



REHABILITATION PLAN FOR THE WORKING FOR WETLANDS PROGRAMME, KWAZULU-NATAL PROVINCE

PROJECT: MAPUTALAND W31L



agriculture,
forestry & fisheries

Department:
Agriculture, Forestry and Fisheries
REPUBLIC OF SOUTH AFRICA

MAY 2014



EXPANDED PUBLIC WORKS PROGRAMME
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**REHABILITATION PLAN FOR THE KZN MAPUTALAND WETLAND PROJECT,
KWAZULU-NATAL: PLANNING YEAR 2014/2015
AS PART OF
THE WORKING FOR WETLANDS PROGRAMME
FOR THE
SOUTH AFRICAN NATIONAL BIODIVERSITY INSTITUTE**

MAIN REPORT

May 2014

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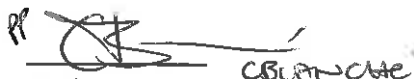
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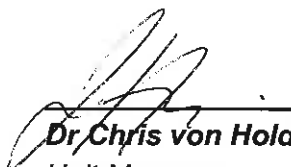
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PROJECT DETAILS

TITLE	Rehabilitation Plan for the KZN Maputaland Wetland Project, KwaZulu-Natal Province: Planning Year 2014/2015
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WORKING FOR WETLANDS: CONTEXT DOCUMENT

1. Introduction

Working for Wetlands (WfWetlands) is a government programme managed by the South African National Biodiversity Institute (SANBI), and is a joint initiative of the Departments of Environmental Affairs (DEA), Water Affairs (DWA) 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, also honours South Africa's commitments under several international agreements, especially the Ramsar Convention on Wetlands.

The programme is mandated to rehabilitate damaged wetlands and to protect pristine wetlands 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 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:

Wetlands offer services such as water provision, regulation, purification and groundwater replenishment are crucial in addressing objectives of water security and water for food security.

Wetlands play a critical role in 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.

Wetlands provide ecological infrastructure, replacing the need for municipal infrastructure by providing the same or better benefit at a fraction of the cost.

Wetlands impede the movement of water in the landscape, 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. For these reasons, artificially created wetlands are often used in newer urban drainage systems to aid both mitigation of flooding and improvement of water quality.

Wetlands function as valuable open spaces and create recreational opportunities for people that include hiking, fishing, boating, and bird-watching.

Many wetlands also have cultural and spiritual significance for the communities living nearby. Commercially, products such as reeds and peat are also harvested from wetlands (Plate B).

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



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

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) study¹, 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 rehabilitation and conservation 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" (SANBI Working for Wetlands Strategy 2006-2010).

¹ Nel J.L. and Driver A. 2012. South African National Biodiversity Assessment 2011: Technical Report. Volume 2: Freshwater Component. CSIR Report Number CSIR/NRE/ECO/IR/2012/0022/A, Council for Scientific and Industrial Research, Stellenbosch.

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.

The two main objectives of the WfWetlands Programme are **wetland conservation** in South Africa and **poverty reduction** through **job creation** and **skills development** amongst **vulnerable** and **marginalised** groups.

Wetland conservation: The strategic framework of the WfWetlands Programme underlines the need for a more refined planning process at catchment scale. 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.

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.

Skills development: In the 12 years since its inception, the WfWetlands Programme has invested R530 million in wetland rehabilitation and has been involved in over 900 wetlands, thereby improving or securing the health of over 70 000 hectares of wetland environment. The WfWetlands Programme currently has a budget of approximately R94 million per year, of which R32 million is allocated directly to paying wages. Being part of the Expanded Public Works Programme (EPWP), the WfWetland Programme has created more than 12 800 jobs and 2.2 million person-days of paid work. The local teams are made up of a minimum of 60% women, 20% youth and 1% disabled persons.

Training and Capacity Building during the Working for Wetlands Programme

The WfWetlands Programme has established a working relationship with the Department of Public Works 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 in the WfWetlands Programme 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 the WfWetlands Programme as an EPWP 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.

Wage information sourced from the best practice guidelines suggests that workers and contractors would be paid daily rates of R 82 and R 251 respectively and would be employed on limited term contracts, i.e. 24 months in a five-year cycle. Employment of workers complies with the Ministerial Determination on Special Public Works Programmes (Government Notice No. R 63, 25 January 2002) and the Code of Good Practice for Employment and Conditions of Work for Special Public Works Programmes (Government Notice No. R 64, 25 January 2002). Targets for employment specify that the programme's workforce should comprise at least 60% women, 20% youth and 1% disabled people.

The WfWetlands Programme 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. The WfWetlands Programme 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 organisations 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.

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 168 400 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 500 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).

Increased labour requirement for the Working for Wetlands Programme

In response to the government request to increase the labour component of all government funded projects, the WfWetlands Programme project team has had to consider, and where practically feasible incorporate, more labour intensive ways of rehabilitating wetlands in order to obtain the increased labour component. Accordingly the project team members have factored this requirement into their planning when designing structures for wetland rehabilitation.

- 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; 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 re-vegetation of stabilised areas with appropriate wetland and riparian plant species;
 - The fencing off of sensitive areas within the wetland to keep grazers out and to allow for the re-establishment of vegetation;
 - The use of biodegradable or natural soil retention systems such as eco-logs, plant plugs, grass or hay bales, and brush-packing techniques;
 - In some instances, the use of appropriate fire management and burning regimes. The removal of undesirable plant and animal species; and
 - Alien invasive plant clearing, which is an important part of wetland rehabilitation (and this is supported by the Working for Water Programme).

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 are each divided into smaller, more manageable and homogenous wetland units. A Wetland Project may be located within one or more quaternary catchments within a Province. SANBI is currently managing 35 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 over a two-year cycle as shown in the flow diagram in Plate C. 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.

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.

The **Project Team** currently comprises the SANBI Programme Manager who oversees the WfWetlands Programme and Provincial Coordinators (PCs) who oversee the identification and implementation of projects in their regions. They are supported by a small team based at the Pretoria Botanical Gardens who fulfil various roles such as planning, monitoring and evaluation, implementation, 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 ecologists who provide scientific insight into the operation of wetlands and bring expert and often local knowledge to the project teams.

The programme makes use of external support to implement its work. External 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.

