended Method Statement thereby committing him/herself to the amended Method Statement.

This Method Statement MUST contain sufficient information and detail to enable the PC (and ECO were applicable) to apply his/her mind to the potential impacts of the works on the environment. The Implementing Entity will also need to thoroughly understand what is required of him/her in order to undertake the works.

THE TIME TAKEN TO PROVIDE A THOROUGH, DETAILED METHOD STATEMENT IS TIME WELL SPENT. INSUFFICIENT DETAIL WILL RESULT IN DELAYS TO THE WORKS WHILE THE METHOD STATEMENT IS REWRITTEN TO THE ASD's SATISFACTION

METHOD STATEMENT

PROJECT NAME: ……

IMPLEMENTING ENTITY: ……

DATE: ……

PROPOSED ACTIVITY *(give title of method statement):*

E.g. construction of diversion structure, temporary damming of stream, deviation from standard rehabilitation procedures

Scope	
Potential Impacts	E.g. litter, spills, damage to flora, contamination of water
Start Date:	
End Date:	
Description (i.e. how will the Method Statement be implemented?):	
Location:	
Person(s) responsible for implementing (Name and designation):	

DECLARATIONS

1) Environmental Consultant/Environmental Control Officer

The work described in this Method Statement, if carried out according to the methodology described, is satisfactorily mitigated to prevent avoidable environmental harm:

_____	_____	_____
Signed	Print name	Dated

2) Implementing Entity

I understand the contents of this Method Statement and the scope of the works required of me. I further understand that this Method Statement may be amended on application to other signatories and that the PC/ECO will audit my compliance with the contents of this Method Statement

_____	_____	_____
Signed	Print name	Dated

3) Engineer/Engineer's Representative

The works described in this Method Statement are approved.

_____	_____	_____
Signed	Print name	Dated

4) Approving authority: PC

_____	_____	_____
Signed	Print name	Designation

Dated: _____

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	Yes
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	Yes
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	Yes
7.2. Additional method statements	Yes
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	**Yes**
9. Audits	
9.1. Baseline Audit	Yes
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	Yes
9.4. Incident and non-conformance reports	Yes
9.5. Site closure	Yes

8 Records

8.5 Request for deviations from standard EMPr or Rehabilitation Plan requirement

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……

DEVIATION 1 *(Implementing Entity to complete)*

Description of deviation	*E.g. mixing of concrete in wetland*
Reason for deviation	*E.g. major wetland system resulting in excessive transport distances*
Start Date:	
End Date:	
Relevant section in EMPr	
Potential impacts associated with deviation	*E.g. concrete spills in wetland, additional vegetation clearance, water pollution*
Mitigation measures identified	*E.g. mixing boards, dedicated wash bins, no cement storage in wetland next to mixing area, regular clean-up*

DEVIATION 2 *(Implementing Entity to complete)*

Description of deviation	
Reason for deviation	
Start Date:	
End Date:	
Relevant section in EMPr	
Potential impacts associated with deviation	
Mitigation measures identified	

PC CHECKLIST

Does the deviation carry a high risk e.g. pollution, structure failure	Yes	No	Unsure	If “yes” or “unsure” consult with Engineer
Does the proposed deviation trigger a new listed activity	Yes	No	Unsure	If “yes” or “unsure” consult with EAP
Does the deviation involve a change in design of the IP	Yes	No	Unsure	If “yes” or “unsure” consult with Engineer and Wetlander
Is the deviation outside the approved wetland system?	Yes	No	Unsure	If “yes” or “unsure” consult with EAP

DECLARATIONS

1) Environmental Consultant/Environmental Control Officer

The work described in this request for deviation does not trigger any additional listed activities and will not result in excessive environmental damage:

_____	_____	_____
Signed	Print name	Dated

2) Person undertaking the works/Implementing Entity

I understand the scope of deviation requested and will implement the mitigation measures as indicated.

_____	_____	_____
Signed	Print name	Dated

3) Engineer/Engineer's Representative

The works described in this Method Statement are approved.

_____	_____	_____
Signed	Print name	Dated

4) Approving authority

_____	_____	_____
Signed	Print name	Designation

Dated _____

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	Yes
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	Yes
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	Yes
7.2. Additional method statements	Yes
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	Yes
9. Audits	
9.1. Baseline Audit	**Yes**
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	Yes
9.4. Incident and non-conformance reports	Yes
9.5. Site closure	Yes

9 Audits

9.1 Baseline audit/ inspection prior to commencement of construction

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……

SECTION 1: WETLAND ZONE IN WHICH WORK WILL BE UNDERTAKEN:

Permanent	Seasonal	Temporary	Outside wetland boundary

SECTION 2: CONDITION OF VEGETATION

Coverage:	Poor	Moderate	Good
Species diversity:	Poor	Moderate	Good
Grazing in wetland:	Yes	No	
Harvesting of vegetation in wetland:	Yes	No	
Level of alien invasive species infestation:	Low	Moderate	High

Insert photos:

SECTION 3: SOIL

Topsoil depth:	≥10cm	≥30cm	≥ 50cm
Peat know to be present?	Yes	No	
Evidence of erosion	Yes	No	
Type of erosion	Dryland	Gullies/donga	In-stream (undercutting, lateral, scouring)
	Stormwater outlets	Dispersed overland flow	Tunnelling (dispersive soils)

SECTION 4: IS THERE ANY EXISTING WASTE OR SPOIL ON SITE?

Yes	No

If yes, specify the type and estimated quantity

Insert photos:

SECTION 5: ARE THERE EXISTING ALIEN INVASIVE SPECIES ON THE SITE?

Yes	No

If yes, list the species

Are any of the species Category 1a or b species? (Alien and Invasive Species Regulations, 2014 - GN R598/2014)

Yes	No

If yes, list the species and number/density of plants.

Insert photos:

SECTION 6: ARE THERE EXISTING ACCESS ROADS TO THE SITE?

Yes	No

If yes, what is the condition of the road(s)?

Good	Moderate	Poor

SECTION 7: ARE THERE OTHER IMPACTED OR DISTURBED AREAS

Cleared area	Mining area	Kraal	Previous site camps	Ploughed agricultural land
Roads	Settlements	Other:		

SECTION 8: EXISTING WATER QUALITY ISSUES

High sediment loads (murky/cloudy water)	Eutrophication (excess algal growth)	High TDS (salt deposits)	Low pH (orange coloured water)	*E. coli* (leaking sewer lines, concentration of animals)

SECTION 9: IS THERE EXISTING FENCING ON THE PROPERTY WHERE THE WORK WILL BE CONDUCTED?

Yes	No

If yes, what type of fencing and what is the condition of the fencing?

Insert photos:

SECTION 10: ARE THERE ANY KNOW PROTECTED PLANT SPECIES ON SITE?

Yes	No

If yes, list the species

Insert photos:

SECTION 11: ARE THERE ANY SIGNIFICANT TREES OR CLUMPS OF TREES WHICH NEED TO BE CONSERVED?

Yes	No

If yes, specify the species and location.

Insert photos:

SECTION 12: ARE THERE ANY KNOWN OR VISIBLE HERITAGE OBJECTS (E.G. OLD KRAAL, OLD FURROW, CORNER POSTS, OLD BUILDINGS)?

Yes	No

If yes, specify the type of object and location.

Insert photos:

SECTION 13: ARE THERE ANY EXISTING ANIMAL (DOMESTIC OR WILD) CROSSINGS ON OR CLOSE TO THE SITE?

Yes	No

If, yes, will the planned work impact on the crossings and movement of the animals?

Yes	No

SECTION 14: ARE THERE ANY EXISTING SERVICES ON OR NEAR THE SITE (E.G. POWER LINES, SUB-STATIONS, PIPELINES, TELEPHONE LINES)?

Yes	No

If yes, specify the type of infrastructure and whether it will be impacted by the activities on site

Insert photos:

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	Yes
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	Yes
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	Yes
7.2. Additional method statements	Yes
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	Yes
9. Audits	
9.1. Baseline Audit	Yes
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	**Yes**
9.4. Incident and non-conformance reports	Yes
9.5. Site closure	Yes

9 Audits

9.3 Internal audits/check conducted by the Implementing Entity

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……
WEEK:	*E.g. Week 1 / Week 2*……

SECTION 1: SITE CONDITIONS

SECTION 2: LAYDOWN AREAS & SITE OFFICES

		EVALUATION		
ITEM	**DESCRIPTION**	**Not to Standard**	**To Standard**	**NOTES**
2.1	Litter control			
2.2	Dust suppression			
2.3	Erosion control			
2.4	Storm water / Runoff control			
2.5	Toilets			
2.6	Fuel & oil storage & dispensing			
2.7	Material handling or Storage			
2.8	Waste management			
2.8.1	*Domestic Waste*			
2.8.2	*Hazardous Waste*			
2.9	Noise control			

SECTION 3: CONSTRUCTION SITES

		EVALUATION		
ITEM	**DESCRIPTION**	**Not to Standard**	**To Standard**	**NOTES**
3.1	Litter control/Recycle			

3.2	Dust suppression			
3.3	Erosion control			
3.4	Toilets			
3.5	Eating areas			
3.6	Material handling and Storage			
3.7	No go areas, natural features and trees have not been damaged			
3.8	Drip trays			
3.9	Waste management			
3.9.1	*Domestic Waste*			
3.9.2	*Hazardous Waste*			
3.10	Noise control			
3.11	Environmental Awareness Training			

SECTION 4: COMPLAINCE WITH THE EA CONDITIONS AND EMP AND/OR ENVIRONMENTAL INCIDENTS

SECTION 5: GENERAL NOTES

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	Yes
3. Approvals and Licenses	
3.1. Environmental Authorisation	
3.2. Section 21(c) and (i) General Authorisation	
3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	Yes
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7.1. Combined method statements	Yes
7.2. Additional method statements	Yes
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	Yes
9. Audits	
9.1. Baseline Audit	Yes
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	Yes
9.4. Incident and non-conformance reports	**Yes**
9.5. Site closure	Yes

9 Audits

9.4 Incident and non-conformance reports

9.4.1 Environmental Incident Report

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……
REVISION:	……

SECTION 1: DESCRIPTION OF INCIDENT

SECTION 2: REMEDIAL ACTION REQUIRED

Remedial Action Due Date:	

SECTION 3: RELEVANT DOCUMENTATION

SECTION 4: SIGNATURES

ECO:		**Implementing Entity:**	
Name:		**Name:**	
Date:		**Date:**	

SECTION 5: REMEDIAL ACTION COMPLETED

Implementer to sign when remedial action has been completed and return original to ECO:	
Name:	
Date:	

SECTION 6: REMEDIAL ACTION VERIFIED

ECO:		**Implementing Entity:**	
Name:		**Name:**	
Date:		**Date:**	

SECTION 7: DRAWING/SKETCH

9.4.2 Environmental Non-Conformance Notice

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……
REVISION:	……

SECTION 1: INCIDENT SEVERITY

High	**Medium**	**Low**
Number of previous similar non-conformances on same contract:		

SECTION 2: DESCRIPTION OF INCIDENT

SECTION 3: DRAWING/SKETCH

SECTION 4: REMEDIAL ACTION REQUIRED

Remedial Action Due Date:	

SECTION 5: DRAWING/SKETCH

SECTION 6: RELEVANT DOCUMENTATION

SECTION 7: SIGNATURES

ECO:		**Implementing Entity:**	
Name:		**Name:**	
Date:		**Date:**	

SECTION 8: REMEDIAL ACTION COMPLETED

Implementer to sign when remedial action has been completed and return original to ECO:	
Name:	
Date:	

