Report No: 113223/11663

WORKING FOR WETLANDS REHABILITATION PROGRAMME, KWAZULU-NATAL

BASIC ASSESSMENT REPORT
NOVEMBER 2017

Agriculture, Forestry and Fisheries
Environmental Affairs
Water Affairs and Sanitation

Working for Wetlands

EXPANDED PUBLIC WORKS PROGRAMME
Creating opportunities towards human fullfilment

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Document control record

Document prepared by:

Aurecon South Africa (Pty) Ltd
Reg No 1977/003711/07
Aurecon Centre
1 Century City Drive
Waterford Precinct
Century City
Cape Town 7441
PO Box 494
Cape Town 8000
South Africa

T +27 21 526 9400
F +27 21 526 9500
E capetown@aurecongroup.com
W aurecongroup.com

Document control						
Report title		Working for Wetlands Rehabilitation Programme: KwaZulu-Natal				
Document ID		11663	**Project number**		113223	
File path		P:\Projects\113223 Plan & Env Comp Work for Wetlands\Enviro\7 DEL SERV\701 Provinces\KwaZulu-Natal\2017_2018\Reports\BAR				
Client		Working for Wetlands Programme				
Client contact		Dr Farai Tererai	**Client reference**		WfWetlands: KZN BAR	
Rev	**Date**	**Revision details/status**	**Author**	**Reviewer**	**Verifier** (if required)	**Approver**
0	9 November 2017	**Draft for PPP**	**Noluyolo Xorile/ Corlie Steyn**	**Zoë Palmer**	**Franci Gresse**	**Diane Erasmus**
Current revision		**0**				

Approval			
Verifier signature		Approver signature	
Name	**Franci Gresse**	Name	**Diane Erasmus**
Title	**Project Leader**	Title	**Associate**

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NEMA requirements for Basic Assessment Reports		aurecon
Appendix 1	**Content as required by NEMA**	**Section**
3(1)	A basic assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include -	
(a)	(i) details of the EAP who prepared the report; and	Section 8.2 Appendix D
	(ii) details of the expertise of the EAP, including curriculum vitae;	
(b)	the location of the activity, including-	
	(i) the 21 digit Surveyor General code of each cadastral land parcel;	Section 1.1.1
	(ii) where available, the physical address and farm name;	
	(iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	N/A
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is-	Figure 1 Chapter 6
	(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
	(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	N/A
(d)	a description of the scope of the proposed activity, including-	
	(i) all listed and specified activities triggered and being applied for; and	Chapter 2
	(ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Section 5.2
(e)	a description of the policy and legislative context within which the development is proposed including -	Chapter 2
	(i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and	
	(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;	
(f)	a motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;	Section 5.1
(g)	a motivation for the preferred site, activity and technology alternative;	Chapter 5
(h)	a full description of the process followed to reach the proposed preferred alternative within the site, including -	Section 5.3
	(i) details of all the alternatives considered;	
	(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Chapter 4 Appendix B
	(iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	
	(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 6
	(v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated;	Chapter 7
	(vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 3.2
	(vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Chapter 7

	(viii) the possible mitigation measures that could be applied and level of residual risk;	
	(ix) the outcome of the site selection matrix;	N/A
	(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	Section 5.3
	(xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;	N/A
(i)	a full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including -	Chapter 3 and 7
	(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and	
	(ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	
(j)	an assessment of each identified potentially significant impact of risk, including -	Chapter 7
	(i) cumulative impacts;	
	(ii) the nature, significance and consequences of the impact and risk;	
	(iii) the extent and duration of the impact and risk;	
	(iv) the probability of the impact and risk occurring;	
	(v) the degree to which the impact and risk can be reversed;	
	(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and	
	(vii) the degree to which the impact and risk can be avoided, managed or mitigated;	
(k)	where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report;	Chapter 8
(l)	an environmental impact statement which contains -	
	(i) a summary of the key findings of the environmental impact assessment;	
	(ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and	
	(iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Chapter 8
(m)	based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the impact management outcomes for the development for inclusion in the EMPr;	
(n)	any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	
(o)	a description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 3.3
(p)	a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 8.2
(r)	an undertaking under oath or affirmation by the EAP in relation to-	Appendix E
	(i) the correctness of the information provided in the report;	
	(ii) the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
	(iii) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	
(s)	where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
(t)	any specific information that may be required by the competent authority; and	N/A
(u)	any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