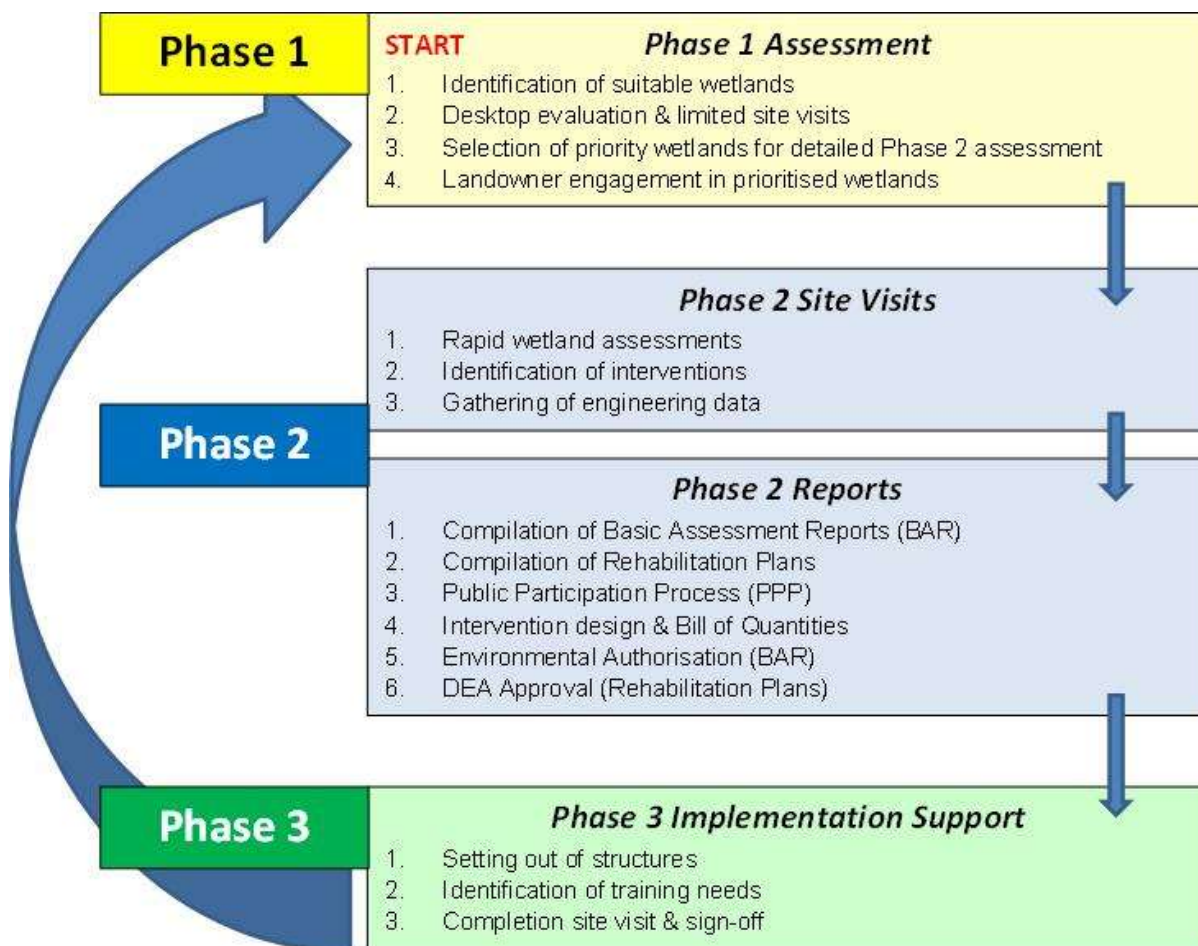


Plate C: The Working for Wetlands planning process (Phase 1 to Phase 3).

Phase 1 commences with a catchment and wetland prioritisation process for every province. The wetland ecologist 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 status quo assessment undertaken by the wetland ecologist.

Phase 2 requires site visits attended by the fieldwork team comprising a wetland ecologist, a Design Engineer, an Environmental Assessment practitioner, and a SANBI Provincial Coordinator. Other interested stakeholders or authorities, landowners and in some instances the implementing agents may also attend the site visits on some occasions. 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 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 maintenance inventory of any existing interventions that are damaged and/or failing and thus requiring maintenance is compiled by the PC, 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.

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, DWA, and the directly affected landowners is obtained, 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 interventions² listed in the Plan.

It is typically at this point in the process when the final construction drawings are issued to the Implementing Agents (IAs). Seventeen Implementing Agents 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, eco-logs, gabion structures as well as hard structures for example weirs.

Rehabilitation work within floodplain systems

Based on lessons learnt and project team discussions held during the National Prioritisation workshop in November 2010 SANBI 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, SANBI do not intend to stop undertaking rehabilitation work in floodplains entirely. Instead, SANBI propose to adopt an approach to the rehabilitation of floodplain areas that takes into account the following guiding principles:

1. As a general rule, avoid constructing hard interventions within an active floodplain channel; and rather
2. 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. The WfWetlands Programme operates within the context of the Constitution of South Africa, 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. The following legislation (listed in **Table A**) informs and guides the WfWetlands Programme in terms of its vision and objectives, whilst simultaneously regulating the wetland rehabilitation activities which WfWetlands carries out.

South Africa has rigorous and comprehensive environmental legislation aimed at preventing degradation of the environment, including damage to wetland systems. 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 the DAFF, DEA, DWA and SANBI 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, No. 107 of 1998, the National Water Act, No. 36 of 1998, and the National Heritage Resources Act, No. 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 Affairs	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 Affairs	1970
<ul style="list-style-type: none"> EIA Guideline Series, in particular: Guideline 3 – General Guide to the Environmental Impact Assessment Regulations, 2006 (DEAT 2006) Guideline 4 – Public Participation in support of the EIA regulations, 2006 (DEAT 2006) Guideline 5 – Assessment of Alternatives and Impacts, 2006 (DEAT 2006) Implementation Guidelines: Sector Guidelines for the EIA Regulations (draft) (DEA, 2010). DEA&DP. 2013. Guideline on Public Participation (DEA&DP, March 2013). DEA&DP. 2013. Guideline on Alternatives (DEA&DP, March 2013). 	Department of Environmental Affairs	2006 - 2013
International Conventions, in particular: <ul style="list-style-type: none"> 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)
 - In terms of Regulations pursuant to the NEMA, certain activities that may have a detrimental impact on the environment (termed Listed Activities) require an Environmental Authorisation from the Department

of Environmental Affairs (DEA). The implementation of interventions will trigger NEMA Listing Notices 1 and 3 (G.N. R544 and G.N. R546 respectively). In order to meet the requirements of these Regulations, it is necessary to undertake a Basic Assessment Process and apply for an EA. This was previously undertaken on an annual basis per Province as the Wetland Projects became known. However as from 2014, an application is now made per Province for Wetland Projects required in the next few planning cycles (anywhere from one to three planning cycles depending on the information gained through the Catchment Prioritisation Process).

- **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 EA's 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.
- 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 authorisation³ (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 rehabilitating⁶ a wetland for conservation purposes. SANBI are 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. SANBI 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.

³Government Notice No. 1198, 18 December 2009

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

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

⁶Defined 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 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), certain activities that may have a detrimental impact on the environment (termed Listed Activities) require Environmental Authorisation (EA) from the Department of Environmental Affairs (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 certain interventions triggers Listing Notices 1 and 3 (G.N. R544 and G.N R546 respectively).

In order to meet the requirements of the Regulations pursuant to NEMA, it was necessary to undertake a Basic Assessment Process. 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.

ii. CONTACT DETAILS

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iii. ABBREVIATIONS

BAR	Basic Assessment Report
BGIS	Biodiversity Geographical Information System
BMP	Best Management Practise
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
DWA	Department of Water Affairs
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
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
NEMA	National Environmental Management Act
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act
NWA	National Water Act
NWI	National Wetlands Inventory
PC	Provincial Coordinator
PET	Potential Evapotranspiration
PIP	Project Implementation Plan
PPP	Public Participation Process
SANBI	South African National Biodiversity Institute
SANParks	South African National Parks
SMME	Small, Medium and Micro Enterprises
WfWetlands	Working for Wetlands

iv. GLOSSARY OF TERMS

Bedrock: The solid rock that underlies unconsolidated material, such as soil, sand, clay, or gravel (Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 2008).

Basic Assessment Report (BAR): A report as described in regulation 23 of the EIA regulation, 2006 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.

Biophysical: The biological and physical components of the environment (Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 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. A 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 (consult DWAF [1994]) (Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 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.

Eco-log: A cylindrical wire mesh sleeve 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).

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 Plan (EMP): Details the methods and procedures for achieving environmental targets and objectives.

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.

Interested and Affected Parties (I&APs): People and organizations that have interest(s) in the proposed activities.

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

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

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

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: All land area drained by a fourth order tributary river and its tributaries.

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.

Rehabilitation: Restoring processes and characteristics that are sympathetic to and not conflicting with the natural dynamic of an ecological or physical system (Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 2008).

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.

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." (SA Water Act 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" (Wetland Management Series: WET-Origins, WRC Report TT 334/08, March 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 (in this case, the EAP, Wetland Ecologist, and SANBI PC) and their subsequent input into the Reporting, comprising the wetland status quo assessment, in addition to input from SANBI's PC. 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.
- SANBI's PCs 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. These include:
 - WW(0): Standard operating procedure,
 - WW(1): Wetland survey and Inspection consent,
 - WW(2): Terms and Conditions for carrying out wetland rehabilitation,
 - WW(3): Wetland Rehabilitation Activities Consent, and
 - WW(4): Property Inspection Prior to Wetland Rehabilitation.
- SANBI have 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 SANBI.
- The implementation of this Rehabilitation Plan must take into account all relevant provisions of Working for Wetlands Best Management Practices and Construction Environmental Management Plan, the recommendations of the Basic Assessments and the requirements of the Environmental Authorisation (EA) for the project.
- DEA's prerequisite to increase the requirement of percentage of funding to be spent on labour within the Working for Wetlands (WfWetlands) programme, has been taken into consideration by the project team during the planning process for wetland rehabilitation.
- Due to the dynamic nature of site conditions and associated biophysical changes within wetlands, this wetland Rehabilitation Plan is only valid for the 2014/15 financial year. Where appropriate interventions have not been implemented previously or included in the 2009/10, 2010/11, 2011/12, 2012/2013 and 2013/14 Project Implementation Plans (PIPs), these have been reviewed and where necessary re-designed for inclusion into the 2014/15 wetland 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 2014/15 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 SANBI's PC, the specialist wetland ecologists, the EAP as well as comments from Interested and Affected Parties (I&APs). Until this Report has been finalised and signed off by SANBI, the content of the Report should be considered as preliminary. (Note that information and input from a Design Engineer was not required for this particular project as the interventions proposed are typically soft interventions.)
- 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 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 SANBI's PCs 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 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 the following reports for this project:

1. Phase 1 Report – October 2013; and
2. Other Phase 2 Planning Reports which include the:
 - a. Basic Assessment Report (2014),
 - b. KZN Maputaland Rehabilitation Plan (February 2011), and the
 - c. Wetland Status Quo Report (**Appendix A** of this report).

vii. DISCLAIMER

- This Rehabilitation Plan is for the KZN Maputaland Wetland Project in the KwaZulu-Natal Province. The plan is to be used to implement the interventions identified as necessary to rehabilitate the KZN Maputaland wetlands, and is to be approved by the Department of Environmental Affairs (DEA) as part of the conditions of Environmental Authorisation (EA).
- The intervention points and wetland boundary polygons provided in this report are based on the shapefiles that have been provided by the South African National Biodiversity Institute (SANBI). The datasets included in the Phase 1 Reports have been updated by the Wetland ecologists and verified by the SANBI Provincial Coordinators (PCs). All reasonable efforts have therefore been made to ensure that the data is accurate. However Aurecon South Africa (Pty) Ltd (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 (should engineering design be required) 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 Aurecon Environmental Assessment Practitioner (EAP), Engineer, SANBI PC and the SANBI Planning, Evaluation and Monitoring Manager.
- All changes 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				
Umesh Bahadur	Programme Manager: Working for Wetlands		✓	
Eric Munzhedzi	Implementation Manager		✓	
Mbali Kubheka	SANBI Provincial coordinator	✓		✓
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 Working for Wetlands programme overview

The Working for Wetlands (WfWetlands) Programme is a government programme (similar to Working for Water, Working on Fire and Working on Land) 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).

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 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.

The WfWetlands Programme forms part of the EPWP which 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 12 years since its inception, the WfWetlands Programme has invested R530 million in wetland rehabilitation and has been involved in over 900 wetlands, thereby improving or securing the health of over 70 000 hectares of wetland environment. The WfWetlands Programme has created more than 12 800 jobs and 2.2 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 60% women, 20% youth and 1% people with disabilities.

1.1.1 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 are each 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. SANBI is currently managing 35 Wetland Projects countrywide, and approximately 500 interventions within these Wetland Projects will be implemented to meet the objectives of the Programme.

1.1.2 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);
- Recreation of wetland habitat towards the conservation of biodiversity;
- Job creation and social upliftment.

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.

1.1.3 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 re-vegetation of stabilised areas with appropriate wetland and riparian plant species;
- The 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;

- 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; and
- In some instances, the use of appropriate fire management and burning regimes.

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

1.2 Project team

The project team currently comprises the SANBI Programme Manager who oversees the WfWetlands Programme and Provincial Coordinators (PCs) who oversee the identification and implementation of projects in their regions. They are supported by a small team based at the Pretoria Botanical Gardens who fulfil various roles such as finance, 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 is assisted by an external team of Wetland Ecologists 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 SANBI Provincial Coordinators (PCs) who are each responsible for provincial planning and implementation.

1.3 KwaZulu-Natal Wetland Projects

Wetland Projects for the 2014/2015 planning cycle were identified during the Phase 1 activities associated with the WfWetlands Programme. Catchment and wetland prioritisation assessments were undertaken by the wetland ecologist/s to identify priority catchments and associated wetlands within which rehabilitation work needed to be undertaken. A review was undertaken to determine local knowledge and identify existing studies of the quaternary catchments in the province. SANBI's current five year strategic plans were further used as a guide to identify wetlands, as well as data from the National Freshwater Ecosystem Priority Areas (NFEPA) project. Decisions on priority areas were informed by input from wetland forums, biodiversity/ conservation plans, municipalities, state departments and various other stakeholders.

Based on this process, the following quaternary catchments (and associated wetland systems) were identified for the 2014/2015 planning cycle in the KwaZulu-Natal Province (**Table 1**):

Table 1: KwaZulu-Natal Wetland Projects

<i>Project Name</i>	<i>Wetland Number</i>	<i>Wetland System</i>
KZN North Project	V60B-01	Boschberg Vlei
	V60D-01	Padda Vlei 1
	V60D-02	Padda Vlei 2
KZN Upper Mzintlava Project	T32B-05	Ivanhoe
	T32C-04	Penny Park
	T32C-05	Mount Currie
	T32C-07	Ross'
KZN Maputaland Project	W31L-01	Kleinspan
	W32B-03	Tshanetshe –Mpempe Channel
iSimangaliso Wetland Park Project	W32H-01	iSimangaliso – Eastern Shores
	W32H-02	iSimangaliso – Western Shores
KZN Midlands Project	U20A-01	Runnymede (Ivanhoe)

A basic Environmental Impact Assessment (EIA) application has been lodged with the National DEA on 4 March 2014 for the undertaking of listed activities in terms of NEMA. The DEA will issue an EA that will permit the WfWetlands Programme to undertake wetland rehabilitation in the above-mentioned wetland systems within the KwaZulu-Natal Province. This Rehabilitation Plan focuses on the ***KZN Maputaland Wetland Project*** and is to be submitted to DEA for their approval as a condition of the EA.

1.3.1 The KZN Maputaland Wetland Project

This document comprises the Rehabilitation Plan for the KZN Maputaland Wetland Project and includes the Kleinspan wetland system (W31L-01) only. The Rehabilitation Plan will be the primary working document for the project via the implementation (construction/undertaking) of interventions⁷ required to meet the wetland rehabilitation objectives. The document details the general methodology that has been adopted for the planning of rehabilitation interventions for identified wetlands. Details of the rehabilitation planning for each wetland and the selected intervention options (including designs, dimensions and locations) within each wetland are presented, along with baseline Monitoring and Evaluation (M&E) data.

A report on the current status of the wetland system is included as **Appendix A** of this report. Upon approval of this Rehabilitation Plan by both DEA and the directly affected landowners, the work detail for the project will be implemented within a year with on-going monitoring being undertaken from thereon.

⁷ This could include soft options such as alien clearing, eco-logs, gabion structures as well as hard structures, for example weirs.

1.4 Project scope

The scope of this Wetland Project is detailed in the **Table 2** below:

Table 2: Project Scope

Quaternary Catchments	W31L
Quaternary Catchment area (Ha)	32 137.28 Ha
Number of wetlands identified during the assessment	1
Extension of existing work (previous financial year)	No
Work to commence at new wetlands in 2014/ 2015	Yes
Available budget for new interventions	R 2 018 079.00
Available budget for maintenance to existing interventions	N/A
Estimated cost of new interventions	Total: R 6 566 416.60)
Estimated cost of maintenance to existing interventions	N/A

2 GENERAL METHODOLOGY

Each Wetland Project is managed in three phases over a two-year cycle as shown in the flow diagram in **Figure 1** 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.

2.1 Landowner consent

The flow diagram **Figure 1** also clearly demonstrates the point at which various consent forms must be approved via signature from the directly affected landowner. SANBI's PCs 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. These include:

- WW(0): Standard operating procedure
- WW(1): Wetland survey and Inspection consent,
- WW(2): Terms and Conditions for carrying out wetland rehabilitation,
- WW(3): Wetland Rehabilitation Activities Consent,
- WW(4): Property Inspection Prior to Wetland Rehabilitation, and
- WW(5): Notification of Completion of Rehabilitation.

Refer to **Appendix E** for a copy of the landowner agreements.