SECTION 9: REMEDIAL ACTION VERIFIED

ECO:		**Implementing Entity:**	
Name:		**Name:**	
Date:		**Date:**	

Section	Template available
1. Rehabilitation Plan and EMP	
2. Implementing Entity Agreements	
2.1. Undertaking in terms of Environmental Authorisation, Environmental Management Programme, Rehabilitation Plan and submitted Method Statements	Yes
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3.3. Waste license (if applicable)	
4. Communication	
4.1. Important correspondence e.g. notice to Competent Authority of commencement of construction	
4.2. Copy of public complaints register	Yes
5. Site Management	
5.1. Approved layout	
5.2. Site instructions (or copies thereof)	
6. Environmental Training	
6.1. Proof of toolbox talks, environmental awareness and induction (incl. attendance register and training material)	
7. Method Statements	
7.1. Combined method statements	Yes
7.2. Additional method statements	Yes
8. Records	
8.1. Record of waste generation – quantity, type, fate (incl. general/hazardous, liquid/solid)	
8.2. Proof of legal/safe waste disposal	
8.3. Record of chemicals on site and Material Safety Data Sheets (MSDS)	
8.4. Record of water usage (if applicable)	
8.5. Request for deviations	Yes
9. Audits	
9.1. Baseline Audit	Yes
9.2. ECO audit reports	
9.3. Internal audits/check conducted by the Implementing Entity	Yes
9.4. Incident and non-conformance reports	Yes
9.5. Site closure	**Yes**

9 Audits

9.5 Site closure

PROJECT NAME:	……
IMPLEMENTING ENTITY:	……
DATE:	……

SECTION 1: SITE CLOSURE INSPECTION SHEET

Slope:	
Alien invasives:	
Topsoil:	
Anti-erosion:	
Waste:	
Other:	
Timeframe for completion:	

PC signature	Implementing Entity signature
Date	Date

SECTION 2: POST SITE CLOSURE INSPECTION COMMENTS

Slope:	
Alien invasives:	
Topsoil:	
Anti-erosion:	
Waste:	
Other:	

Outstanding items:

1._____

2._____

3._____

Completion date: _____

PC signature	Implementing Entity signature
Date	Date

Annexure C: Sensitive Areas

Sensitive areas (incl. delineated wetland boundary)

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Annexure D: Minimum Standards for Construction and Maintenance

Note that maintenance information of structures (position, numbering and BoQ) will be determined as part of the planning process (by the PC and/or the Engineer) and will be included in the Rehabilitation Plan together with new wetlands. This information will be available on WetIS for inclusion in the PIPs. It is the Implementing Entity's responsibility to make provision for maintenance activities in the PIP as discussed and agreed with the PC.

Concrete Batching

- Concrete shall be mixed according to the correct MPa and mix information as specified in the construction notes of the respective design drawings.
- All material used in the mixing of concrete are to be of good quality, clean and clear of any organic material.
- Manufacturer's directions for mixing, consistency and treatment after pouring shall be complied with.
- Cement shall be stored in dry conditions for no longer than six weeks after delivery.
- When cement is stored temporarily infield it shall be kept on a dry waterproof base with a waterproof cover.
- The batching of concrete shall be done on a smooth impermeable surface (e.g. shutter ply-wood sheets). The batching area shall be prepared by cutting (not removing) the existing vegetation and covering the natural ground level (NGL) with Geotextile lining (minimum A4 grade). A sand retaining berm is to be constructed on top of the geotextile on the downstream end to contain any run-off. A 250µm plastic lining is to cover the geotextile and sand berm while secured to the NGL. The prepared area should be of sufficient size to prevent overspill of any material of substance. All wastewater resulting from batching of concrete shall be disposed of via a contaminated water management system and shall not be discharged into the environment.
- Contaminated water storage areas shall not be allowed to overflow and appropriate protection from rain and flooding shall be implemented.
- A demarcated site at least 20m away from water/ wetland edge shall be used for cement mixing. No batching activities shall occur directly on unprotected ground.
- Empty cement bags shall be stored in weather proof containers to prevent windblown cement dust and water contamination. Empty cement bags shall be disposed of on a regular basis via the solid waste management system, and shall not be used for any other purpose. Unused cement bags shall be stored so as not to be affected by rain or runoff events. In this regard, closed steel containers shall be used for the storage of cement powder and any additives.
- The Implementing Entity shall ensure that sand, aggregate, cement or additives used during the mixing process are contained and covered to prevent contamination of the surrounding environment.
- The Implementing Entity shall take all reasonable measures to prevent the spillage of cement/ concrete during batching and construction operations. During pouring, the soil surface shall be protected using plastic and all visible remains of concrete shall be physically removed on completion of the cement/ concrete pour and appropriately disposed of. All spoiled and excess

aggregate/ cement/ concrete shall be removed and disposed of via the solid waste management system.

- Construction using shuttering shall take into consideration the structure design dimensions and safe working heights to prevent over extension of shuttering. Steel shuttering panel sizes shall be used to match the dimensions of the final concrete section as close as possible.
- Concrete will be mixed and used on the same day. Time from mixing to final compaction should not exceed 45 minutes.
- The maximum haul distance of mixed concrete by means of wheel barrows should be limited to ensure the maximum time from mixing to final compaction does not exceed 45 minutes.
- Where sand, stone and cement are transported by wheelbarrow to their point of mixing the distance travelled should be limited to 150m.
- Where applicable, the location of the batching site (including the location of cement stores, sand and aggregate stockpiles) shall be as approved by the PC. The concrete batching plant shall be kept neat and clean at all times.
- Water used for mixing purposes will be of suitable non-potable quality and may not be obtained from natural water resources.

Concrete Structures:

- Concrete mix to follow the design specification.
- Participants shall be trained in concrete mixing and placing by an accredited organisation prior to performing construction of concrete structures.
- Concrete to be placed in 300mm layers and vibrated using a concrete vibrator.
- Minimum 50mm cover required on all concrete reinforcing and mesh unless otherwise specified.
- 250µm plastic sheets to be placed under structure.
- All concrete walls to be fully supported until they are backfilled to the designed level.
- All mesh reinforcing to have 500mm overlaps between sheets.
- Buttresses and walls to be cast monolithically with footing.
- Construction joints to be used wherever new concrete is cast against previously cast concrete.
- If rebar or mesh crosses a construction joint, it should be continuous through the joint and extend 600mm into each side.
- Foundation improvement to be constructed from 70kg sandbags made of BIDIM A4 and filled with sand or well graded gravel, where indicated.

Gabion Structures:

- Gabion work shall be done according to design specifications.
- Participants shall be trained in gabion construction by an accredited organisation prior to performing placing or construction of gabion structures.
- Gabion baskets and Reno mattresses to be constructed of minimum double twisted, hexagonal galfan galvanised wire mesh of nominal diameter and 80mm mesh. Frame wire to be 3.4mm outside diameter (o/d) and mesh wire to be 2.7mm o/d with partitions at 1m centres.

- Support and binding wire shall be a minimum 2.2mm. Lacing shall be done according to specification.
- Support wires (bracing) shall be in place according to manufacturer's specifications.
- All adjoining baskets shall be laced together according to manufacturer's specifications.
- Geotextile shall line all faces of the gabion baskets that are exposed to earth and certain water exposed sides with a minimum of 200mm overlap in all directions and stitched with either polyester of galvanised wire at 300mm c/c.
- Water corrosivity shall be determined at each site; if necessary PVC coated gabion gabion wire shall be used as specified.
- Soil dispersivity shall be determined at each site. If dispersive soils are detected, the ECO / Engineer shall be contacted.
- Density of fill material shall satisfy the gabion design. Clay bricks, weathered rock and sandstone and shale shall not be used as fill material. Any unconventional fill material shall be approved by the ECO / Engineer.
- Fill material shall not be smaller than mesh size.
- Where fill material is hauled to its point of placement by means of wheelbarrows, the haul distance shall not be greater than 150m.

Stone Masonry Structures:

- Stone to be packed and mortared in place using concrete with specified strength.
- Concrete mix to follow the design specification
- 100mm - 200mm stone to be used in all stone masonry, gabions and Reno mattresses. Stone fill must be non-friable & insoluble e.g. Granite, basalt, limestone or sandstone.

Geo Cells:

- Geo cells shall not be used in conditions that exceed their design specifications.
- Geo cell material shall be UV resistant.
- Geo cells shall be anchored in by the "trench" method and in such a way that prevents undermining of the cells.
- Fill material shall conform to the design specifications. The following general rules shall be applied: If soil is used to fill the cells, it shall be re-vegetated immediately with optimum prepared soil conditions.
- If concrete is used to fill the cells, some degree of permeability of the structure shall be permitted. If concrete is used as fill, concrete baffles should be inserted or as per specified design. Rock is not suitable for this purpose.

Earth Works

- Excavations may not exceed 1.5m depth without stepping, shoring and/or reinforcement.
- All excavated material temporarily stored shall be placed on Geotextile sheets covering the NGL. If stockpiled for extended periods, it will be done so at predetermined positions approved by the ECO.
- Excavation and compaction must comply with design specifications.

- The ECO / Engineer must be consulted for work undertaken in dispersive, unstable and organic soils.
- Backfilling in trenches must be done in layers of thickness not exceeding 100mm before compaction. Each layer shall be compacted using hand compactors or mechanical rammers at optimum moisture content.
- Where excavation material is hauled by means of wheelbarrows, the haul distance shall not be greater than 150m.

All earthworks shall be undertaken in such a manner so as to minimise the extent of any impacts caused by such activities, particularly with regards to erosion and dust generation. No equipment associated with earthworks shall be allowed outside of the Site and defined access routes unless expressly permitted by the ECO / Engineer.

Rock Packing:

- Stone must be non-friable and insoluble, e.g. granite, basalt, limestone or sandstone
- Rock packs placed across a stream to be tied min 1m into each bank.
- The ECO must approve the source of rocks if not supplied by suitable rock supplier.
- The haul distance may not be greater than 150m where rocks are transported to their point of placement by means of wheel barrows
- The size of rocks must comply with the specifications shown on the drawings and must be handled in a safe manner particularly during offloading/placing. Heavy duty gloves to be worn when handling rocks.

Ecologs:

- Wooden pegs used to anchor EcoLogs are to be no less than 40mm diameter and 1000mm in length.
- Pegs should protrude no less than 600mm from the soil @ 1000 c/c.

MacMat / MacMat-R

- MacMat / MacMat-R to be installed to manufacturers specifications.

Working with Wire (Ecologs, fencing, silt traps)

- Wire used must comply with the engineer's specifications.
- The appropriate tools are to be used for safe handling of wire.
- Heavy duty gloves must be worn when handling wire.
- No loose wire/sharp edges are to remain on completed interventions.
- All excess wire must be removed from the site.
- Stakes used for pegging should not present a tripping/piercing risk (as far as practically possible).

Annexure E: Curriculum Vitae of EAP

Franci Gresse

Qualifications

BSc (Hons) Conservation Ecology

Member, International Association of Impact Assessment (IAIA)

Specialisation

Environmental Impact Assessment Practitioner

Years in industry

8.08

Franci is a senior environmental practitioner in Aurecon's Cape Town office. She has been involved in various environmental investigations, including environmental impact assessments (EIA's), environmental management plans (EMP's), environmental management programmes (EMP's), rehabilitation plans maintenance management plans (MMP's) and fatal flaw analysis.

Franci has been involved with the Working for Wetlands rehabilitation programme for the past five years, of which she has been acting as the Team Leader for the environmental assessment practitioners (EAP's) for the last three years. The Working for Wetlands project won the 2012 Aurecon Chairman's Award for its positive contribution to the natural and social environmental. In addition, Franci has also been involved with a number of projects in the renewable energy sector.

Franci served on the committee of the South African affiliate of the International Association for Impact Assessment (IAIA) for the Western Cape Branch from 2009 to 2011, and remains a member. She completed a Bachelor of Science and an Honours Degree in Conservation Ecology at the University of Stellenbosch (South Africa).

Experience

Working for Wetlands plan 2016 - 2018, Regional South Africa, Department of Environmental Affairs: Natural Resource Management Directorate, 06/2016 - Date, Project Leader

The Natural Resource Management Directorate of the Department of Environmental Affairs appointed Aurecon to provide environmental and engineering services for the Working for Wetlands Programme which is a national wetland rehabilitation programme. Responsibilities include the management and coordination of the overall project, management of the environmental authorisation component of the project, as well as the compilation of basic assessment reports (BAR) for the country. Other responsibilities include the compilation of wetland rehabilitation plans for the Western Cape, Northern Cape and Limpopo Provinces, liaison with authorities and the public (public participation process) and management of wetland specialists.