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APPENDICES

FIGURES

TABLES

ABBREVIATIONS

AMSL	Above mean sea level
ASD	Assistant Director: Wetlands Programmes
BAR	Basic Assessment Report
BGIS	Biodiversity Geographic Information Systems
CBA	Critical Biodiversity Area
CPP	Catchment Prioritisation Process
CSIR	Council for Scientific Research
DAFF	Department of Agriculture, Forestry and Fisheries
DEA	Department of Environmental Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMF	Environmental Management Framework
EMPr	Environmental Management Programme
EPWP	Expanded Public Works Programme
ESA	Ecological Support Area
GA	General Authorisation
GIS	Geographic Information System
GPS	Geographical Positioning System
IA	Implementing Agent
I&AP	Interested and Affected Party
IDP	Integrated Development Plan
M&E	Monitoring and Evaluation
MAP	Mean Annual Precipitation
NEMA	National Environmental Management Act (Act 107 of 1998)
NEM:BA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEM:WA	National Environmental Management: Waste Act (Act 59 of 2008)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act (Act 25 of 1999)
NWA	National Water Act (Act 36 of 1998)
NWI	National Wetland Inventory Project
PET	Potential Evapotranspiration
PPP	Public Participation Process
SDF	Spatial Development Framework
SMME	Small, Medium and Micro Enterprises
UNESCO	United Nations Educational, Scientific and Cultural Organisation
WfWetlands	Working for Wetlands

GLOSSARY OF TERMS

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

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

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

Catchment: All the land area from mountaintop to seashore which is drained by a single river and its tributaries. Each catchment in South Africa has been subdivided into secondary catchments, which in turn have been divided into tertiary catchments. Finally, all tertiary catchments have been divided into interconnected quaternary catchments. 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 (Cowden and Kotze, 2008).

Development: The building, erection, construction or establishment of a facility, structure or infrastructure, *including associated earthworks* or borrow pits, that is necessary for the undertaking of a listed or specified activity, including any associated post development monitoring, but *excludes any modification, alteration or expansion* of such a facility, structure or infrastructure, including associated earthworks or borrow pits, and *excluding the redevelopment of the same facility in the same location, with the same capacity and footprint*.

Development Footprint: means *any evidence of physical alteration* as a result of the undertaking of an activity.

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

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

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

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

Expansion: The *modification, extension, alteration* or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the *capacity* of the facility or the *footprint* of the activity is increased.

Indigenous Vegetation: Vegetation consisting of indigenous plant species occurring naturally in an area, *regardless of the level of alien infestation* and where the topsoil has not been lawfully disturbed during the preceding ten years.

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

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

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

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

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').

Maintenance Management Plan: A management plan for maintenance purposes defined or *adopted by the competent authority.* [For WfWetlands, this is called a Rehabilitation Plan.]

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

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

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

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

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

Wetland: "Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which in normal circumstances supports or would support vegetation typically adapted to life in saturated soils." (National Water Act, 36 of 1998) *and* "Land where an excess of water is the dominant factor determining the nature of the soil development and the types of plants living there" (Cowden and Kotze, 2008).

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1 INTRODUCTION AND BACKGROUND

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

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

Due to the nature of the project, it is important to note that the very objectives of the WfWetlands Programme are to improve both environmental and social circumstances. The legislation protecting the environment in South Africa was not written with the intention of preventing wetland rehabilitation efforts, but rather of curtailing development in sensitive environments.

Throughout this report there will therefore be sections which guide the reader to understand how the minimum legal requirements (as required by the amended 2014 Environmental Impact Assessment (EIA) Regulations) will be met. It is important to note that the planning cycle of the WfWetlands Programme occurs annually, and continuously builds on existing information (dating back to the early 2000s). Each project cycle occurs within three phases (Refer to Section **Error! Reference source not found.**), with Phase 1 and Phase 2 occurring prior to implementation. Figure 1 on the following page provides an overview of how Phase 1 and 2 relate to the basic assessment process.