2.2 Phase 1

The wetland ecologist responsible for the KwaZulu-Natal Province undertook a desktop study to determine the most suitable wetlands for the WfWetlands rehabilitation efforts. The involvement of the iSimangaliso Wetland Park and other key stakeholders was 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). The following wetland was prioritised and agreed to by the various parties for the KZN Maputaland Wetland Project:

1. Kleinspan (W31L-01)

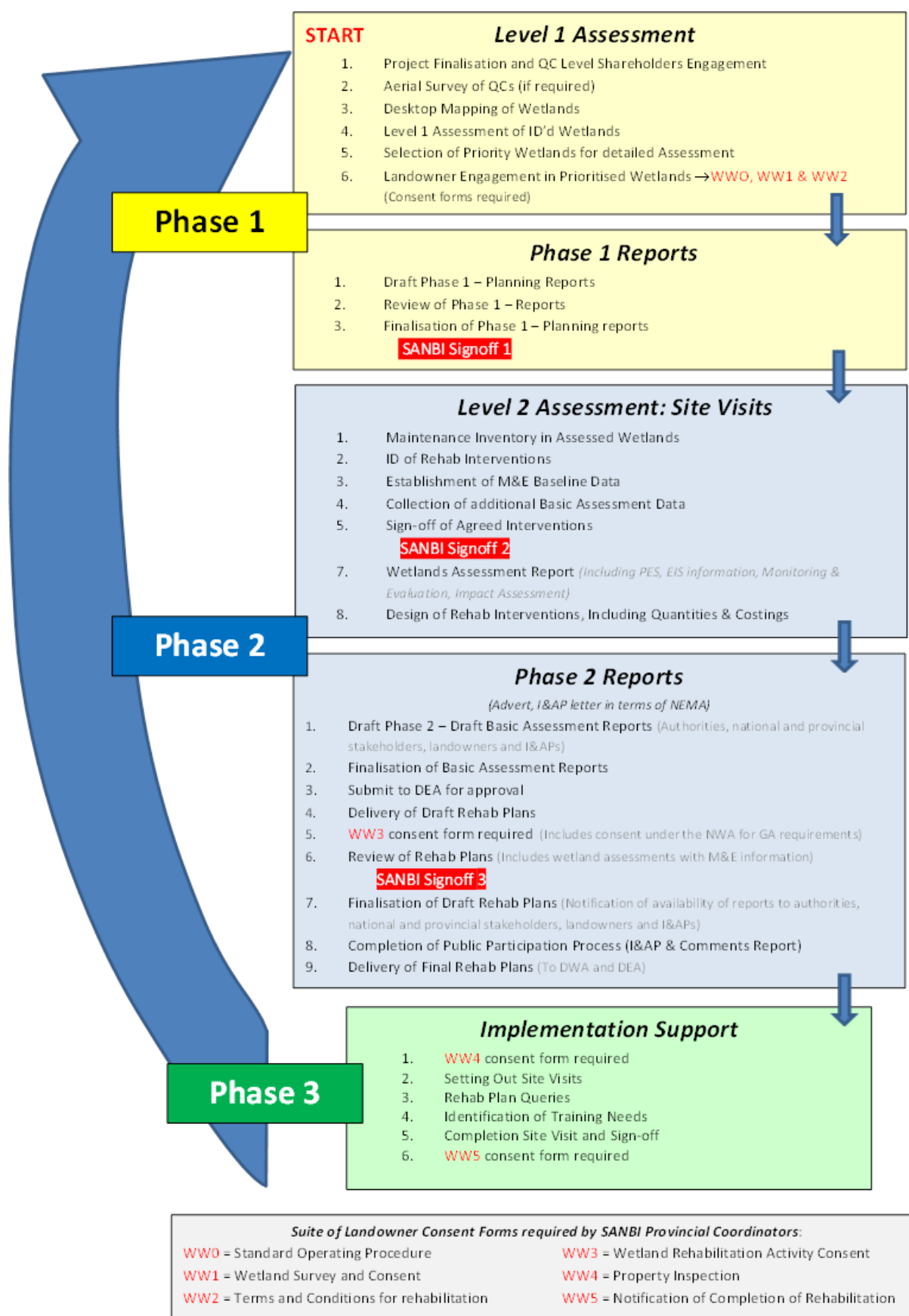


Figure 1: The three phases that must be undertaken for the successful rehabilitation of wetlands

2.3 Phase 2

2.3.1 Site visits

Phase 2 required site visits attended by the fieldwork team comprising a Wetland Ecologist, an EAP, and a SANBI provincial coordinator. Representatives of the iSimangaliso Wetland Park and the implementing agent were also present. This allowed for a highly collaborative approach to be used, as options were discussed by experts from different scientific disciplines, as well as local inhabitants with deep anecdotal knowledge. The following site visits were undertaken for the KZN Maputaland Wetland Project:

1. Kleinspan (October 2013)

The following team members attended the site visits:

- Mbali Kubheka (SANBI PC),
- Piet-Louis Grundling (Wetland Ecologist),
- Franci Gresse (EAP),
- Carl Myhill (iSimangaliso Wetland Park)
- Stefan Kruger (.Eastern Wetland Rehabilitation)

At the end of the site visit the rehabilitation objectives together with the location layout of the proposed interventions were agreed upon by the project team.

During Phase 2, monitoring systems were put in place to support the continuous evaluation of interventions. The systems monitor both the environmental and social benefits of the interventions.

2.3.2 Wetland Status Quo Reports

The time and resources required to determine the current status of the wetlands was generally limited, and thus a rapid procedure was adopted to assist the project team in systematically carrying out the assessments under constraints. The procedure was based on the following steps:

a. Assess impacts and threats

The following steps were used by the wetland ecologist to assess the ecological status and associated impacts and threats posted to the wetland system:

- The hydro-geomorphic setting of the wetland was described according to Kotze *et al.* (2008);
- The overall health of the wetland sites were not done according to Level 2 WET-Health (Macfarlane *et al.*, 2007) and nor was the Importance and Sensitivity of wetland determine based on Rountree 2009. Larger management realities and priorities of the iSimangaliso Wetland Park control the planning process (Myhill 2009). Therefore detailed planning focused on localised impacts and solutions within a broader landscape scale assessment and management plan resulting in the limited applications of tools such as Wet-Ecoservices, Wet-Health and Hectare Equivalents.

- The assessment of wetlands for soft option interventions are time consuming and deals with a large number of wetlands with a myriad of small low cost interventions. The focus of this approach to decrease person day cost was on roads impacting on seeps. The small nature of these systems and time constraints lead to the decisions not to apply Wet-Ecoservices, Wet-Health and Hectare Equivalents but rather to describe the impacts on these systems, the effect on their hydrology and an estimation of hectares to be secured with rehabilitation interventions – thus and expert opinion approach.
- Based on the above findings, the specific impacts and/or threats to be addressed by structural rehabilitation were identified, and described in more detail where necessary (for example the specific dimensions and level of activity of removing roads are specifically described).

b. Set rehabilitation objectives and choose appropriate measures for achieving the objectives

Rehabilitation objectives were informed by the above assessments (e.g., if the primary threat to the wetland was identified as headcut erosion threatening to propagate through the wetland then an appropriate rehabilitation objective would be to halt propagation of the headcut). The wetland ecologist identified, selected and prioritised the appropriate interventions to achieve the identified rehabilitation objectives.

c. Assess the likely contribution of rehabilitation interventions to wetland health and ecosystem delivery

An assessment of the predicted contribution that the identified rehabilitation interventions would make to improving wetland health and ecosystem delivery through addressing the identified impacts/threats was required. Without these assessments, a wetland rehabilitation programme is unlikely to have a well-informed basis on which to improve the rehabilitation's "return on investment" (with return being measured in terms of wetland health and ecosystem services delivery). This is directly linked into the *WfWetlands* Monitoring and Evaluation Framework. The following steps were followed to assess the contribution of rehabilitation interventions within each wetland system:

- The spatial area likely to be affected by the proposed intervention/s was identified; and
- The benefits that were likely to result from achievement of the rehabilitation objective/s were determined in terms of professional and expert opinion, as well as the estimation of hectares to be secured with the rehabilitation interventions versus the total wetland area.

Furthermore, the wetland ecological status was assessed by considering impacts to wetland hydrology, geomorphology and vegetation. These impacts were described and the assessment of threats and opportunities were presented in relation to the current state of the wetland in terms of hydrology, geomorphology and vegetation in order to determine the overall condition of the wetland. In addition, the expected trajectory of change anticipated at

the site was determined both with and without the proposed interventions and in terms of the given current management of the wetlands.

Refer to **Appendix A** which contains the Wetland Status Quo Report.

2.3.3 Identification and location of intervention designs

The project teams 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 wetland ecologist 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.

a. Intervention naming convention

A new naming convention was introduced in the 2011/2012 planning phase and this has been continued in this years' Rehabilitation Plans.

The **historical naming convention** for interventions is explained below:

A00A-00-000, where

Number	Explanation
A00A	quaternary number
00	wetland number
000	intervention number

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.

2.3.4 Collection of Monitoring & Evaluation Baseline and Basic Assessments Data

In accordance with WET-Rehab-Evaluate (Cowden & Kotze, 2008) the collection of baseline monitoring information is important to allow for the evaluation of the performance of wetland rehabilitation activities. Monitoring and evaluation facilitate the dissemination of lessons learnt and provide a means of reporting on the success of specific wetland rehabilitation initiatives. The monitoring and evaluation (M&E) of an identified wetland rehabilitation project's performance is therefore considered vital to inform the evaluation of wetland rehabilitation success. Baseline monitoring needs to be carried out prior to the implementation of rehabilitation activities to provide comparable data for monitoring at a later stage, following the wetland rehabilitation.