Integrated Environmental Impact Assessment (EIA) for the proposed extension of the Ash Dam facility at Kriel power station, Mpumalanga Province, South Africa, Eskom Holdings, 06/2016 - date, Project Leader

Appointed by Eskom to conduct an integrated environmental impact assessment (EIA) for the proposed construction of a fourth ash dam facility at the Kriel power station. Responsible for the general project management and finances, authority liaison and the compilation and review of the EIA documentation.

Amended Environmental and Socio-Economic Impact Assessment for a concentrated solar plant facility near Arandis in the Erongo Region, 02/2016 – 10/2016, Project Leader

Aurecon was appointed by the NamPower to amend the Environmental Clearance Certificate (ECC) issued for the Erongo Coal-fired Power Station at Arandis, to a Concentrated Solar Plant. Responsibilities included project management (programme, finances and client expectations), liaison with authorities and relevant stakeholders, review of specialist reports and the compilation and review of the Amendment Report.

Franci Gresse Senior Environmental Impact Assessment Practitioner

Table Mountain Group (TMG) Aquifer feasibility study and pilot project, Western Cape Province, South Africa, City of Cape Town, 2015 - date, Environmental Consultant

The TMG Aquifer Feasibility Study and Pilot Project was initiated in 2002 and is a long term planning initiative to investigate the groundwater potential of the TMG Aquifer as a water source to augment Cape Town's water supply. Given the recommendations in the Exploratory Phase report, and the fact that the TMG Aquifer has since been utilised as a water resource in areas such as Hermanus and Oudtshoorn, the City of Cape Town decided to omit the Pilot Phase and rather proceed with an extended Exploratory Phase, which would include limited pump testing. Aurecon was appointed n to undertake the extended Exploratory Phase work. Responsibilities include the compilation of Environmental Management Plans for the additional test sites, liaison with the relevant authorities and landowners and management of the Environmental Control Officers on the project.

Implementation of the Hoekplaas environmental authorisation (EA), Northern Cape Province, South Africa, Mulilo Renewable Energy, 11/2013 - 05/2015, Project Leader

Aurecon assisted the holder of the environmental authorisation (EA) for the 100 MW photovoltaic (PV) facility in De Aar with the implementation of the environmental conditions to ensure compliance to all relevant environmental legislation. Responsible for the management of tasks and review of all documentation. Also assisting client with questions on the environmental impact assessment (EIA) process.

Environmental impact assessment and compilation of an environmental management plan (EMP) for the Swakopmund-Mile 7 Water Supply, Phase 2, Swakopmund, Namibia, NamWater, 11/2013 - 10/2015, Project Leader

NamWater appointed Aurecon to assist with the environmental impact assessment process for the proposed construction of a new bulk water pipeline between Swakopmund and Mile 7. Responsible for the management and review of the environmental impact assessment (EIA) reports and processes, as well as the project's finances.

Working for Wetlands plan 2014 - 2016, Regional South Africa, South African National Biodiversity Institute (SANBI), 06/2013 – 05/2016, Task Leader

The South African National Biodiversity Institute (SANBI) appointed Aurecon to provide environmental and engineering services for the Working for Wetlands Programme which is a national wetland rehabilitation programme. Responsible for the management of the environmental authorisation component of the project, as well as the compilation of basic assessment reports (BAR) for the country. Other responsibilities include the compilation of wetland rehabilitation plans for the Western Cape, Northern Cape, North West and Limpopo Provinces, liaison with authorities and the public (public participation process) and management of wetland specialists.

Franci Gresse Senior Environmental Impact Assessment Practitioner

Maintenance management plans (MMP's) for flood damaged road infrastructure, Western Cape Province, South Africa, Western Cape Provincial Government Department of Transport and Public Works, 06/2013 - Date, Project Staff

The project entails the compilation of maintenance management plans (MMP's) for two local municipal areas (Laingsburg and Worcester), as well as obtaining the necessary permits/ water use authorisations. Personally involved during the project commencement with regards to strategy development, meetings with the relevant authorities and assistance with the development of the MMP's.

Environmental impact assessment (EIA) for the expansion of approved solar energy facilities located near Prieska and De Aar, Northern Cape Province, South Africa, Mulilo Renewable Energy, 03/2013 - 09/2015, Phase Leader

Mulilo Renewable Energy decided to expand the approved solar energy facilities on the farms Hoekplaas and Klipgats in Prieska, as well as on the farms Badenhorst Dam and Du Plessis Dam in De Aar. The expasion of Hoekplaas farm in Prieska includes ten additional 75 MW photovoltaic (PV) facilities and six additional PV units at Klipgats Pan farm. The expansion at Badenhorst Dam farm includes four additional 75 MW PV facilities and three additional PV units at Du Plessis Dam farm. Responsible for the management and review of the environmental impact assessment (EIA) reports and processes, as well as the project's finances.

Fatal flaw study for two potential Wind Energy Facility (WEF) sites, Northern and Western Cape Provinces, South Africa, Juwi Renewable Energies (Pty) Ltd, 03/2013 - 04/2013, Environmental Practitioner

The study entailed a fatal flaw analysis of two potential wind energy facility (WEF) sites in the Northern and Western Cape Provinces. Responsible for the assessment of the sites and compilation of the fatal flaw report.

Richtersveld wind energy facility (WEF), Northern Cape Province, South Africa, TRE Tozzi Renewable Energy S.p.A and Guma Group, 07/2012 - 09/2013, Environmental Practitioner

The project entailed a due diligence of the proposed wind energy facility (WEF) to review compliance with the requirements of the Department of Energy's independent power producer (IPP) process. Responsible for the review of the environmental reports and compilation of the due diligence report.

Three photovoltaic (PV) energy facilities near Copperton, Northern Cape Province, South Africa, Mulilo Renewable Energy (MRE), 09/2011 - 05/2015, Environmental Practitioner

The project entailed three environmental impact assessments (EIA's) for three photovoltaic (PV) energy facilities comprising 75 MW to 150 MW, located near Copperton. Responsible for the management the EIA process and project specialists, compilation of scoping and EIA reports and liaison with authorities.

Fatal flaw study for four potential wind energy facility (WEF) sites, Northern and Western Cape Provinces, South Africa, Mainstream Renewable Power South Africa, 11/2011 - 05/2012, Environmental Practitioner

The study entailed a fatal flaw analysis of four potential wind energy facility (WEF) sites across the Northern and Western Cape Provinces. Responsible for the management of specialists, review of reports, assessment of the sites and compilation of the fatal flaw report.

Franci Gresse Senior Environmental Impact Assessment Practitioner

Implementation of the Klipgats Pan environmental authorisation (EA), Northern Cape Province, South Africa, Mulilo Renewable Energy, 09/2011 - 05/2015, Project Leader

Aurecon was appointed to undertake three environmental impact assessments (EIA's) for three proposed phtovoltaic (PV) solar energy plants near Copperton. The first PV solar energy plant will generate around 100 MW (preferred alternative) or 150 MW (alternative) on the Hoekplaas Farm (Farm 146/RE). The proposed PV plant will cover approximately 300 ha (preferred alternative) or 450 ha (alternative). The second includes a PV solar energy plant to generate roughly 100 MW on the farm Klipgats Pan (Farm 117/4) near Copperton in the Northern Cape. The proposed PV plant will cover an estimated 300 ha. An alternative site for a 100 MW PV plant with a 300 ha footprint is also being considered. The third comprises a PV solar energy plant to generate about 100 MW (preferred alternative) or 300 MW (alternative) on the farm Struisbult (Farm 104, portion 1) which will cover 300 ha to 900 ha. Responsible for managing tasks and reviewing all documentation for updating the environmental management plan (EMP) and implementing the environmental authorisation (EA). Also assisted client with questions on the EIA process.

Proposed rehabilitation of Wetlands as part of the Working for Wetlands, Regional, South Africa, South African National Biodiversity Institute (SANBI), 08/2011 - 09/2013, Environmental Practitioner

Appointed by the South African National Biodiversity Institute (SANBI) to conduct environmental impact assessments (EIA's) for the rehabilitation of specific wetlands in all provinces of South Africa over a five year period. Responsible for the compilation of basic assessment reports (BAR) and Wetland Rehabilitation Plans for the Western Cape, Northern Cape, Gauteng and Limpopo Provinces. Other responsibilities included liaison with authorities, public participation process, management of specialists and general project management of the environmental component of the project.

Repair of flood damage to road structures in the Eden District Municipality, Western Cape Province, South Africa, Western Cape Provincial Department of Transport and Public Works, 01/2011 - Date, Environmental Practitioner

The project entails the compilation of maintenance management plans (MMP) for seven areas with the Eden District Management Area to repair. Responsible for compilation of MMP's, review of reports and liaison with stakeholders and authorities.

Environmental impact assessment (EIA) for the proposed extension of the Ash Dam facility at Kriel power station, Mpumalanga Province, South Africa, Eskom Holdings, 11/2009 - 12/2015, Environmental Practitioner

Appointed by Eskom to conduct an environmental impact assessment (EIA) for the proposed construction of a fourth ash dam facility at the Kriel power station. Responsible for the general project management and finances, screening process, compilation of the scoping and EIA reports, public participation and the compilation of a waste management licence application.

Franci Gresse Senior Environmental Impact Assessment Practitioner

Environmental impact assessment (EIA) for proposed relocation of solar energy facility, Onder Rietvlei Farm, Aurora, Western Cape Province, South Africa, Solaire Direct Southern Africa, 2010 - 2011, Project Leader

Appointed by Solaire Direct to undertake a basic environmental impact assessment (EIA) process for the proposed relocation of an approved, but not yet constructed 10 MW solar energy facility. Responsible for the management and review of the EIA process and finances.

Environmental impact assessment (EIA) for proposed solar energy facility, Onder Rietvlei Farm, Western Cape Province, South Africa, Solaire Direct Southern Africa, 07/2010 - 02/2012, Environmental Practitioner

Appointed by Solaire Direct to undertake a basic environmental impact assessment process for the proposed construction of a 10 MW solar energy facility. Responsible for the compilation of the draft and final reports, public participation process, management of specialists and general project management.

Proposed Paarl Mountain and Ysterbrug pumping main upgrades, Western Cape Province, South Africa, Drakenstein Municipality, 06/2010 – 12/2015, Environmental Advisor

The Drakenstein Municipality appointed Aurecon's engineers to investigate and plan the proposed upgrade of the Paarl Mountain and Ysterbrug Pumping Scheme. The upgrading of the pipelines feeding the Meulwater Water Treatment Works from the Bethel and Nantes dams, also part of this scheme, was also investigated. Responsible for providing advice on environmental processes required. Other responsibilities included the management of the independent environmental assessment practitioner and the review of all environmental impact assessment (EIA) documentation.

Environmental sensitivity study (ESS) for a proposed solar energy facility on a farm Near Aurora, Western Cape Province, South Africa, Solaire Direct Southern Africa, 2010, Environmental Practitioner

Appointed to provide and environmental sensitivity study (ESS) which inter alia highlights the potential constraints ('red flags') and opportunities presented by the site from an environmental perspective. Responsible for the compilation of the ESS.

Proposed remediation, rehabilitation and restoration of the Spruit, Krom, Leeu and Palmiet Rivers, Western Cape Province, South Africa, Drakenstein Municipality, 2009 - 2010, Environmental Practitioner

Appointed by the Drakenstein Municipality to undertake the requisite environmental impact assessment (EIA) process for the rehabilitation, remediation and stabilisation of four rivers in Paarl and Wellington. Responsible for the EIA and public participation processes.

Proposed construction of a new pipeline from Bovlei Winer to Withoogte Dam, Wellington, Western Cape Province, South Africa, Drakenstein Municipality, 2009 - 2010, Environmental Practitioner

The Drakenstein Municipality proposed to replace a section of the existing pipeline extending from the Withoogte Dam to the Welvanpas Reservoir near Wellington as part of the municipality's water master plan in order to improve the overall water supply. Responsible for the compilation of the environmental impact assessment (EIA) report, management of specialists and the public participation process.