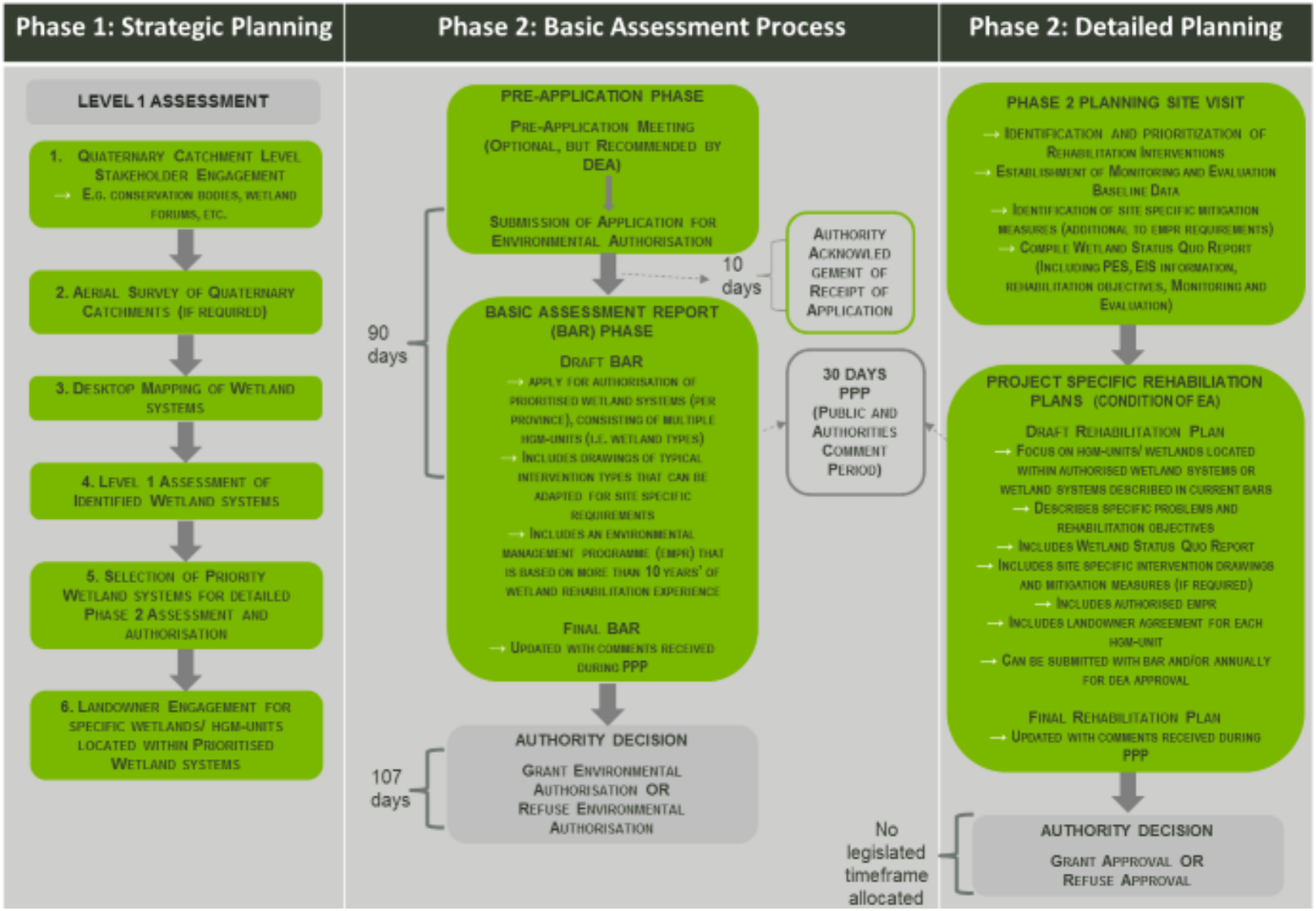

Figure 1: Overview of Phase 1 and 2 as part of the planning process

1.1 Introducing the Project

The WfWetlands Programme is currently managing 37 WfWetlands Projects countrywide, including projects in the KwaZulu-Natal Province. WfWetlands has actively been rehabilitating wetlands in the KwaZulu-Natal province since the early 2000s. Priority wetland systems requiring rehabilitation were identified during Phase 1 of the WfWetlands Programme. Catchment and wetland prioritisation assessments were undertaken by the provincial Wetland Specialist/s to identify priority catchments and associated wetlands within which rehabilitation work needs to be undertaken. A review was undertaken to determine local knowledge and identify existing studies of the quaternary catchments in the province. The Programme'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.

1.1.1 Project Location

Based on the above, the following new wetland systems were identified in the KwaZulu-Natal Province as shown in **Table 1** and **Table 2** below.