As a result, the wetland ecologist worked on the measurement of the intervention locations, in addition to gathering the additional data required for M&E baselines.

Any additional data/information required for the assessment of the potential impacts of the proposed interventions and construction activities was also collected by the wetland ecologist and the EAP to inform the Basic Assessments.

At the end of the site visit a location layout of the agreed interventions and rehabilitation objectives was signed off by the SANBI PC and landowner, as indicated by SANBI Signoff 2 in **Figure 1**.

2.3.5 Development of the Rehabilitation Plan

The standardised Rehabilitation Plan format has been approved by SANBI Programme Manager: Planning, Monitoring and Evaluation.

Summaries of the wetland prioritisation, problems and rehabilitation objectives were documented in the KZN Maputaland Rehabilitation Plan. A report on the current status of the wetland was prepared by the wetland ecologist and is included as **Appendix A** to this report.

The KZN Maputaland Rehabilitation Plan was submitted to the SANBI PC and wetland ecologist for review before it was made available to stakeholders for comment. Any comments received during the comments period were taken into account in the finalisation of the Rehabilitation Plans.

a. 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 2** below.

- 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.

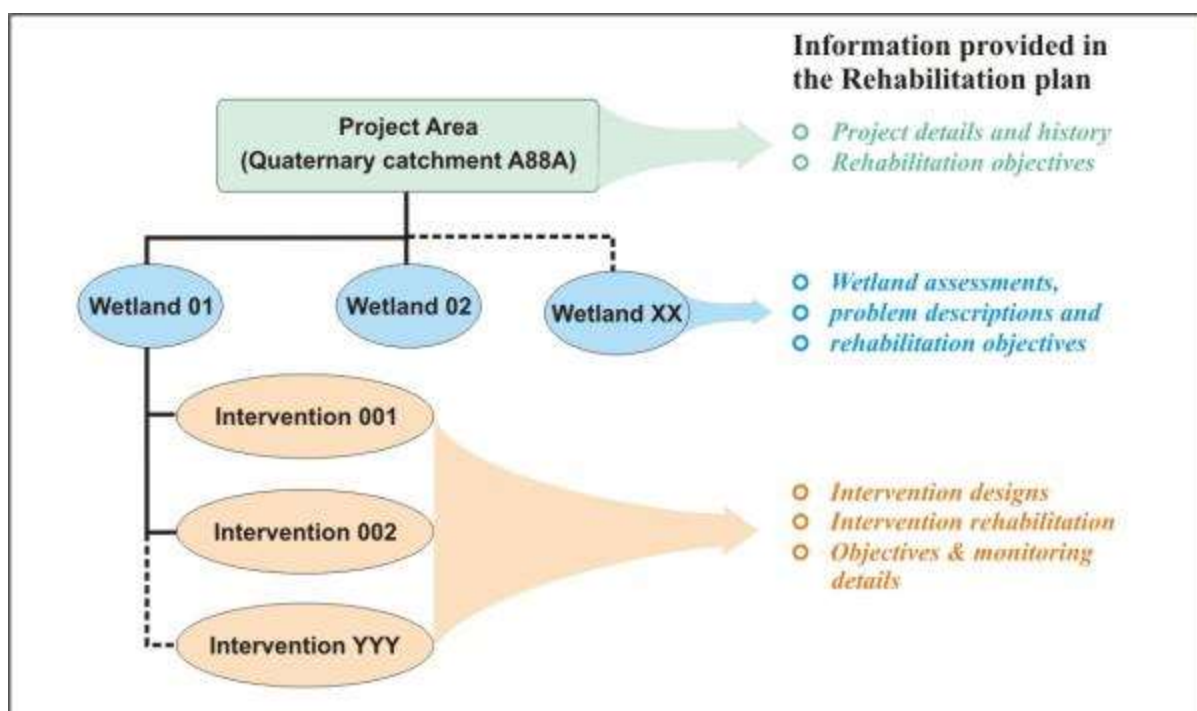


Figure 2: Hierarchy used in the Wetland Rehabilitation Plan

3 PROJECT DESCRIPTION

3.1 Project details

Background:

The KZN Maputaland Wetland Project falls within quaternary catchments W31L and W32B in the Mkuze River Floodplain, Maputaland and is part of the iSimangaliso Wetland Park on the east coast of KwaZulu-Natal. Furthermore, this wetland project is located in the iSimangaliso Wetland Park, a World Heritage Site that hosts Africa's largest estuarine system and eight interlinking ecosystems. In addition, the Wetland Park contains approximately 25% of South Africa's peatlands and four Ramsar Wetland sites.

Although detailed planning and rehabilitation work has been undertaken in Maputaland in previous years (refer **Table 8** in **Section 4.1**), the Kleinspan Wetland has been prioritised for rehabilitation work in the 2014/2015 planning cycle (refer **Table 3** and **Table 4**). This work is a continuation and extension of the work done in the 2011/2012 planning cycle

Table 3: Project details

Project Name	KZN Maputaland	
Region (Province)	KwaZulu-Natal	
Project Budget	R 2 018 079.00	
Planning Category	Kleinspan	Category 3
Nearest Town/s	St. Lucia	
Partnership	N/A	

Table 4: Identified wetlands within the KZN Maputaland Wetland Project

Wetland Number	Wetland Name	Longitude	Latitude
W31L-01	Kleinspan	27°40'38.29"S	32°21'31.53"E

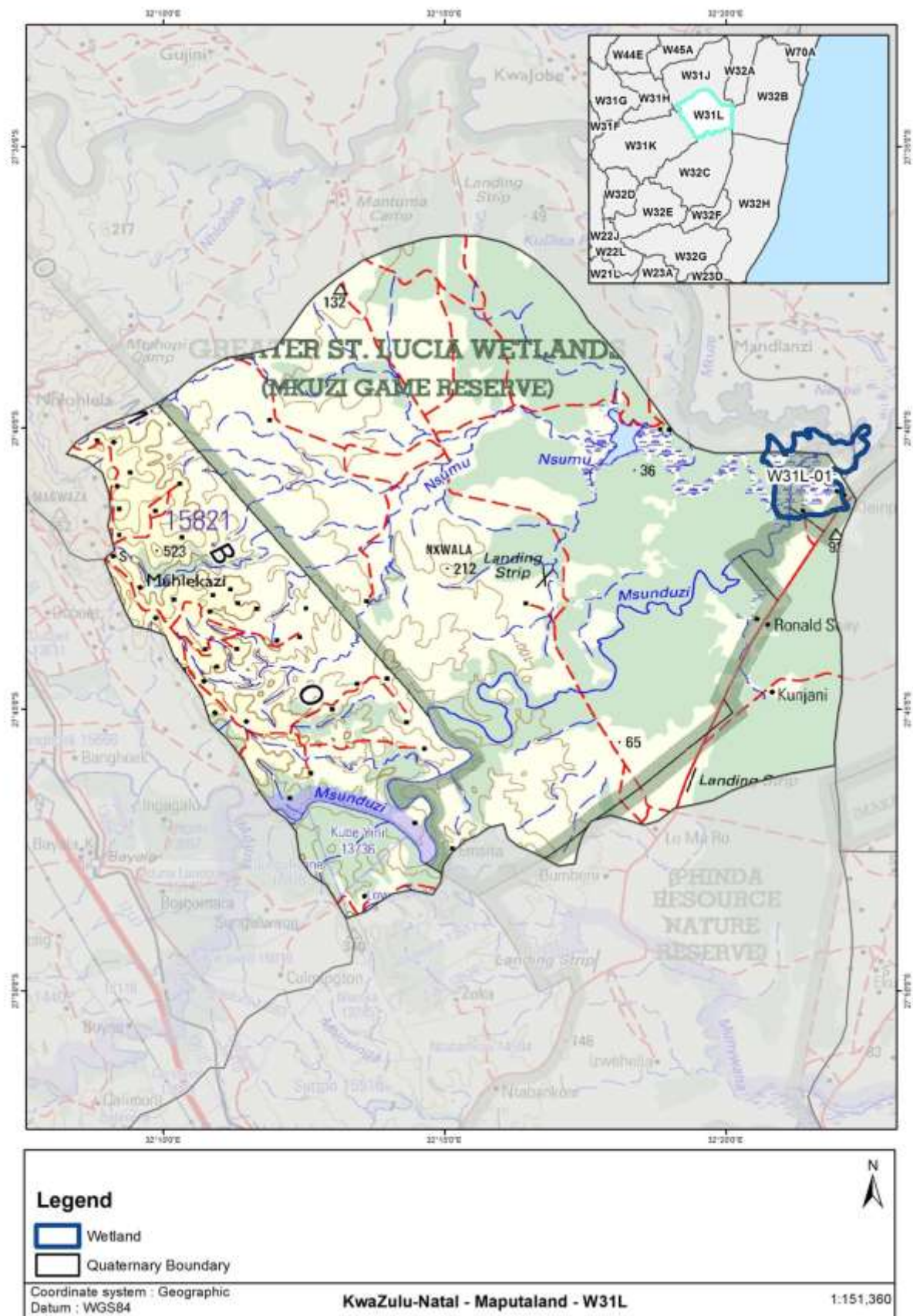


Figure 3: Topographic map showing the location, cadastral boundaries and access routes of quaternary catchment W31L