Franci Gresse Senior Environmental Impact Assessment Practitioner

Proposed erection of Eskom communication sirens and public anouncement (PA) systems, Blaauwberg, Western Cape Province, South Africa, Eskom, 2009 - 2010, Environmental Practitioner

The project entailed three environmental impact assessment (EIA) processes for the (a) erection of 10 new sirens in the Parklands area, (b) the relocation of one siren in Bloubergstrand, and (c) the upgrade of five sirens on farms near Melkbosstrand. Responsible for compiling environmental impact assessment (EIA) reports, and the public participation process.

Overberg District Municipality integrated transport plan (ITP) strategic environmental informants, Western Cape Province, South Africa, Overberg District Municipality, 2009, Environmental Practitioner

Aurecon's Transportation Unit was appointed to revise the integrated transport plan (ITP). The Environmental Unit was subcontracted to provide environmental input. Responsible for identifying and describing the relevant informants.

Annandale Commercial: development of petrol filling station on portion of Erf 5561, Kuils River, Western Cape Province, South Africa, Communicate, 2009, Environmental Practitioner

Appointed to compile a construction environmental management plan (CEMP) for the construction of a filling station on the corner of Gladioli Street and Amandel Drive, Kuils River. Responsible for the compilation of the project specification document as part of the CEMP.

Environmental impact assessment (EIA) for the proposed Langezandt Quays development in Struisbaai Harbour, Western Cape Province, South Africa, Golden Falls (Pty) Ltd, 2008 - Date, Environmental Practitioner

Aurecon was appointed to undertake an environmental impact assessment (EIA) process for the proposed development of a four storey development on Erf 848 within the Struisbaai harbour precinct. Responsible for drafting responses to the Department of Environmental Affairs' independent review report on the proposed development.

Pre-feasibility and feasibility studies for augmenting the Western Cape water supply system, South Africa, Department of Water Affairs (DWA), 2008 - 2013, Project Staff

The Department of Water Affairs commissioned pre-feasibility and feasibility studies for the augmentation of the Western Cape water supply system through the further development of the surface water resources. Surface water schemes to be investigated were identified by the Western Cape water supply system reconciliation strategy study. Responsible for the public participation process, managing environmental specialists, and compiling a socio-economic overview of the study area.

Proposed redevelopment of the Blaauwberg Conservation Area: Eerstesteen Node, Western Cape Province, South Africa, City of Cape Town, 2008 - 2010, Environmental Practitioner

The project entailed an environmental impact assessment (EIA) process for redeveloping the Eerstesteen Conservation Area on the West Coast. Responsible for compiling the EIA report, as well as managing specialists and the public participation process.

Franci Gresse Senior Environmental Impact Assessment Practitioner

Table Mountain Group aquifer feasibility study and pilot project, Western Cape Province, South Africa, City of Cape Town, 2008 - 2010, Environmental Control Officer

The City of Cape Town initiated a study into the Table Mountain Group Aquifer as a potential water source to augment the city's supply. The feasibility and pilot project phase record of decision (RoD) required completion for site-specific environmental management plans (EMP's) for drilling sites that were assessed to be environmentally sensitive. Site-specific EMP's were designed for sensitive sites to ensure minimal environmental impact during the drilling phase. Responsible for monitoring compliance with the RoD and EMP during the drilling phase.

Water reconciliation strategy for the Algoa water supply area, Eastern Cape Province, South Africa, 2008 - 2009, Environmental Practitioner

This project provided an assessment of the environmental opportunities and constraints for a suite of water schemes in the Algoa water supply area. This was undertaken as part of a broader study in the area.

Application for rectification in terms of Section 24G of the National Environmental Management Act (NEMA) for the unlawful commencement of a fruit processing factory on Op de Tradouw Farm, Number 69, Barrydale, Western Cape Province, South Africa, Schoonies Family Trust, 2008 - 2009, Environmental Practitioner

The project consisted of an application for rectification in terms of Section 24G of NEMA. Responsible for compiling an environmental impact report and an environmental management plan (EMP) for the application, as well as managing the public participation process.

Proposed development of apple and pear orchards on Soetmelksvlei Farm, Western Cape Province, South Africa, BETCO, 2008 - 2009, Project Staff

This Agri-development project involved the development of 50 ha of apple and pear orchards in the Riviersonderend region. Responsible for compiling the basic assessment report, environmental management plan (EMP), and managing the specialists and public participation process.

C.A.P.E. Olifants-Doring Catchment Management Agency project: Development of a catchment management strategy water resource protection sub-strategy for the Olifants-Doring Catchment, South Africa, CapeNature, 2008 - 2009, Environmental Practitioner

Appointed by CapeNature to compile a catchment management strategy water resource protection sub-strategy for the Olifants-Doorn catchment. Responsible for compiling a database that lists all institutions and their respective mandates in terms of water resource protection and biodiversity conservation decision making for the Olifants-Doring Catchment, workshop arrangements, and general project related work.

Environmental sensitivity study for the proposed Dasdrif poultry farm in Moorreesburg, Western Cape Province, South Africa, Eikenhoff Poultry Farms (Pty) Ltd, 2008, Project Staff

The project consisted of an environmental sensitivity study (ESS) which, inter alia, highlighted the potential constraints ('red flags') and opportunities presented by the site from an environmental perspective. Responsible for compiling the ESS.

Qualifications

MSc Geography

BSc (Geography and Environmental Management)

BSc Geography (Hons)

Environmental Assessment Practitioner, Interim Certification Board of Environmental Assessment Practitioners of South Africa

Candidate Natural Scientist, South African Council for Natural Scientific Professions (SACNASP)

Member, International Association for Impact Assessment (IAIAsa), South Africa

Member, Institute of Waste Management of Southern Africa (IWMSA)

Specialisation

Environmental Specialist

Years in industry

7

Languages

Afrikaans

English

Margaret Lowies

Senior Environmental Scientist

Margaret is a senior environmental scientist currently based in Aurecon's Port Elizabeth office. She has over seven years of experience in environmental impact assessment (EIA) processes, water use licence applications, waste licence applications, environmental compliance auditing, mining permit applications, wetland assessments, due diligence assessments and water quality assessments. Most of these projects have been focussed at a municipal level within the various municipalities of the Eastern Cape, and her roles include both the technical work and overall project management. Her role as an environmental control officer (ECO) has also given her a very practical understanding of how projects of various scales are implemented.

She obtained a BSc degree in Geography and Environmental Management, a BSc in Geography (Hons) as well as an MSc degree in Geography from the University of Johannesburg, South Africa in 2008, 2010 and 2014 respectively. She is registered as an environmental assessment practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPSA) and is a registered candidate natural scientist with the South African Council for Natural Scientific Professions (SACNASP). She is also member of the Institute of Waste Management of South Africa (IWMSA) and the South African affiliate of the International Association of Impact Assessment (IAIAsa).

Experience

Training & Capacity Building

Working for Wetlands ECO training, South Africa,

Having worked on the planning cycles of the Working for Wetlands Programme for many years, Margaret provided training on the importance of implementing the appropriate mitigation measures during wetland rehabilitation. This was guided by her experience as an Environmental Control Officer.

Environmental Control Officer

Construction of Zone 7 municipal infrastructure to service the TNPA Tank Farm, Eastern Cape Province, South Africa, Coega Development Corporation (CDC), 10/2007 - 12/2025, Environmental Control Officer

The project involved the construction of roads, a stormwater detention pond and the installation of various services. Responsible for ensuring compliance with environmental assessment and CDC standard environmental specifications.

Dordrecht water and sanitation services upgrade, Eastern Cape Province, South Africa, Chris Hani District Municipality, 10/2015 - 12/2017, Environmental Control Officer

This project is divided into four future projects, which includes the construction of new sewage treatment facilities; the construction of new reticulation in Dordrecht; immediate water supply upgrades and long-term bulk water supply upgrades. Responsible for report review.

Margaret Lowies Senior Environmental Scientist

Northern outfall sewers, Mthatha, Eastern Cape Province, South Africa, Amatola Water - Amanzi, 06/2013 - 12/2017, Environmental Control Officer

The project entailed consulting engineering, social facilitation and environmental services for the construction of the outfall sewers along the banks of the Mthatha River. This involved the installation of 1 200 mm diameter sewer pipes, crossing the river above ground and below the river bed level. The sewage will discharge into a 17 m-deep pump station, from where it will be pumped into the head of the existing wastewater treatment works (WWTW).The project also entailed the application for a water use licence application (WULA). Responsible for management of environmental site officer, report writing and WULA report/application review.

Construction of Graaff-Reinet solid waste site, Eastern Cape Province, South Africa, Camdeboo Local Municipality, 12/2010 - 12/2016, Environmental Control Officer

The project comprised the construction of a new solid waste site outside Graaff-Reinet. Responsible for monitoring compliance with the environmental management plan (EMP) and record of decision (ROD).

Construction environmental management plan (EMP) for Ugie particle board plant, Eastern Cape Province, South Africa, PG Bison, 08/2006 - 08/2016, Environmental Control Officer

The project entailed a construction environmental management plan (EMP), operation environmental management plan (OEMP), atmospheric emissions license (AEL) reviews and ongoing monitoring for the Ugie particle board plant. Responsible for operational compliance auditing.

Sidwadweni Bulk Regional Water Supply Scheme, Eastern Cape Province, South Africa, Amatola Water - Amanzi, 09/2012 - 07/2016, Environmental Control Officer

The project included the construction of river abstraction, raw water reservoir, water treatment works (WTW), clear water pump station and bulk supply mains for the Sidwadweni Bulk Regional Water Supply Scheme. Responsible for report review.

Idutywa East Water Supply Scheme (WSS), Eastern Cape Province, South Africa, Amathole District Municipality (ADM), 05/2006 - 12/2015, Environmental Control Officer

Aurecon undertook the design and construction of the Idutywa East Water Supply Scheme (WSS) in the Eastern Cape Province. Responsible for ensuring environmental compliance and report review.

Khayamnandi housing development project, Eastern Cape Province, South Africa, Nelson Mandela Bay Metropolitan Municipality (NMBMM), 02/2011 - 01/2015, Environmental Control Officer

The project entailed environmental services for the development of Khayamnandi extension on erven 114, 609, 590 and 24337, Bethelsdorp, including the construction of 7 960 residential stands, business stands and community facilities and supporting infrastructure. Responsible for overall environmental monitoring and inputs as well as compilation/review of monthly audit reports.

Cookhouse Wind Farm project, Eastern Cape Province, African Clean Energy Developments (ACED), 12/2012 - 12/2014, Environmental Control Officer

Aurecon was appointed as owner's engineer for the construction of a 140 MW wind farm in the Eastern Cape Province of South Africa. The scope of services included design review, site supervision, environmental monitoring, health and safety monitoring and witnessing of commissioning and testing. The Cookhouse Wind Farm Stage 1 comprise 66 x Suzlon S88 2.1 MW wind turbines, associated roads and foundations, electrical reticulation, substation, supervisory control and data acquisitioning (SCADA) system as well as a 132 kV overhead line (OHL) to the Poseidon substation. The scope of owner's engineer services has been structured to align with the role and obligations of the owner's engineer defined in the draft engineering, procurement and construction (EPC) agreement for the project. Responsible for overseeing environmental compliance of the project including updating of the environmental management plan (EMP), approval of method statements, environmental authorisation and layout amendments, bi-weekly audits with a monthly environmental assessment (EA) and EMP compliance report.