Table 1: Project details

Project Name	Wetland System	Wetland Number	Lat (DDMMSS)	Long (DDMMSS)
KZN Maputaland	Kleinspan	W31L-01	27° 41' 18.81"	32° 21' 51.66"
	Mkhuze	W32B-04	27° 43' 24.60"	32° 29' 23.31"
	Muzi Swamp	W70A-01	26° 59' 28.39"	32° 30' 21.96"
	Tshenetshe Pan	W32B-03	27° 40' 17.57"	32° 26' 35.62"
KZN North	Stilwater	W21A-01	27° 45' 44.66"	30° 42' 30.82"
	Stilwater	W21A-02	27° 46' 19.22"	30° 43' 34.57"
KZN Midlands	Heatherdon	U20A-02	29° 31' 03.92"	29° 52' 45.22"

Table 2: Farm details for KwaZulu-Natal projects

Project Name	Wetland System	Property Number	21 digit SG code	Property Size (ha)
KZN Maputaland	Kleinspan	1/14182	N0HV00000001418200001	451.64
		14/14250	N0HV00000001425000014	
		15833	N0HV00000001583300000	
		17445	N0HV00000001744500000	
	Mkhuze	RE/7638	N0HV00000000763800000	6847.81
	Muzi Swamp	49/17497	N0HV00000001749700049	30013.60
	Tshenetshe Pan	RE/7638	N0HV00000000763800000	6646.01
KZN North	Stilwater	1/9	N0HT00000000000900001	156.10
		2/231	N0HT00000000023100002	317.30
		9/408	N0HT00000000040800009	275.38
		10/408	N0HT00000000040800010	198.05
		11/408	N0HT00000000040800011	170.42
		1/623	N0HT00000000062300001	345.39

		4/623 5/623	N0HT00000000062300004 N0HT00000000062300005	161.33 114.00
	Stilwater	9/408	N0HT00000000040800009	275.38
KZN Midlands	Heatherdon	1/5358 6248	N0FS00000000535800001 N0FS00000000624800000	523.02 175.11

1.1.2 Project Team

The Aurecon team, in partnership with GroundTruth, comprises Design Engineers and Environmental Assessment Practitioners (EAPs) who undertake the planning, design and authorisation components of the project. The team is assisted by an external team of Wetland Specialists[1] who provide scientific insight into the operation of wetlands and expert local knowledge of the wetlands. The project team is also complimented by the Assistant Director for Wetlands Programme (ASDs) who are each responsible for a project team for KwaZulu-Natal Province includes the following professionals:

Table 3: Planning Team for KwaZulu-Natal Province

Role	Representative	Company
ASD	Mbali Kubheka	Department of Environmental Affairs
EAPs	Zoë Palmer	Aurecon South Africa (Pty) Ltd
	Simon Clark	Aurecon South Africa (Pty) Ltd
	Claire Blanché	Aurecon South Africa (Pty) Ltd
Engineers	Trevor Pike	GroundTruth
	Andrew Hull	GroundTruth
Wetlanders	Fiona Eggers	GroundTruth
	Craig Cowden	GroundTruth

The delivery of the final basic assessment reports (BARs) and rehabilitation plans are managed by Aurecon's Cape Town office where Ms Franci Gresse provides the role of the main EAP and project leader. Ms Gresse has been part of the WfWetlands Programme since 2010 and is involved with the technical planning component for the Limpopo, Northern Cape and Western Cape Provinces, as well as the management and delivery of the project. Ms Gresse's signed EAP declaration and curriculum vitae (CV) can be found in **Appendix E.**

Specialist input is provided within this BAR by the provincial wetland specialist, however a specialist report does not accompany the report. The wetland specialist provides two deliverables, the first being a high-level strategy during Phase 1, and a detailed assessment of the wetland system and proposed interventions at Phase 2 based on the WET-Health methodology. The Phase 2 reports will be included as an appendix to the project specific rehabilitation plans.

Should any heritage resources be identified on site (refer to Section **Error! Reference source not found.**) a heritage specialist will be appointed to undertaken the necessary permitting procedures in terms of the National Heritage Resources Act (Act 25 of 1999) (NHRA). This will not be required for the KwaZulu-Natal Province.

[1] These Wetland Specialists are also referred to as Wetlanders in the Programme, and the two terms should be used interchangeably. The individuals are selected based on their expertise in the province, and their involvement in the wetland society of South Africa.