3.2 Landowner details

All land included in this project is located within the iSimangaliso Wetland Park and is managed by the iSimangaliso Authority. This area is zoned as a Provincial Nature Reserve and is a World Heritage Site and is thus protected.

The Chief Executive Officer (CEO) of the Wetland Park was contacted in connection with this Wetland Project (**Table 5**) and consent for any proposed wetland rehabilitation (subject to the approval of the Rehabilitation Plans) has been sought. Copies of the consent obtained are provided in **Appendix E**.

Table 5: List of Landowners and SG Key

Wetland Number	Property SG Key	Owner / Trust	Consent Obtained
W31L-01	N0HV00000001418200001	iSimangaliso Wetland Park	August 2010
	N0HV00000001744500000		

3.3 Projected rehabilitation indicators

The assessments for this project were done as part of a broader management plan and as such detailed planning focused on localised impacts and solutions within a broader landscape scale assessment and management plan. A rough calculation was however done to estimate the potential increase of the wetland area by implementing the proposed interventions (see **Table 6** below).

Table 6: Rehabilitation indicators

Hectare/Functional Equivalents of Wetland Habitat:	
Future scenario with no intervention	356
Post-rehabilitation scenario	431
Hectare/Functional Equivalents Gained or Lost:	
Wetland hectare equivalents gained by removing berms and deactivate drain	75

3.4 Interventions required

The following table (**Table 7**) provides a list of interventions requiring redesign, maintenance and or new structures for this project and their associated new intervention number.

Table 7: Summary of the interventions including a cross reference of intervention numbers

Descriptive name	New Intervention number	Proposed action	Reference document
NEW			
Kleinspan (W31L-01)			
Earthworks	W31L-01-204-00	Berm removal.	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-205-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-206-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-207-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Silt fence	W31L-01-208-00	Construct stepped pole/silt fence from treated gum poles	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-209-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Alien clearing	W31L-01-210-00	Frill <i>Seringa spp.</i>	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-211-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Alien clearing	W31L-01-212-00	Alien clearing	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-213-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-214-00	Berm removal and infilling of two drains adjacent to berm	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-215-00	Berm removal	KZN Maputaland Rehab Plan: 2014

Descriptive name	New Intervention number	Proposed action	Reference document
Earthworks	W31L-01-216-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-217-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-218-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-219-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-220-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-221-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-222-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-223-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-224-00	Berm removal.	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-225-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-226-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-227-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-228-00	Berm removal	KZN Maputaland Rehab Plan: 2014
Earthworks	W31L-01-229-00	Berm removal	KZN Maputaland Rehab Plan: 2014

The intervention designs/ drawings included in this Rehabilitation Plan have been labelled according to the **new naming convention** only. For historical labelling of interventions, please use the table above (**Table 7**) as a cross reference.

4 KLEINSPAN WETLAND –W31L-01

The assessment of the Kleinspan Wetland of the Maputaland Wetland Project W31L-01, its problems, and the development of the rehabilitation objectives are described in detail in **Appendix A: Wetland Status Quo Reports**. The following subsections provide a brief summary for this wetland.

4.1 Wetland details

The Kleinspan Wetland is located in quaternary catchment W31L, in the central part of the iSimangaliso Wetland Park, on the east coast of KwaZulu-Natal (refer **Figure 3** in **Section 3** of this report). **Table 8** provides a summary of the wetland details.

Table 8: Summary of the wetland details

Wetland Name	Kleinspan
Wetland Number	W31L-01
River System Name	Mkuze River and the Msunduze channel
Land Use in Catchment	The wetland is located within a catchment that covers an extensive area (6 086 000 ha). Economic activity is diverse and includes rain fed and subsistence farming, irrigation, afforestation and eco-tourism.
Land Use in Wetland	Land use within the wetland is predominantly conservation. However livestock grazing still occurs as well as biomass harvesting (e.g. reed cutting). Past practices included cultivation.
No. of Properties Intersecting Wetland Area	N/A: iSimangaliso Wetland Park (World Heritage Site)
Date of Planning Site Visit	17 August 2007 ;10-12 August 2010; 2-13 September 2011 and October 2013
Wetland Assessor(s)	Piet-Louis Grundling
Wetland size	481 Ha

4.1.1 Motivation

The Kleinspan Wetland has been selected for rehabilitation in the previous planning cycles and again in the 2014/2015 planning cycle due to its size and position in the landscape as well as its location within the iSimangaliso Wetland Park. The Kleinspan wetland has been extensively modified for agricultural purposes and is impacted by the numerous drains and earthen berms that prevent flooding of a large part of the wetland surface.

4.1.2 Description

The Kleinspan wetland is part of the larger Mkuze River floodplain, which is a highly dynamic complex of pans, floodplains, as well as both channelled and unchannelled valley bottom wetlands. Regionally, the Mkuze River is the primary driver of topographic variation. The Mkuze River system is a typical alluvial floodplain river, in that ongoing sediment accumulation on the channel bed and levees has resulted in the long term raising of the alluvial ridge above the adjacent floodplain and tributaries. Berms and drains in the Kleinspan wetland have severely impeded natural flow patterns.

4.1.3 Rehabilitation

The primary aim of the rehabilitation efforts in the Kleinspan Wetland is to re-instate more natural water distribution and retention patterns across the wetland in order to improve the hydrological functioning of the wetland. This will also assist with the improvement of the condition of wetland vegetation as well as to prevent erosion by reducing flow concentration.

4.2 Site photos



Figure 4: Site photos of the Kleinspan Wetland

4.3 Wetland problems

The following problems have been identified as posing a risk to the integrity of the wetland:

- Berms / dams left alongside drains (excavated material) that serves to enhance the efficiency of existing drains;
- Historic cultivation within wetland areas;
- Straightening of a section of the natural channel in the lower reaches of the wetland;
- Erosion in drains leading to localized increased sediment inputs;
- Livestock grazing within the wetland; and
- Alien woody species, for example *Seringa*.

4.4 Rehabilitation objectives

The primary objective of the rehabilitation is to re-instate more natural water distribution and retention patterns in order to improve the hydrological functioning of the wetland and associated condition of wetland vegetation. The secondary objective is to prevent erosion by reducing flow concentration.

4.5 Summary of proposed interventions

Rehabilitation within the Kleinspan Wetland has been ongoing since 2011, with the interventions focussed on the removal of earthen berms. For more detail on past rehabilitation activities, please refer to the WfWetlands rehabilitation plan dated February 2011.

The proposed interventions listed in **Table 9** will address the wetland problems and achieve the rehabilitation objectives described in **Sections 4.3** and **4.4** above respectively. The “implementation order” as depicted in the table indicates the timing order in which interventions should be implemented within the wetland (number 1 first). The “priority” as depicted in the table indicates the relative importance of each intervention across the project as a whole – if interventions have to be omitted for any reason, those with the lowest priority (highest number) across the whole project should be omitted first.