Advisory

Reconciliation strategy for Algoa Water Supply System (WSS), Eastern Cape Province, South Africa, Department of Water and Sanitation, 04/2016 - 03/2019, Environmental Specialist - Advisory

The project objectives are to put arrangements and resources in place for the ongoing implementation of the recommendations and maintenance of the Algoa Reconciliation Strategy; to evaluate the efficiency of the Orange-Fish-River Project and to remove potential operating system constraints for the sustainable delivery of the Orange River bulk water supply to the Lower Sundays River Government Water Scheme (LSRGWS) and to Nelson Mandela Bay Municipality (NMBM) for water requirements up to 2040. In order to evaluate the efficiency of the Orange River Project Aurecon will estimate water use efficiency; determine catchment yields of the Fish and Sundays catchments; give recommendations for the phasing-out of current gratis allocations; identify potential water savings and provide options for re-allocation as well as confirm an official allocation from the Teebus Tunnel to the Orange-Fish System (OFS) in the Eastern Cape. While the focus is on providing additional balancing storage in addition to the Scheepersvlakte Balancing Dam, the provision of storage at other potential locations in the bulk transfer infrastructure must also be considered. Responsible for ad hoc advisory relating to environmental legislation compliance and general environmental matters.

Public Servant Association Social and Labour Plan (SLP), Eastern Cape Province, South Africa, Public Servant Association, 12/2010 - 02/2011, Environmental Assessment Practitioner

The Social and Labour Plan (SLP) was done in order to obtain a mining right conversion for the Department of Mineral Resources (DMR) for the Gonubie Sand Mine. Responsible for compilation of SLP and communication with DMR.

Margaret Lowies Senior Environmental Scientist

Integrated Environmental Permitting (EIAs, EMPs and MMPs)

Working for Wetlands Programme, Department of Environmental Affairs, 06/2011 - 04/2018, Environmental Assessment Practitioner - Coordinator of the Mpumalanga and Eastern Cape Provincial teams

Aurecon was appointed in 2011, 2013 and then again in 2016 for a three-year cycle for the design, planning, environmental, project and risk management of the Working for Wetlands programme. The programme's objective is to rehabilitate damaged wetlands throughout South Africa, with an emphasis on complying with the principles of the Expanded Public Works Programme (EPWP) through employing only local small, medium and micro enterprises (SMMEs). Involvement included site work, a rehabilitation plan and basic assessment report to enable the rehabilitation of various wetlands within the Mpumalanga and Eastern Cape provinces. Responsible for coordination of provincial team (wetland specialist, engineer and DEA Assistant Director) and report writing.

Motherwell North Bulk Sewer, Eastern Cape Province, South Africa, Nelson Mandela Bay Metropolitan Municipality (NMBMM), 12/2015 - 10/2017, Project Leader/Environmental Assessment Practitioner

Aurecon was appointed to undertake environmental authorisations for the Motherwell North Bulk Sewer project. This included environmental impact assessment (EIA), heritage, water use licenses (WUL) and specialist studies for the 1.5 m diameter collector sewer of 10 km. Responsible for project management and review of report.

Misgund augmentation bulk water supply, Eastern Cape Province, South Africa, Amatola Water - Amanzi, 01/2014 - 06/2017, Environmental Assessment Practitioner/Specialist

The project entailed a study to determine the technical feasibility of bulk water supply in Misgund as per the Department of Water Affairs (DWA) guidelines for Regional Bulk Infrastructure Grant (RBIG) projects. Responsible for environmental impact assessment (EIA) process, water use licence application (WULA) and wetland assessment.

Upgrading and permitting of the Klipplaat landfill site, Eastern Cape Province, South Africa, Ikwezi Local Municipality, 10/2011 - 06/2016, Environmental Assessment Practitioner

The project involved the upgrading and permitting of the existing Klipplaat landfill site. This includes a scoping-environmental impact assessment (EIA) process as well as waste licence application process. Responsible for managing the EIA process, including public participation and report writing and review.

Bende water supply scheme, Eastern Cape Province, South Africa, Amathole District Municipality, 05/2014 - 02/2015, Environmental Assessment Practitioner

Aurecon was appointed for the environmental management for the proposed implementation of two rural water supply schemes at Bende and Shixini in the Eastern Cape Province. Responsible for report review, appointment of specialists and management of environmental impact assessment (EIA) process.

Upgrading of National Route 61 Section 6 (R61/6) from All Saints (Km 68.5) to Section 7 - Baziya (Km 12), between Baziya and Queenstown, Eastern Cape Province, South Africa, South African National Roads Agency Limited

(SANRAL), 04/2012 - 12/2014, Environmental Assessment Practitioner/Environmental Specialist

Aurecon was appointed by Jeffares & Green (J&G), on behalf of the South African National Roads Agency Limited (SANRAL), to undertake an all environmental authorisation and public participation process (PPP) for the proposed road upgrade of National Route R61. The project involved the upgrading of a 36 km stretch of road as well as replacing five bridges. Responsible for project management, report writing and water quality specialist report.

Social impact assessment (SIA) for augmentation of the Driftsands collector sewer, Eastern Cape Province, South Africa, Nelson Mandela Bay Metropolitan Municipality (NMBMM), 08/2011 - 10/2011, Environmental Assessment Practitioner

The project involved a survey of households in the Walmer Township that are impacted by the augmentation of the Driftsands sewer collector. Responsible for coordination of survey, capturing of data and report writing.

Other Environmental Permitting/ Management Projects

- Churchill water treatment works (WTW), Eastern Cape Province, 03/2007 – 12/2020, Environmental Assessment Practitioner
- Upgrade of Brickfields pre-treatment works in Nelson Mandela Bay Metropolitan Municipality, 12/2010 – 07/2020, Environmental Assessment Practitioner
- Sewer maintenance backlog study for the Nelson Mandela Bay Metropolitan Municipality, Eastern Cape Province, South Africa, Nelson Mandela Bay Metropolitan Municipality (NMBMM), 10/2004 - 07/2020, Environmental Assessment Practitioner
- Environmental impact assessment for pipe upgrade of Eastbury Drive Sewer, KwaZulu-Natal Province, South Africa, eThekwini Municipality, 06/2016 - 05/2019, Environmental Assessment Practitioner
- Environmental services for upgrading of R75, Eastern Cape Province, South Africa, South African National Roads Agency Limited (SANRAL), 02/2015 - 02/2018, Project Leader/Environmental Assessment Practitioner
- Woodchem water use licence, Mpumalanga Province, South Africa, KAP Diversified Industrial (Pty) Ltd, 04/2016 - 07/2017, Environmental Specialist
- Environmental impact assessment (EIA) for Coega wastewater treatment works (WWTW), Eastern Cape Province, South Africa, Nelson Mandela Bay Metropolitan Municipality (NMBMM), 12/2014 - 05/2017, Project Leader/Environmental Assessment Practitioner
- Water use licence application (WULA) and wetland assessment for Grassridge to Melkhout 132 kV line, Eastern Cape Province, South Africa, Eskom SOC Ltd, 11/2014 - 12/2015, Environmental Specialist/Project Leader
- Proposed construction of the Ingquza Hill Museum - basic assessment, Eastern Cape Province, South Africa, National Department of Arts and Culture, 08/2013 - 10/2013, Environmental Assessment Practitioner

APPENDIX G

STAKEHOLDER DATABASE

Stakeholder Database

Stakeholder	Contact	Organisation
National Stakeholders	Mr Mark Anderson	Birdlife South Africa
	Ms Mpume Ntlokwana	Department of Agriculture Forestry & Fisheries
	Ms Serah Muobeleni	Department of Agriculture Forestry & Fisheries: Land Use and Soil Management
	Ms Wilma Lutsch	Department of Environmental Affairs: Biodiversity Conservation
	Mr Danie Smit	Department of Environmental Affairs: Sensitive Environments
	Ms Naomi Fourie	Department of Water and Sanitation
	Dr Paul Meulenbeld	Department of Water and Sanitation
	Ms Jackie Jay	Department of Water and Sanitation
	Ms Barbara Weston	Department of Water and Sanitation
	Mr Kelvin Legge	Department of Water and Sanitation
	Mr Bongani Madikizela	Water Research Commission
	Ms Olga Jacobs	SANParks: Biodiversity and Social Projects
	Mr Steven Segang	Endangered Wildlife Trust
	Mr Ahmend Khan	Department of Environmental Affairs
	Mr Louwrens Ferreira	Department of Environmental Affairs
	Mr Wemer Roux	Department of Environmental Affairs
	Ms Kerryn Morrison	Endangered Wildlife Trust
	Ms Tanya Smith	Endangered Wildlife Trust
	Morgan Griffiths	WESSA
	Mr Dumisani Mabona	Department of Environmental Affairs: Sensitive Environments
	Mr Umesh Bahadur	Department of Environmental Affairs: Working for Wetlands
	Mr Farai Tererai	DEA: Working for Wetlands: Manager: Planning, Monitoring and Evaluation
	Dr Piet-Louis Grundling	Department of Environmental Affairs: Working for Wetlands

Stakeholder	Contact	Organisation
	Mr Seoka Lekota	DEA: Biodiversity Conservation
	Khosa Tsunduka	Department of Water and Sanitation
	Malaudzi Nkumbudzeni	Department of Water and Sanitation
	Lumka Kuse	Department of Water and Sanitation
	Xolani Hadebe	Department of Water and Sanitation
Provincial Stakeholders: State Authorities	Mr Thingahangwi Malotsha	Limpopo Department of Economic Development, Environment and Tourism
	Mr Chris S Nghenabo	Limpopo Department of Economic Development, Environment and Tourism
	Mr Vincent Egan	Limpopo Department of Economic Development, Environment and Tourism
	Mr Meshack Masindi	Limpopo Department of Economic Development, Environment and Tourism
	Mr Donald Lithole	Limpopo Heritage Resource Authority
	Mr Nimrod Mathivha	Department of Agriculture
	Mr David Nethengwe	Department of Water and Sanitation
	Mr Foletgi Mahlakoane	Department of Agriculture, Forestry & Fisheries
	Mr Sam Makhubele	Limpopo Department of Economic Development, Environment and Tourism
	Mr Solly Kgopong	Limpopo Department of Economic Development, Environment and Tourism
	Mr Vusi E Makhubele	Limpopo Department of Economic Development, Environment and Tourism
	Ms Magdeline Msimanga	Department of Water and Sanitation
	Mr Love Hlekane	Department of Water and Sanitation
	Mr Anton Van Wetten	Limpopo Department of Economic Development, Environment and Tourism
Landowner	Mr Nditsheni Seth Nethengwe	Thengwe Tribal Authority
	Mr Reuben Mabunda	Mahumani Tribal Authority
	Hosi Mahumani	Mahumani Tribal Authority
	Mr Madi Simon	Thulamela Local Municipality

Stakeholder	Contact	Organisation
Municipal Stakeholders	Mr C Mapholi	Vhembe District Municipality
	Mr Godfrey Mawela	Vhembe District Municipality
	HE Maluleke	Thulamela Local Municipality
	Mrs J Selapyane	Bela-Bela Local Municipality
	Cllr Thoma Tuaani	Thulamela Local Municipality
	Cllr TS Pandelane	Thulamela Local Municipality
	Mr Ombali Phineas Sebola	Modimolle/Mookgophong Local Municipality
	Ms Marlene Van Staden	Modimolle/Mookgophong Local Municipality
	Mr Robert Mokgalabone	Limpopo Tribunal
	Cllr M.J Aphiri	Limpopo Executive Council
	Cllr R.R Molapo	Limpopo Executive Council
	Mr Republic Monakedi	Mopani District Municipality
	Mr Dumisani Shitlhangu	Mopani District Municipality
	Ms Faith Maboya	Mopani District Municipality
	Cllr Nkakareng Rakgoale	Mopani District Municipality
	Maxwell Chauke	Greater Giyani Local Municipality
General I&APs	Mrs Kelly Abram	Waterberg Biosphere
	Mr Mick Angliss	LEDET
	J.A Bierman	Marievale Farms
	Mr Michael Breetzke	Southern Mapping
	Ms Terry Calmeyer	ILISO Consulting Environmental
	Mr Mahlomola Ernest Daemane	SANParks
	Mr Samuel Davidson-Phillips	Welgevonden Game Reserve
	Mr C.S Deetlefs	Smithvlei
	Ms Natasha Du Plessis	Nylsvley Nature Reserve
	Ms Marion Dunkeld-Mengell	Friends of Nylsvley
	Ms Helette Dunne	SANParks: BSP
	Martin Engelbrecht	Mapungubwe Conservation manager
	Prof Paul Fauche	University of Venda