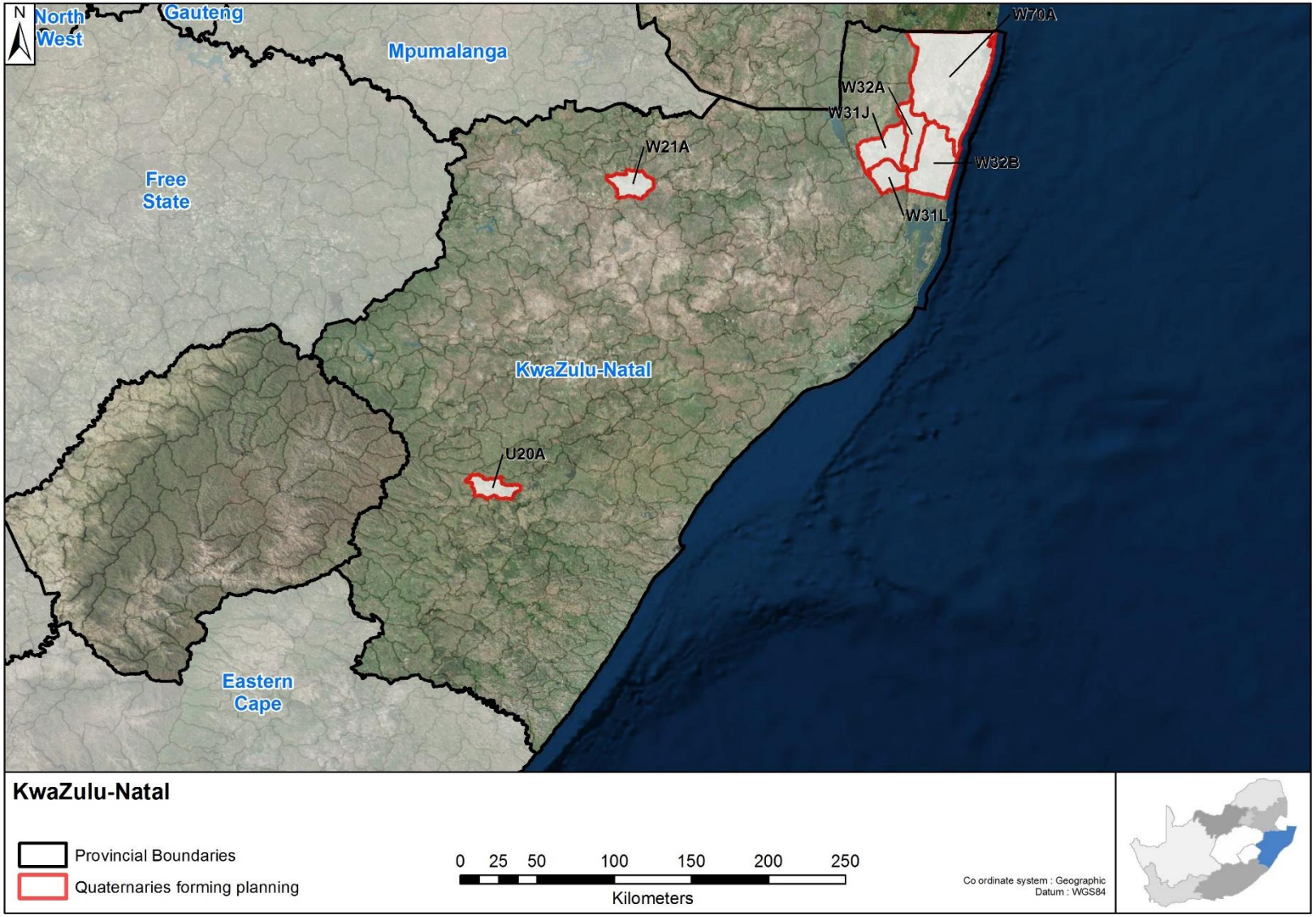

Figure 2: Locality map showing the location of quaternary catchments included in this BAR

2 LEGAL AND PLANNING CONTEXT

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

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

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

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

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

2.1 Relevant Legislation

There are a host of legal and policy documents and guidelines to consider when undertaking such a project.

Table 4 provides and overview of all the relevant legislation.

Table 4: Relevant Legislation, policies and guidelines considered in preparation of the Basic Assessment Report

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
Legislation			
The Constitution of South Africa (Act 108)	The WfWetlands Programme is a rehabilitation proposal that aims to protect and conserve South Africa's wetland ecosystems. As such the listed legislation, policies and guidelines are all of relevance to the project.	National Government	1996
National Environmental Management Act (107) (NEMA)		Department of Environmental Affairs	1998
National Environmental Management Act (Act 107), Amendment Act (NEMA)		Department of Environmental Affairs	1998
The National Water Act (Act 36)		Department of Water and Sanitation	1998
Conservation of Agricultural Resources Act (Act 43)		Department of Agriculture, Forestry & Fisheries	1983
Natural Heritage Resources Act (Act 25)		National Heritage Resources Agency	1999
World Heritage Conventions Act (Act 49)		Department of Environmental Affairs	1999