*Please note that the location of the interventions described in **Sections 3.4** and **4.6** may change as a result of changes in the landscape (due to continued erosion, for example) during the time period that has lapsed between the initial planning site visit and the actual implementation thereof.*

Table 9: Summary of proposed new interventions, W31L-01

Intervention Number	Intervention Structure Type	Implementation Order	Priority	Structure Cost (Excl. Vat)
W31L-01-204-00	Earthworks	22	22	R 57,624.00
W31L-01-205-00	Earthworks	23	23	R 91,728.00
W31L-01-206-00	Earthworks	24	24	R 142,968.00
W31L-01-207-00	Earthworks	25	25	R 89,488.00
W31L-01-208-00	Erosion Control	1	1	R 27,200.00
W31L-01-209-00	Earthworks	2	2	R 345,744.00

Intervention Number	Intervention Structure Type	Implementation Order	Priority	Structure Cost (Excl. Vat)
W31L-01-210-00	Clearance of alien invasive species	14	14	R 70,560.00
W31L-01-211-00	Earthworks	3	3	R 156,800.00
W31L-01-212-00	Clearance of alien invasive species	14	14	R 75,600.00
W31L-01-213-00	Earthworks	4	4	R 260,725.50
W31L-01-214-00	Earthworks	5	5	R 260,725.50
W31L-01-215-00	Earthworks	6	6	R 212,800.00
W31L-01-216-00	Earthworks	7	7	R 431,200.00
W31L-01-217-00	Earthworks	8	8	R 261,450.00
W31L-01-218-00	Earthworks	9	9	R 97,977.60
W31L-01-219-00	Earthworks	10	10	R 461,244.00
W31L-01-220-00	Earthworks	11	11	R 412,160.00
W31L-01-221-00	Earthworks	12	12	R 302,820.00
W31L-01-222-00	Earthworks	13	13	R 353,584.00
W31L-01-223-00	Earthworks	15	15	R 830,844.00
W31L-01-224-00	Earthworks	16	16	R 945,000.00
W31L-01-225-00	Earthworks	17	17	R 214,200.00
W31L-01-226-00	Earthworks	18	18	R 193,830.00
W31L-01-227-00	Earthworks	19	19	R 72,072.00
W31L-01-228-00	Earthworks	20	20	R 85,176.00
W31L-01-229-00	Earthworks	21	21	R 112,896.00
Total				R 6 566 416.60

4.5.1 Design selection and sizing

The objective of the interventions is to restore the natural flow patterns and wetland habitat within the wetland system. The most appropriate and cost effective method of doing this was considered to involve soft interventions such as:

- The removal of the existing berms and dams alongside drains to promote the flow of water into the wetland.
- The clearing of alien invasive plant species that pose a risk to the integrity of the wetland, namely *Seringa*.

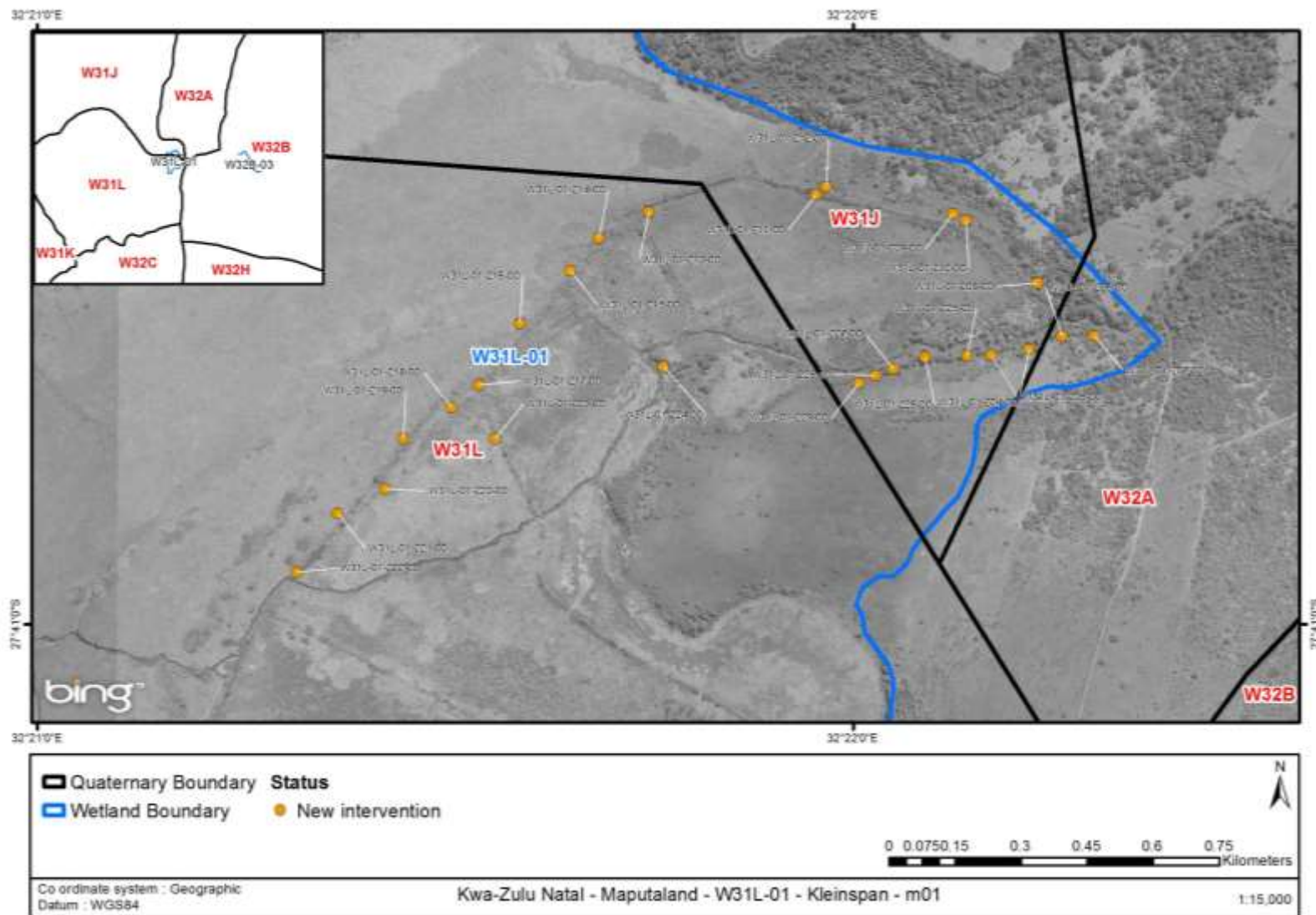


Figure 5: Wetland map, W31L-01 with proposed new wetland interventions indicated.

4.6 Intervention designs

4.6.1 Intervention: W31L-01-204-00

Intervention Description	Earthworks: Earthen Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'40.10"S
Longitude (D°M'S")	32°22'10.20"E



Figure 6: Intervention site W31L-01-204-00

4.6.1.1 Bill of quantities: W31L-01-204-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	205.80	R 280.00	R 57 624.00
Total				R 57 624.00

4.6.1.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a

foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.2 Intervention: W31L-01-205-00

Intervention Description	Earthworks: Earthen Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'39.70"S
Longitude (D°M'S")	32°22'13.00"E

4.6.2.1 Bill of quantities: W31L-01-205-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	327.60	R 280.00	R 91 728.00
Total				R 91 728.00

4.6.2.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.3 Intervention: W31L-01-206-00

Intervention Description	Earthworks: Earthen Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'38.70"S
Longitude (D°M'S")	32°22'15.40"E

4.6.3.1 Bill of quantities: W31L-01-206-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	510.60	R 280.00	R 142 968.00
Total				R 142 968.00

4.6.3.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.4 Intervention: W31L-01-207-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'38.70"S
Longitude (D°M'S")	32°22'17.80"E

4.6.4.1 Bill of quantities: W31L-01-207-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	319.60	R 280.00	R 89 488.00
Total				R 89 488.00

4.6.4.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.5 Intervention: W31L-01-208-00

Intervention Description	Erosion control: stepped pole/silt fence from treated gum poles; 4 rows starting at 10cm height above ground level in drain; increase height with 20cm every 1m; total length: 4m; water must be able to get over.
Rehabilitation Objective	To arrest erosion
Latitude (D°M'S")	27°40'34.80"S
Longitude (D°M'S")	32°22'13.60"E



Figure 7: Intervention site W31L-01-208-00

4.6.5.1 Bill of quantities: W31L-01-208-00

Item	Units	Quantity	Unit Cost	Item Cost
Treated Gum Poles		200.00	R 70.00	R 14 000.00
Labour	Person days	220.00	R 60.00	R13 200.00
Total				R 27 200.00

4.6.6 Intervention: W31L-01-209-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'29.70"S
Longitude (D°M'S")	32°22'7.40"E

4.6.6.1 Bill of quantities: W31L-01-209-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	1 234.80	R 280.00	R 345 744.00
Total				R 345 744.00

4.6.6.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.7 Intervention: W31L-01-210-00

Intervention Description	Clearance of alien invasives, namely Seringa
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'30.19"S
Longitude (D°M'S")	32°22'8.33"E

4.6.7.1 Bill of quantities: W31L-01-210-00

Item	Units	Quantity	Unit Cost	Item Cost
Alien clearing	ha	14.00	R 5 040.00*	R 70 560.00
Total				R 70 560.00

* Includes labour costs

4.6.8 Intervention: W31L-01-211-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'28.33"S
Longitude (D°M'S")	32°21'57.32"E



Figure 8: Intervention site W31L-01-211-00, note the Seringa trees (*Melia azedarach*) on the berm.