Stakeholder	Contact	Organisation
	Ms Navashni Govender	SANParks
	Ms Cathy Greaver	SANParks
	Mr Zebulon Hlungwane	SANParks
	Steven Khoza	Private I&AP
	Ernest Lesoalo	University of Limpopo
	Ntombi Majozi	Private I&AP
	Mr Jerome Mandoma	Zwisimane
	Manoko Masilo	LEDET
	Ms Doris Maumela	Department of Water and Sanitation
	Mr Stephen Midzi	SANParks
	Mr Zebulon Modilkwe	Lepelle Northen Water Board
	Tumelo Mokgotho	Marakele Project Manager
	Mr Kesentseeng Mosotho	Limpopo Department of Agriculture
	Nketso Mphake	SANParks
	M.S. Mugivhi	LEDET
	Mr Daniel Mundalamo	Mutale Community Representative
	Mr Hector Muvhenzhe	SANParks: Field Assistant
	Anathi Nabi	Private I&AP
	Mr David Neguyuni	Mutale Community Representative
	Mphadeni Nthangeni	Marakele National Park
	Mr Kenny Phasha	Tsogang Water and Sanitation
	Ms Winnie Phuluwa	Department of Water and Sanitation
	Abel Ramavhale	Private I&AP
	Mr Marius Renke	SANParks
	Mr B Schroder	Welgevonden Game Reserve
	Mr Richard Selemela	Department of Agriculture
	CJ Smith	Roosvlei
	Mr Marius Snyders	Ripzone

Stakeholder	Contact	Organisation
	Mr Peter Tsheola	LEDET
	M.S Tshikundamalema	Tshikundamalema
	Kennedy Tshivase	Senior Traditional Leader
	Mr Eddie Ubisi	SANParks
	Mrs C West	Elangeni DooranDraai
	Nick Zambatis	Biodiversity Conservation
	Moses Ratshivhadelo	Tswelopele Ya Rena Tra. Co.
	Lorraine Maloma	Tswelopele Ya Rena Tra. Co.
	Sello Ledwaba	Department of Environmental Affairs
	Pamole Motshana	Private I&AP
	Thuso Maphuthu	Private I&AP
	Mr John Wesson	WESSA
	Thomas Tshivhandekano	Private I&AP

APPENDIX H

EAP & SPECIALIST CVs

DETAILS OF THE ENVIRONMENTAL ASSESSMENT PRACTITIONER, DECLARATION OF INTEREST AND UNDERTAKING UNDER OATH

	(For official use only)
File Reference Number:	
NEAS Reference Number:	DEA/EIA/
Date Received:	

Application for authorisation in terms of the National Environmental Management Act, Act No. 107 of 1998, as amended and the Environmental Impact Assessment (EIA) Regulations, 2014, as amended (the Regulations)

PROJECT TITLE

Working for Wetlands Programme

Kindly note the following:

1. This form must always be used for applications that must be subjected to Basic Assessment or Scoping & Environmental Impact Reporting where this Department is the Competent Authority.
2. This form is current as of 01 September 2018. It is the responsibility of the Applicant / Environmental Assessment Practitioner (EAP) to ascertain whether subsequent versions of the form have been published or produced by the Competent Authority. The latest available Departmental templates are available at https://www.environment.gov.za/documents/forms.
3. A copy of this form containing original signatures must be appended to all Draft and Final Reports submitted to the department for consideration.
4. All documentation delivered to the physical address contained in this form must be delivered during the official Departmental Officer Hours which is visible on the Departmental gate.
5. All EIA related documents (includes application forms, reports or any EIA related submissions) that are faxed; emailed; delivered to Security or placed in the Departmental Tender Box will not be accepted, only hardcopy submissions are accepted.

Departmental Details

Postal address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Private Bag X447
Pretoria
0001

Physical address:
Department of Environmental Affairs
Attention: Chief Director: Integrated Environmental Authorisations
Environment House
473 Steve Biko Road
Arcadia

Queries must be directed to the Directorate: Coordination, Strategic Planning and Support at:
Email: EIAAdmin@environment.gov.za

1. ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP) INFORMATION

EAP Company Name:	**Aurecon South Africa (Pty) Ltd**			
B-BBEE	Contribution level (indicate 1 to 8 or non-compliant)	1	Percentage Procurement recognition	
EAP name:	Franci Gresse			
EAP Qualifications:	BSc (Hons) Conservation Ecology			
Professional affiliation/registration:	IAIAsa			
Physical address:	Aurecon Centre, 1 Century City Drive, Waterford Precinct, Century City			
Postal address:	PO Box 494, Cape Town			
Postal code:	8000	Cell:	082 891 2384	
Telephone:	021 526 6022	Fax:		
E-mail:	Franci.Gresse@aurecongroup.com			

The appointed EAP must meet the requirements of Regulation 13 of GN R982 of 04 December 2014, as amended.

2. DECLARATION BY THE EAP

I, Franci Gresse, declare that –

- I act as the independent environmental assessment practitioner in this application;
- I have expertise in conducting environmental impact assessments, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, Regulations and all other applicable legislation;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I will take into account, to the extent possible, the matters listed in Regulation 13 of the Regulations when preparing the application and any report relating to the application;
- I undertake to disclose to the applicant and the Competent Authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the Competent Authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the Competent Authority, unless access to that information is protected by law, in which case it will be indicated that such information exists and will be provided to the Competent Authority;
- I will perform all obligations as expected from an environmental assessment practitioner in terms of the Regulations; and
- I am aware of what constitutes an offence in terms of Regulation 48 and that a person convicted of an offence in terms of Regulation 48(1) is liable to the penalties as contemplated in Section 49B of the Act.

Disclosure of Vested Interest (delete whichever is not applicable)

- I do not have and will not have any vested interest (either business, financial, personal or other) in the proposed activity proceeding other than remuneration for work performed in terms of the Regulations;

Signature of the Environmental Assessment Practitioner

Aurecon South Africa (Pty) Ltd

Name of Company:

23/01/2019

Date

3. UNDERTAKING UNDER OATH/ AFFIRMATION

I, Franci Gresse, affirm that all the information submitted or to be submitted for the purposes of this application is true and correct.

Signature of the Environmental Assessment Practitioner

Aurecon South Africa (Pty) Ltd

Name of Company

23/01/2019

Date

Signature of the Commissioner of Oaths

23/1/2019

Date

COMMISSIONER OF OATHS
MARIA WILHELMINA OOSTHUIZEN
REF 9/1/8/2 CAPE TOWN (19 MARCH 2008)
1 CENTURY CITY DRIVE, WATERFORD
PRECINCT, CENTURY CITY 7441, RSA

Date: 23/1/2019

Franci Gresse

Programme Manager

Qualifications

BSc (Hons) Conservation Ecology

Member, International Association of Impact Assessment South Africa (IAIAsa)

Specialisation

Environmental Impact Assessment Practitioner

Years in industry

10,08

Franci is a senior environmental practitioner in Aurecon's Cape Town office. She has been involved in various environmental investigations, including environmental impact assessments (EIA's), environmental management plans (EMP's), environmental management programmes (EMP's), rehabilitation plans maintenance management plans (MMP's) and fatal flaw analysis.

Franci has been involved with the Working for Wetlands rehabilitation programme for the past five years, of which she has been acting as the Team Leader for the environmental assessment practitioners (EAP's) for the last three years. The Working for Wetlands project won the 2012 Aurecon Chairman's Award for its positive contribution to the natural and social environmental. In addition, Franci has also been involved with a number of projects in the renewable energy sector.

Franci served on the committee of the South African affiliate of the International Association for Impact Assessment (IAIA) for the Western Cape Branch from 2009 to 2011, and remains a member. She completed a Bachelor of Science and an Honours Degree in Conservation Ecology at the University of Stellenbosch (South Africa).

Experience

Implementation of the Hoekplaas environmental authorisation (EA), Northern Cape Province, South Africa, Mulilo Renewable Energy, 11/2013 - 05/2015, Project Leader

Aurecon assisted the holder of the environmental authorisation (EA) for the 100 MW photovoltaic (PV) facility in De Aar with the implementation of the environmental conditions to ensure compliance to all relevant environmental legislation. Responsible for the management of tasks and review of all documentation. Also assisting client with questions on the environmental impact assessment (EIA) process.

Environmental impact assessment and compilation of an environmental management plan (EMP) for the Swakopmund-Mile 7 Water Supply, Phase 2, Swakopmund, Namibia, NamWater, 11/2013 - 10/2015, Project Leader

NamWater appointed Aurecon to assist with the environmental impact assessment process for the proposed construction of a new bulk water pipeline between Swakopmund and Mile 7. Responsible for the management and review of the environmental impact assessment (EIA) reports and processes, as well as the project's finances.

Working for Wetlands plan 2014 - 2017, Regional South Africa, South African National Biodiversity Institute (SANBI), 06/2013 - Date, Task Leader

The South African National Biodiversity Institute (SANBI) appointed Aurecon to provide environmental and engineering services for the Working for Wetlands Programme which is a national wetland rehabilitation programme. Responsible for the management of the environmental authorisation component of the project,

as well as the compilation of basic assessment reports (BAR) for the country. Other responsibilities include the compilation of wetland rehabilitation plans for the Western Cape, Northern Cape, North West and Limpopo Provinces, liaison with authorities and the public (public participation process) and management of wetland specialists.

Maintenance management plans (MMP's) for flood damaged road infrastructure, Western Cape Province, South Africa, Western Cape Provincial Government Department of Transport and Public Works, 06/2013 - Date, Project Staff

The project entails the compilation of maintenance management plans (MMP's) for two local municipal areas (Laingsburg and Worcester), as well as obtaining the necessary permits/ water use authorisations. Personally involved during the project commencement with regards to strategy development, meetings with the relevant authorities and assistance with the development of the MMP's.

Environmental impact assessment (EIA) for the expansion of approved solar energy facilities located near Prieska and De Aar, Northern Cape Province, South Africa, Mulilo Renewable Energy, 03/2013 - 09/2015, Phase Leader

Mulilo Renewable Energy decided to expand the approved solar energy facilities on the farms Hoekplaas and Klipgats in Prieska, as well as on the farms Badenhorst Dam and Du Plessis Dam in De Aar. The expasion of Hoekplaas farm in Prieska includes ten additional 75 MW photovoltaic (PV) facilities and six additional PV units at Klipgats Pan farm. The expansion at Badenhorst Dam farm includes four additional 75 MW PV facilities and three additional PV units at Du Plessis Dam farm. Responsible for the management and review of the environmental impact assessment (EIA) reports and processes, as well as the project's finances.

Fatal flaw study for two potential Wind Energy Facility (WEF) sites, Northern and Western Cape Provinces, South Africa, Juwi Renewable Energies (Pty) Ltd, 03/2013 - 04/2013, Environmental Practitioner

The study entailed a fatal flaw analysis of two potential wind energy facility (WEF) sites in the Northern and Western Cape Provinces. Responsible for the assessment of the sites and compilation of the fatal flaw report.

Richtersveld wind energy facility (WEF), Northern Cape Province, South Africa, TRE Tozzi Renewable Energy S.p.A and Guma Group, 07/2012 - 09/2013, Environmental Practitioner

The project entailed a due diligence of the proposed wind energy facility (WEF) to review compliance with the requirements of the Department of Energy's independent power producer (IPP) process. Responsible for the review of the environmental reports and compilation of the due diligence report.

Three photovoltaic (PV) energy facilities near Copperton, Northern Cape Province, South Africa, Mulilo Renewable Energy (MRE), 09/2011 - 05/2015, Environmental Practitioner

The project entailed three environmental impact assessments (EIA's) for three photovoltaic (PV) energy facilities comprising 75 MW to 150 MW, located near Copperton. Responsible for the management the EIA process and project specialists, compilation of scoping and EIA reports and liaison with authorities.