Title of legislation, policy or guideline	Applicability to the project	Administering authority	Date
The National Environmental Management: Biodiversity Act (Act 10)		Department of Environmental Affairs	2004
National Environmental Management: Protected Areas Act (Act 57)		Department of Environmental Affairs	2003
The Mountain Catchments Areas Act (Act 63)		Department of Water and Sanitation	1970
National Guidelines			
EIA Guideline Series, in particular: Guideline 5 – Companion to the NEMA EIA Regulations, 2010 (DEA, October 2012) Guideline 7 – Public Participation in the EIA process, 2012 (DEA, October 2012) Guideline 9 – Guideline on Need and Desirability, 2010 (DEA, October 2014)	The WfWetlands Programme is a rehabilitation proposal that aims to protect and conserve South Africa's wetland ecosystems. As such the listed legislation, policies and guidelines are all of relevance to the project.	Department of Environmental Affairs	2012 - 2014
Provincial Bylaws, Frameworks, Plans and Policies			
KwaZulu-Natal Environmental Management Framework	The WfWetlands Programme is a rehabilitation proposal that aims to protect and conserve South Africa's wetland ecosystems. As such the listed legislation, policies and guidelines are all of relevance to the project.	KwaZulu-Natal Department of Agriculture and Rural Development	2014
KwaZulu-Natal Biodiversity Plan		KwaZulu-Natal Department of Agriculture and Environmental Management	2014
International Conventions			
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)	The WfWetlands Programme is a rehabilitation proposal that aims to protect and conserve South Africa's wetland ecosystems. As such the listed legislation, policies and guidelines are all of relevance to the project.		

2.2 National Environmental Management Act, No. 107 of 1998 (NEMA)

The implementation of various interventions aimed at wetland rehabilitation require Environmental Authorisation (EA) from the Department of Environmental Affairs (DEA) in terms of Regulations pursuant to NEMA, as amended. It has been determined together with DEA that a **Basic Assessment Report (BAR)** will be prepared for each Province where work is proposed by the WfWetlands Programme. The EAs would be inclusive of all Listed Activities for these wetland systems and would essentially authorise any typical wetland rehabilitation activities required during the WfWetlands Programme implementation phase.

The intention is that **rehabilitation plans** would be prepared every year after sufficient field work has been undertaken in the wetlands that have an EA. These rehabilitation plans would be made available to registered Interested and Affected Parties (I&APs) before being submitted to DEA for approval as a condition of the EA for

each of the Provinces. The rehabilitation plans would 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 of each intervention. These interventions would vary but a booklet of typical hard engineering designs is included in **Appendix A** of this report. The rehabilitation plans would also provide site photographs of the general landscape as well as photographs of the proposed locations for each intervention.

The WfWetlands Programme is not a development proposal
It is important to note that the very objectives of the WfWetlands Programme are 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. The legislation protecting the environment in South Africa was not written with the intention of preventing wetland rehabilitation efforts, but rather of 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 Environmental Authorisation in terms of Regulations pursuant to NEMA, such environmentally positive rehabilitation projects should not need to be assessed for negative environmental impact. Therefore, legislative processes aimed at preventing negative environmental impact through development are really not applicable to a project of this nature and **the project activities that trigger Listing Notices are only being undertaken to benefit the environment.**

2.2.1 Listed Activities

The following listed activities, as shown in **Table 5**, have been identified as being applicable to the proposed rehabilitation interventions:

Table 5: Listed activities triggered by the proposed KwaZulu-Natal Projects

Listed activity	Description of project activity that triggers listed activity
Listing Notice 1 (GN R983, as amended)	
Activity 12: The development of- *i. weirs, where the weir, including infrastructure and water surface area, exceeds 100 square metres in size; or* *ii. infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs-* *a. within a watercourse;* *c. if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.*	In order to achieve the objectives of wetland rehabilitation, changes must be made to artificial drainage lines or eroding water channels if the wetland systems are to be returned to their original statuses. The following may be necessary: • The construction of concrete or gabion weirs within a watercourses (wetlands); • The formalisation of stream crossings to ensure that the integrity of wetland systems downstream and upstream of the crossings are protected from further degradation; and • The construction of walkways in public wetlands to limit human impact, and to form part of the educational component of the project.
Activity 48: The expansion of- . *i.. infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or*	In order to achieve the objectives of wetland rehabilitation, changes must be made to artificial drainage lines or eroding water channels if the wetland systems are to be returned to their original statuses. The following may be necessary:

Listed activity	**Description of project activity that triggers listed activity**
ii.. weirs, where the weir, including infrastructure and water surface area, is expanded by 100 square metres or more; *where such expansion or expansion and related operation occurs-* *a. within a watercourse;* *c. if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.*	The expansion of existing concrete or gabion weirs within watercourses (wetlands). Furthermore, some educational infrastructure may be required to limit human impact on the wetland system. Even though the interventions are intended to improve ecological status and habitats, this listing notice will be triggered because: Walkways in public wetlands may constitute infrastructure with a footprint exceeding 100m^2.
Listing Notice 3 (GN R985, as amended)	
GN 985: Activity 14 The development of- *i. weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres; or* *ii. infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs -* *a. within a watercourse;* *c. if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *(c) In KwaZulu-Natal:* *iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the KwaZulu-Natal Conservation Plan or in bioregional plans;* *v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act 10 of 2004);* *vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority;* *x. Sites zoned for conservation or public open space or equivalent zoning.*	In order to achieve the objectives of wetland rehabilitation, changes must be made to artificial drainage lines or eroding water channels if the wetland systems are to be returned to their original statuses. The following may be necessary: • The construction of concrete or gabion weirs within watercourses (wetlands); • The formalisation of stream crossings to ensure that the integrity of wetland systems downstream and upstream of the crossings are protected from further degradation; and • The construction of walkways in public wetlands to limit human impact, and to form part of the educational component of the project. The projects within KwaZulu-Natal fall within sensitive areas including the iSimangaliso Wetland Park, and the Tembe Elephant Park. Furthermore, most of the wetlands are included in areas either demarcated as Critical Biodiversity Aras (CBAs) or Ecological Support Areas (ESAs).
Activity 23: The expansion of- *i. weirs where the weir is expanded by 10 square meters or more in size;* *ii. infrastructure or structures where the physical footprint is expanded by 10 square metres or more;* *where such development occurs* *a. within a watercourse;* *c. if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *(c) In KwaZulu-Natal:* *iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the KwaZulu-Natal Conservation Plan or in bioregional plans;*	In order to achieve the objectives of wetland rehabilitation, changes must be made to artificial drainage lines or eroding water channels if the wetland systems are to be returned to their original statuses. The following may be necessary: The construction of concrete or gabion weirs within watercourses (wetlands); • The formalisation of stream crossings to ensure that the integrity of wetland systems downstream and upstream of the crossings are protected from further degradation; • The construction of walkways in public wetlands to limit human impact, and to form part of the educational component of the project.

Listed activity	Description of project activity that triggers listed activity
v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act 10 of 2004); *vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority;* *x. Sites zoned for conservation or public open space or equivalent zoning.*	The projects within KwaZulu-Natal fall within sensitive areas including the iSimangaliso Wetland Park, and the Tembe Elephant Park. Furthermore, most of the wetlands are included in areas either demarcated as Critical Biodiversity Aras (CBAs) or Ecological Support Areas (ESAs).

2.3 National Water Act, No. 36 of 1998 (NWA)

In terms of Section 39 of the NWA, a General Authorisation[2] (GA) has been granted for certain activities 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*[3]' and '*altering the bed, banks, course or characteristics of a watercourse*[4]' where they are specifically undertaken for the purposes of rehabilitating[6] a wetland for conservation purposes. The WfWetlands Programme is required to register the 'water use' in terms of the GA.

2.4 National Heritage Resource Act, No. 25 of 1999 (NHRA)

Section 38 of the NHRA requires that 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.

[2]Government Notice No. 1198, 18 December 2009
[3]Section 21(c) of the NWA, No. 36 of 1998
[4]Section 21(i) of the NWA, No. 36 of 1998

3 METHODOLOGY

3.1 Approach to the Project

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. These Wetland Projects may be located within one or more quaternary catchments within a Province.

Each Wetland Project is managed in three phases (as shown in the flow diagram in **Figure 3**) over a two-year cycle. The first two phases straddle the first year of the cycle and involve planning, identification, design and authorisation of interventions. The third phase is implementation, which takes place during the second year.

In order to undertake these three phases, a collaborative team has been established as follows. The **Programme Team** currently comprises two subdirectories: a) Implementation and After Care and b) Planning, Monitoring and Evaluation. The Assistant Directors for Wetlands Programmes (ASDs)[5] report to the Implementation and After Care Deputy Director and are responsible for the identification and implementation of projects in their regions. The Programme Team is further supported by a small team that fulfil various roles such as Geographical Information Systems (GIS) and training. Independent Design Engineers and Environmental Assessment Practitioners (EAPs) are appointed to undertake the planning, design and authorisation components of the project. The project team is assisted by a number of wetland specialists who provide scientific insight into the operation of wetlands and bring expert and often local knowledge to the project teams. They are also assisted by the landowners and implementers who have valuable local knowledge of these wetlands.