4.6.8.1 Bill of quantities: W31L-01-211-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	560.00	R 280.00	R 156 800.00
Total				R 156 800.00

4.6.8.2 Implementation Notes:

The following soil management measures should be followed when rehabilitating this site:

- Soil must not be dispersed across the area to prevent the spreading of alien seed and increasing the impact footprint;

- b. Spoil heaps shall comprise no more than 4 wheelbarrows and shall not be higher than 20cm.
- c. Spoil heaps shall be placed in a checkerboard layout, as this will exhaust the seedbank of alien vegetation and limit the disturbance footprint.
- d. Alternatively the soil can be used for the infilling of the drain located adjacent to the berm.

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.9 Intervention: W31L-01-212-00

Intervention Description	Alien clearing: cut stump seringas
Rehabilitation Objective	To restore wetland habitat and prevent the spread of alien invasive species
Latitude (D°M'S")	27°40'27.72"S
Longitude (D°M'S")	32°21'58.05"E

4.6.9.1 Bill of quantities: W31L-01-212-00

Item	Units	Quantity	Unit Cost	Item Cost
Clearance of Seringa Plant Species	ha	14.00	R 5 040.00*	R 75 600.00
Total				R 75 600.00

* Includes labour costs

4.6.10 Intervention: W31L-01-213-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'29.60"S
Longitude (D°M'S")	32°21'45.00"E



Figure 9: Intervention site W31L-01-213-00

4.6.10.1 Bill of quantities: W31L-01-213-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	374.40	R 280.00	R 260 725.50
Total				R 260 725.50

4.6.10.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.11 Intervention: W31L-01-214-00

Intervention Description	Earthworks: Berm removal and infilling of the two drains located adjacent to the berm.
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'31.50"S
Longitude (D°M'S")	32°21'41.30"E



Figure 10: Intervention site W31L-01-214-00

4.6.11.1 Bill of quantities: W31L-01-214-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	931.1625	R 280.00	R 260 725.50
Total				R 260 725.50

4.6.11.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.12 Intervention: W31L-01-215-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'33.90"S
Longitude (D°M'S")	32°21'39.20"E

4.6.12.1 Bill of quantities: W31L-01-215-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	760.00	R 280.00	R 212 800.00
Total				R 212 800.00

4.6.12.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.13 Intervention: W31L-01-216-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'37.80"S
Longitude (D°M'S")	32°21'35.50"E

4.6.13.1 Bill of quantities: W31L-01-216-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	1 540.00	R280.00	R 431 200.00
Total				R 431 200.00

4.6.13.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.14 Intervention: W31L-01-217-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'42.33"S
Longitude (D°M'S")	32°21'32.49"E

4.6.14.1 Bill of quantities: W31L-01-217-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	933.75	R280.00	R 261 450.00
Total				R 261 450.00

4.6.14.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.15 Intervention: W31L-01-218-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'44.00"S
Longitude (D°M'S")	32°21'30.50"E

4.6.15.1 Bill of quantities: W31L-01-218-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	349.92	R280.00	R 97 977.60
Total				R 97 977.60

4.6.15.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.16 Intervention: W31L-01-219-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'46.30"S
Longitude (D°M'S")	32°21'26.90"E

4.6.16.1 Bill of quantities: W31L-01-219-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	1 647.30	R280.00	R 461 244.00
Total				R 461 244.00

4.6.16.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.17 Intervention: W31L-01-220-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'50.00"S
Longitude (D°M'S")	32°21'25.60"E

4.6.17.1 Bill of quantities: W31L-01-220-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	1 472.00	R280.00	R 412 160.00
Total				R 412 160.00

4.6.17.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.18 Intervention: W31L-01-221-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'51.80"S
Longitude (D°M'S")	32°21'22.10"E

4.6.18.1 Bill of quantities: W31L-01-221-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	1 081.50	R280.00	R 302 820.00
Total				R 302 820.00

4.6.18.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.19 Intervention: W31L-01-222-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'56.10"S
Longitude (D°M'S")	32°21'19.10"E

4.6.19.1 Bill of quantities: W31L-01-222-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	1 262.80	R280.00	R 353 584.00
Total				R 353 584.00

4.6.19.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.20 Intervention: W31L-01-223-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'46.30"S
Longitude (D°M'S")	32°21'33.70"E

4.6.20.1 Bill of quantities: W31L-01-223-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	2 967.30	R280.00	R 830 844.00
Total				R 830 844.00

4.6.20.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.21 Intervention: W31L-01-224-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'41.00"S
Longitude (D°M'S")	32°21'46.10"E



Figure 11: Intervention site W31L-01-224-00

4.6.21.1 Bill of quantities: W31L-01-224-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	3 375.00	R280.00	R 945 000.00
Total				R 945 000.00

4.6.21.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.22 Intervention: W31L-01-225-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'40.20"S
Longitude (D°M'S")	32°22'8.40"E

4.6.22.1 Bill of quantities: W31L-01-225-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	765.00	R280.00	R 214 200.00
Total				R 214 200.00

4.6.22.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.23 Intervention: W31L-01-226-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'40.26"S
Longitude (D°M'S")	32°22'5.34"E

4.6.23.1 Bill of quantities: W31L-01-226-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	692.25	R280.00	R 193 830.00
Total				R 193 830.00

4.6.23.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.24 Intervention: W31L-01-227-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'40.26"S
Longitude (D°M'S")	32°22'5.34"E

4.6.24.1 Bill of quantities: W31L-01-227-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	692.25	R280.00	R 193 830.00
Total				R 193 830.00

4.6.24.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.25 Intervention: W31L-01-228-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'41.64"S
Longitude (D°M'S")	32°22'1.68"E

4.6.25.1 Bill of quantities: W31L-01-228-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	304.20	R280.00	R 85 176.00
Total				R 85 176.00

4.6.25.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.6.26 Intervention: W31L-01-229-00

Intervention Description	Earthworks: Berm removal
Rehabilitation Objective	To restore natural flow patterns and wetland habitat
Latitude (D°M'S")	27°40'38.76"S
Longitude (D°M'S")	32°22'20.86"E

4.6.26.1 Bill of quantities: W31L-01-229-00

Item	Units	Quantity	Unit Cost	Item Cost
Earthworks: Berm Removal	m ³	403.20	R280.00	R 112 896.00
Total				R 112 896.00

4.6.26.2 Implementation notes

All berm material must be used to fill adjacent drains/excavations; additional berm material must be spread out in such a way that it does not smother natural vegetation or become a foothold for alien invasive species. All cleared areas must be re-vegetated and/or mulched or brush packed.

4.7 Construction Environmental Management Plan issues

The proposed rehabilitation is to be undertaken on in a nature reserve 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 iSimangaliso Wetland Park. The implementation of these interventions must also take into account all relevant provisions of WfWetlands Best Management Practices and the Construction Environmental Management Plan (CEMP), the recommendations of the approved Basic Assessments and Environmental Authorisation for the project.

The Construction phase EMP (CEMP) is included as **Appendix F**.

The following project-specific management issues apply:

This site falls within the iSimangaliso Wetland Park. Conservation policy of the park authority should be followed where relevant. Furthermore, this area has close community involvement and a wise use project might be in order. Lastly, care should be taken that work areas do not become a foothold for alien invasive plants, e.g. *Seringa (Melia azedarach)* and *Parthenium hysterophorus*

4.8 Wetland management recommendations

The system is currently utilised for nature conservation and will continue as such. The proposed rehabilitation interventions will not only affect the ecological integrity of the broader wetland system (positively) but will also have a number of positive impacts on the supply of goods and services provided by the wetland .

4.9 Baseline M&E data

The collection of baseline information was carried out to show changes in the system associated with the wetland rehabilitation activities.

4.9.1 Erosion problems

The erosional features within the wetland are generally limited to channel incision and are relatively stable, and will therefore not be monitored specifically. If these features were to become unstable at any point, monitoring should be undertaken.