Fatal flaw study for four potential wind energy facility (WEF) sites, Northern and Western Cape Provinces, South Africa, Mainstream Renewable Power South Africa, 11/2011 - 05/2012, Environmental Practitioner

The study entailed a fatal flaw analysis of four potential wind energy facility (WEF) sites across the Northern and Western Cape Provinces. Responsible for the management of specialists, review of reports, assessment of the sites and compilation of the fatal flaw report.

Implementation of the Klipgats Pan environmental authorisation (EA), Northern Cape Province, South Africa, Mulilo Renewable Energy, 09/2011 - 05/2015, Project Leader

Aurecon was appointed to undertake three environmental impact assessments (EIA's) for three proposed phtovoltaic (PV) solar energy plants near Copperton. The first PV solar energy plant will generate around 100 MW (preferred alternative) or 150 MW (alternative) on the Hoekplaas Farm (Farm 146/RE). The proposed PV plant will cover approximately 300 ha (preferred alternative) or 450 ha (alternative). The second includes a PV solar energy plant to generate roughly 100 MW on the farm Klipgats Pan (Farm 117/4) near Copperton in the Northern Cape. The proposed PV plant will cover an estimated 300 ha. An alternative site for a 100 MW PV plant with a 300 ha footprint is also being considered. The third comprises a PV solar energy plant to generate about 100 MW (preferred alternative) or 300 MW (alternative) on the farm Struisbult (Farm 104, portion 1) which will cover 300 ha to 900 ha. Responsible for managing tasks and reviewing all documentation for updating the environmental management plan (EMP) and implementing the environmental authorisation (EA). Also assisted client with questions on the EIA process.

Proposed rehabilitation of Wetlands as part of the Working for Wetlands, Regional, South Africa, South African National Biodiversity Institute (SANBI), 08/2011 - 09/2013, Environmental Practitioner

Appointed by the South African National Biodiversity Institute (SANBI) to conduct environmental impact assessments (EIA's) for the rehabilitation of specific wetlands in all provinces of South Africa over a five year period. Responsible for the compilation of basic assessment reports (BAR) and Wetland Rehabilitation Plans for the Western Cape, Northern Cape, Gauteng and Limpopo Provinces. Other responsibilities included liaison with authorities, public participation process, management of specialists and general project management of the environmental component of the project.

Repair of flood damage to road structures in the Eden District Municipality, Western Cape Province, South Africa, Western Cape Provincial Department of Transport and Public Works, 01/2011 - Date, Environmental Practitioner

The project entails the compilation of maintenance management plans (MMP) for seven areas with the Eden District Management Area to repair. Responsible for compilation of MMP's, review of reports and liaison with stakeholders and authorities.

Environmental impact assessment (EIA) for the proposed extension of the Ash Dam facility at Kriel power station, Mpumalanga Province, South Africa, Eskom Holdings, 11/2009 - 12/2015, Environmental Practitioner

Appointed by Eskom to conduct an environmental impact assessment (EIA) for the proposed construction of a fourth ash dam facility at the Kriel power station. Responsible for the general project management and finances, screening process, compilation of the scoping and EIA reports, public participation and the compilation of a waste management licence application.

Environmental impact assessment (EIA) for proposed relocation of solar energy facility, Onder Rietvlei Farm, Aurora, Western Cape Province, South Africa, Solaire Direct Southern Africa, 2010 - 2011, Project Leader

Appointed by Solaire Direct to undertake a basic environmental impact assessment (EIA) process for the proposed relocation of an approved, but not yet constructed 10 MW solar energy facility. Responsible for the management and review of the EIA process and finances.

Environmental impact assessment (EIA) for proposed solar energy facility, Onder Rietvlei Farm, Western Cape Province, South Africa, Solaire Direct Southern Africa, 07/2010 - 02/2012, Environmental Practitioner

Appointed by Solaire Direct to undertake a basic environmental impact assessment process for the proposed construction of a 10 MW solar energy facility. Responsible for the compilation of the draft and final reports, public participation process, management of specialists and general project management.

Proposed Paarl Mountain and Ysterbrug pumping main upgrades, Western Cape Province, South Africa, Drakenstein Municipality, 06/2010 - Date, Environmental Advisor

The Drakenstein Municipality appointed Aurecon's engineers to investigate and plan the proposed upgrade of the Paarl Mountain and Ysterbrug Pumping Scheme. The upgrading of the pipelines feeding the Meulwater Water Treatment Works from the Bethel and Nantes dams, also part of this scheme, was also investigated. Responsible for providing advice on environmental processes required. Other responsibilities included the management of the independent environmental assessment practitioner and the review of all environmental impact assessment (EIA) documentation.

Environmental sensitivity study (ESS) for a proposed solar energy facility on a farm Near Aurora, Western Cape Province, South Africa, Solaire Direct Southern Africa, 2010, Environmental Practitioner

Appointed to provide and environmental sensitivity study (ESS) which inter alia highlights the potential constraints ('red flags') and opportunities presented by the site from an environmental perspective. Responsible for the compilation of the ESS.

Proposed erection of Eskom communication sirens and public anouncement (PA) systems, Blaauwberg, Western Cape Province, South Africa, Eskom, 2009 - 2010, Environmental Practitioner

The project entailed three environmental impact assessment (EIA) processes for the (a) erection of 10 new sirens in the Parklands area, (b) the relocation of one siren in Bloubergstrand, and (c) the upgrade of five sirens on farms near Melkbosstrand. Responsible for compiling environmental impact assessment (EIA) reports, and the public participation process.

Proposed remediation, rehabilitation and restoration of the Spruit, Krom, Leeu and Palmiet Rivers, Western Cape Province, South Africa, Drakenstein Municipality, 2009 - 2010, Environmental Practitioner

Appointed by the Drakenstein Municipality to undertake the requisite environmental impact assessment (EIA) process for the rehabilitation, remediation and stabilisation of four rivers in Paarl and Wellington. Responsible for the EIA and public participation processes.

Proposed construction of a new pipeline from Bovlei Winer to Withoogte Dam, Wellington, Western Cape Province, South Africa, Drakenstein Municipality, 2009 - 2010, Environmental Practitioner

The Drakenstein Municipality proposed to replace a section of the existing pipeline extending from the Withoogte Dam to the Welvanpas Reservoir near Wellington as part of the municipality's water master plan in order to improve the overall water supply. Responsible for the compilation of the environmental impact assessment (EIA) report, management of specialists and the public participation process.

Overberg District Municipality integrated transport plan (ITP) strategic environmental informants, Western Cape Province, South Africa, Overberg District Municipality, 2009, Environmental Practitioner

Aurecon's Transportation Unit was appointed to revise the integrated transport plan (ITP). The Environmental Unit was subcontracted to provide environmental input. Responsible for identifying and describing the relevant informants.

Annandale Commercial: development of petrol filling station on portion of Erf 5561, Kuils River, Western Cape Province, South Africa, Communicate, 2009, Environmental Practitioner

Appointed to compile a construction environmental management plan (CEMP) for the construction of a filling station on the corner of Gladioli Street and Amandel Drive, Kuils River. Responsible for the compilation of the project specification document as part of the CEMP.

Overberg District Municipality integrated transport plan (ITP): strategic environmental informants, Western Cape Province, South Africa, Overberg District Municipality, 2009, Environmental Practitioner

Aurecon's Transportation Unit was appointed to revise the integrated transport plan (ITP). The Environmental Unit was subcontracted to provide environmental input. Responsible for identifying and describing the relevant informants.

Environmental impact assessment (EIA) for the proposed Langezandt Quays development in Struisbaai Harbour, Western Cape Province, South Africa, Golden Falls (Pty) Ltd, 2008 - Date, Environmental Practitioner

Aurecon was appointed to undertake an environmental impact assessment (EIA) process for the proposed development of a four storey development on Erf 848 within the Struisbaai harbour precinct. Responsible for drafting responses to the Department of Environmental Affairs' independent review report on the proposed development.

Pre-feasibility and feasibility studies for augmenting the Western Cape water supply system, South Africa, Department of Water Affairs (DWA), 2008 - 2013, Project Staff

The Department of Water Affairs commissioned pre-feasibility and feasibility studies for the augmentation of the Western Cape water supply system through the further development of the surface water resources. Surface water schemes to be investigated were identified by the Western Cape water supply system reconciliation strategy study. Responsible for the public participation process, managing environmental specialists, and compiling a socio-economic overview of the study area.

Proposed redevelopment of the Blaauwberg Conservation Area: Eerstesteen Node, Western Cape Province, South Africa, City of Cape Town, 2008 - 2010, Environmental Practitioner

The project entailed an environmental impact assessment (EIA) process for redeveloping the Eerstesteen Conservation Area on the West Coast. Responsible for compiling the EIA report, as well as managing specialists and the public participation process.

Table Mountain Group aquifer feasibility study and pilot project, Western Cape Province, South Africa, City of Cape Town, 2008 - 2010, Environmental Control Officer

The City of Cape Town initiated a study into the Table Mountain Group Aquifer as a potential water source to augment the city's supply. The feasibility and pilot project phase record of decision (RoD) required completion for site-specific environmental management plans (EMP's) for drilling sites that were assessed to be environmentally sensitive. Site-specific EMP's were designed for sensitive sites to ensure minimal environmental impact during the drilling phase. Responsible for monitoring compliance with the RoD and EMP during the drilling phase.

Application for rectification in terms of Section 24G of the National Environmental Management Act (NEMA) for the unlawful commencement of a fruit processing factory on Op de Tradouw Farm, Number 69, Barrydale, Western Cape Province, South Africa, Schoonies Family Trust, 2008 - 2009, Environmental Practitioner

The project consisted of an application for rectification in terms of Section 24G of NEMA. Responsible for compiling an environmental impact report and an environmental management plan (EMP) for the application, as well as managing the public participation process.

Proposed development of apple and pear orchards on Soetmelksvlei Farm, Western Cape Province, South Africa, BETCO, 2008 - 2009, Project Staff

This Agri-development project involved the development of 50 ha of apple and pear orchards in the Riviersonderend region. Responsible for compiling the basic assessment report, environmental management plan (EMP), and managing the specialists and public participation process.

Proposed extension of Lock Road, Kalk Bay, Western Cape Province, South Africa, Mr Rick Bartlett, 2008 - 2009, Project Staff

The project comprised an environmental impact assessment (EIA) process for extending Lock Road to an existing erf. Involved during the final stages of the application.

Water reconciliation strategy for the Algoa water supply area, Eastern Cape Province, South Africa, 2008 - 2009, Environmental Practitioner

This project provided an assessment of the environmental opportunities and constraints for a suite of water schemes in the Algoa water supply area. This was undertaken as part of a broader study in the area.

C.A.P.E. Olifants-Doring Catchment Management Agency project: Development of a catchment management strategy water resource protection sub-strategy for the Olifants-Doring Catchment, South Africa, CapeNature, 2008 - 2009, Environmental Practitioner

Appointed by CapeNature to compile a catchment management strategy water resource protection sub-strategy for the Olifants-Doorn catchment. Responsible for compiling a database that lists all institutions and their respective mandates in terms of water resource protection and biodiversity conservation decision making for the Olifants-Doring Catchment, workshop arrangements, and general project related work.

Environmental sensitivity study for the proposed Dasdrif poultry farm in Moorreesburg, Western Cape Province, South Africa, Eikenhoff Poultry Farms (Pty) Ltd, 2008, Project Staff

The project consisted of an environmental sensitivity study (ESS) which, inter alia, highlighted the potential constraints ('red flags') and opportunities presented by the site from an environmental perspective. Responsible for compiling the ESS.

Joint Maputo River Basin water resources study, Mozambique, Swaziland and South Africa, 2008, Project Staff

The project provided an environmental opportunities and constraints assessment of a suite of potential dams in South Africa and Swaziland, within the Maputo River Catchment. This was undertaken as part of a broader study into the catchment.

Department of Economic Affairs, Environment and Tourism (DEAET) decision-making support, South Africa, Department of Economic Affairs, Environment and Tourism (DEAET), 2008, Project Staff

Responsible for assisting the DEAET with the review and processing of environmental impact assessment (EIA) applications in terms of the Environment Conservation Act.

environmental affairs

Department:
Environmental Affairs
REPUBLIC OF SOUTH AFRICA

DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

	(For official use only)
File Reference Number:	12/12/20/ or 12/9/11/L
NEAS Reference Number:	DEA/EIA
Date Received:	

Application for integrated environmental authorisation and waste management licence in terms of the-

(1) National Environmental Management Act, 1998 (Act No. 107 of 1998), as amended and the Environmental Impact Assessment Regulations, 2014; and

(2) National Environmental Management Act: Waste Act, 2008 (Act No. 59 of 2008) and Government Notice 921, 2013

PROJECT TITLE

Working for Wetlands Rehabilitation Programme: Limpopo Province

Specialist:	Anton Linström		
Contact person:	Anton Linström		
Postal address:	P O Box 4442, Lydenburg,		
Postal code:	1120	Cell:	083 226 1089
Telephone:	NA	Fax:	NA
E-mail:	wetearth@telkomsa.net		
Professional affiliation(s) (if any)	Pr Sc Nat 400275/11		

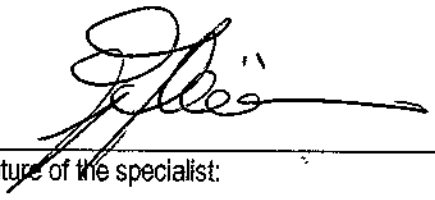
Project Consultant:	Aurecon South Africa Pty (Ltd)		
Contact person:	Claire Blanché		
Postal address:	PO Box 494		
Postal code:	8000	Cell:	082 445 5438
Telephone:	021 526 6937	Fax:	021 526 9500
E-mail:	Claire.Blanche@aurecongroup.com		

4.2 The specialist appointed in terms of the Regulations_

I, Anton Linström , declare that –

General declaration:

I act as the independent specialist in this application;
I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
I declare that there are no circumstances that may compromise my objectivity in performing such work;
I have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
I will comply with the Act, Regulations and all other applicable legislation;
I have no, and will not engage in, conflicting interests in the undertaking of the activity;
I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
all the particulars furnished by me in this form are true and correct; and
I realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.



Signature of the specialist:

Wet Earth Eco Specs (Pty) Ltd
Name of company (if applicable):

17 January 2019
Date:

Anton Linström

Idi nr. 6303265035081

58 Church Street
Lydenburg
1120

Tel. 013 235 2889
Cell. 083 226 1089

Education

National Diploma (Nature Conservation). SA Technikon. 1989
National Higher Diploma (Environment management). Port Elizabeth Technikon. 1994
Masters Degree in Environmental Management (River Ecology). Orange Free State University. 1999.

Affiliations

International Mire Conservation Group.
Animal Demographic Unit (ADU).
South African Wetland Society (SAWS)
The South African Council for Natural Scientific Professions (SACNASP – 400275/11)
Affiliated with the Wildlife Resource Association

Experience

June 2010 -

Free Lance Wetland Ecologist

- Undertake specialist wetland and riparian studies.
- Lecturing at the Advanced Wetland Course and the Wetland Rehabilitation Course at the University of the Free State.
- Undertook one-day course in Riparian Vegetation Response Assessment Index (VEGRAI) for the Mpumalanga Tourism and Parks Agency staff.
- Undertook a one-day course in Riparian Vegetation Response Assessment Index (VEGRAI) for the Department of Water Affairs and Sanity.

November 2008 to May 2010

Golder Associates Africa — South Africa

Wetland Ecologist

- Undertake specialist wetland investigations as part of EIA's.
- Undertook a Wetland Biomonitoring Project at the Kusile Power Station.
- Completed two wetland scoping reports for Comprehensive Reserve Determinations for Riparian Areas.
- Specialist wetland studies further afield in the Democratic Republic of the Congo for the Frontier Mine.

1998 to 2008

Mpumalanga Tourism and Parks Agency — Mpumalanga, South Africa

Wetland Scientist.

- Managed the participation of MTPA in the development application process through the evaluation of and commenting on development applications with specific reference to that of wetlands in Mpumalanga to ensure proper mitigation of possible negative environmental impacts.
- Coordinated the Bi-annual Co-ordinated Water Bird Counts in collaboration with the University of Cape Town Animal Demography Unit for several years. A total of 8 wetland sites in the province were surveyed and reported on. This took place in cooperation with Bird Clubs and private volunteers.

- Implement and manage a service of specialist aquatic wetland research for the Mpumalanga Parks Board to solve specific management problems.
- Compile and work on a Wetland Inventory for the Mpumalanga Province in South Africa.
- Was actively involved in the development of a Riparian Vegetation Index as part of the National Biomonitoring Programme on all the main rivers in the Mpumalanga Province.
- Authored the Ecological Reserve Determination for riparian vegetation in the Elands River and the Crocodile River in the Mpumalanga Province.
- Initiated and actively involve with the establishment of a "Wetlands/Riparian Habitats: A practical field procedure for identification and delineation" as a policy within the Forestry Industry and all the other major land-users in South Africa.
- Initiate and actively involve with the South African Wetland National Indaba.
- Initiate and actively involve with the Mpumalanga Wetland Forum.
- Actively involve with local communities and wetlands, i.e. Delmas Municipality, Chrissiesmeer Community, the Wakkerstroom Community, Khadishi Community and the Emhlangeni Community Wetland Project.
- Initiate and driving the Ramsar Application for Verloren Valei, Wakkerstroom Wetland and the Chrissiesmeer Pan System. International recognition was given to the Verloren Valei Wetlands during 2001. The Wakkerstroom Wetland Information Sheet is handed in for Ramsar recognition.
- Initiate and actively involve with several wetland rehabilitation projects in the Province. This is part of a Poverty Relieve project with the Working for Water programme.
- Received a Merit Award in 1998/9 for the "Best Research & Development Contribution".
- Actively involve and contribute to the South African White-winged Flufftail (*Sarothrura ayresi*) Action Plan Workshop, 2003.
- Present and lead a wetland training session in the form of a fieldtrip and a lecture for the final students of the University of Tswane.
- Take part in the bi-annual Coordinated Avifauna Road Counts.

1996 to 1998 **Mpumalanga Parks Board** **Mpumalanga, South Africa**

Assistant Director

Served as Sub-Regional Head in MPB.

- Supervision over three nature reserves and the Southern Drakensberg Sub-Region.
- Managed 23 General Assistants, three Reserve Managers and a Law Enforcement Officer.

Managed all Nature Conservation related matters in this Region.

1994 to 1996 **Transvaal Provincial Administration** **Transvaal, South Africa**

Officer in Charge – Sterkspruit Mountain Catchment

- Officer in charge of the Sterkspruit Nature Reserve.
- Managed a 10 000 hectare Mountain Catchment Area.
- Supervise a total of 15 General Assistants.
- Chaired the Mountain Catchment Committee and the Water Quality Sub-committee

1991 to 1993 **Transvaal Provincial Administration** **Transvaal, South Africa**

Lydenburg, South Africa

Scarce and Protected Plant Project – Technical Support

- Scarce and Protected Plant Inventory – Helicopter Arial Surveys.
- Reestablishment of a Critical Endangered Plant – Stapelia clavicorona.
- Reassess all Conservation Plans of Scarce and Protected Plants in the Province.

- Monitor the conservation status of several scarce and protected plants.

1990 to 1991 **Transvaal Provincial Administration** **Transvaal, South Africa**
Hans Hoheisen Wildlife Research Station
Elephant Project – Technical Assistance

- Monitor movement of Elephant on two Private Nature Reserves.
- Aerial game counts on two Private Nature Reserves.

1986 to 1990 **Transvaal Provincial Administration** **Transvaal, South Africa**
Boskopdam Nature Reserve, South Africa
Officer in Charge – Boskopdam Nature Reserve.

- Managed a 4000 hectare grassland Nature Reserve and all related activities.
- Supervision over 25 General Assistants.
- Execute all reserve monitoring programmes: game counts, condition indexes, culling operations, burning programmes, bird programmes, etc.

PUBLICATIONS AND REPORTS

- Impesa. 2003. Classification and mapping of Peatlands in Southern Africa including Lesotho.
- Intermediate Ecological Reserve Determination for the Elands River Catchment, Incomati System, Mpumalanga. Chapter 7: Riparian Vegetation. Report no: ENV-P-C 2000-090.
- Intermediate Ecological Reserve Determination for the Crocodile River Catchment, Mpumalanga, Chapters: Wetlands and Riparian Vegetation. Report no.: ENV-P-C 200 2009.
- The Evaluation of Riparian Vegetation and its application on Riverine Management. Masters Degree in Environmental Management. In the Faculty of Natural Sciences (Centre for Environmental Management). University of the Orange Free State Bloemfontein. November 1999.
- Anton Linström and Danie Otto for the Department of Water Affairs and Forestry (DWAF), 2008. *Resource Directed Measures: Comprehensive Reserve determination study of the Integrated Vaal River System*. Lower Vaal Water Management Area Technical Component: Inception Report. Report no: RDM/ WMA10 C000/ 01/CON/0107 (Golder Associates). Pretoria, South Africa.
- Anton Linstrom and Johan Engelbrecht. 2009. Frontier Mine (Congo): Aquatic Biodiversity Survey. For First Quantum Mineral Limited. Report nr. 12377-9162-1 (Golder Associates).
- Anton Linstrom, 2009. *Groot Marico and Crocodile West River Reserve Determination Study – Wetland Scoping Report* (Golder Associates). Department of Water Affairs and Forestry (DWAF). Pretoria. 0001.
- Linström, A., De Wet, K., Engelbrecht, J., De Wet, F., Matthews, W., and Cilliers, J.P. 2012. *Biodiversity Action Plan: SASOL Secunda and Sasolburg.* Wet-Earth Eco-Specs.
- Van Rooy, J. Linström, A., and Grundling, P. 2013. Bryological Notes New national and regional bryophyte records, 35 Journal of Bryology, 35: 2, 129-139(11)
- Linström, A. 2014. Wetland Vegetation in the Kruger National Park. In Press. Part of a wetland characterisation project of the Savanna Parks in South Africa.
- Lesotho Highlands Water Project – Phase 2. 2014. Part of the Specialist Consultants undertaking baseline studies and Instream Flow Requirements for Phase 2. Institute of Natural Resources. A project for the Lesotho Highlands Development Authority.
- *S*tassen, R. Graham, M, Linstrom, A., Otto, D., O'Brien, G., Pike, T., and Bruton, S. 2014. *Intermediate Ecological Reserve Determination Study for the Spook and Vaalbankspruit.* BHP Billiton: Mpumalanga.
- Implementation of the River Health Programme in the Crocodile (West) Marico WMA. 2013-2015. Focus area is the Riparian Vegetation Component by using the Riparian Vegetation Response Assessment Index (VEGRAI).

- Baseline monitoring of aquatic ecosystem health in the Orange-Senqu River basin. 2010 – 2011. Focus area is the Riparian Vegetation Component by using the Riparian Vegetation Response Assessment Index (VEGRAI).
- Goodman, P.S., Matthews, W.S. and Linström, A. (2016). A Review of the Biophysical Environment and Conservation Importance of the Sasol Secunda Property. Unpublished report, Sasol Secunda, Secunda, South Africa.
- Grundling, P-L., Linstrom, A., Pretorius, M.L., Bootsma, A., Job, N., Delport., L., Elshehawi, S., Grootjans, A., Grundling, A., Mitchell. S. 2015. Investigation Of Peatland Characteristics And Processes As Well As Understanding Of Their Contribution To The South African Wetland Ecological Infrastructure. Water Research Commission Project: KSA 2: K5/2346
- Linstrom, A., Rossouw, P.S., and Grundling, P-L. 2016. Grass Pan Rehabilitation - Graspan (Glencore) at Middelburg, Mpumalanga, South Africa. Evaluation and guidelines for rehabilitation of a pre-rehabilitated pan by Wet-Earth Eco-Specs. Unpublished report, 127 pp.