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

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

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

[5] Also referred to as Provincial Coordinators (PCs).

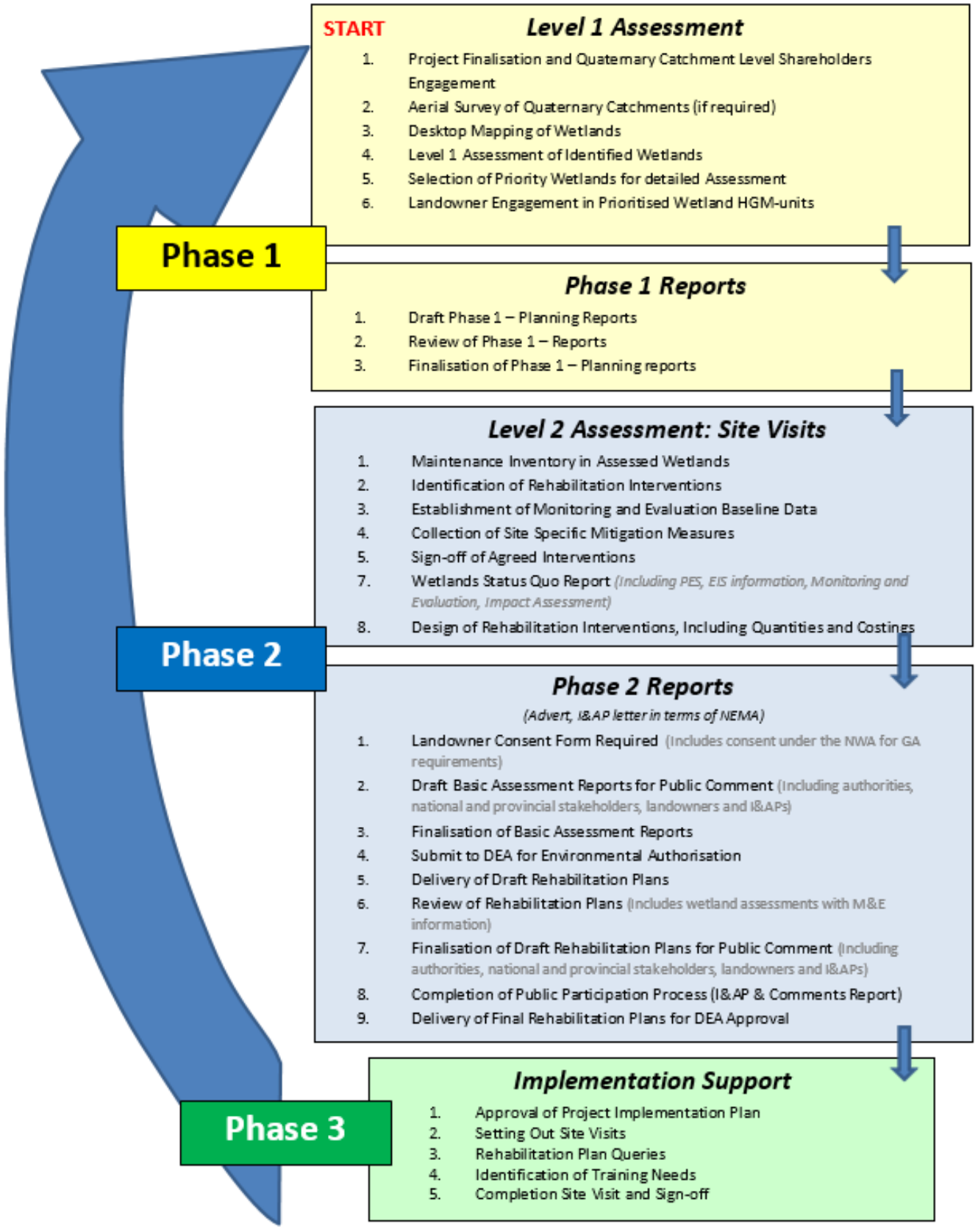

Figure 3: The Working for Wetlands planning process

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

During Phase 2, monitoring systems are put in place to support the continuous evaluation of the interventions. The systems monitor both the environmental and social benefits of the interventions. As part of the Phase 2 site visit, a maintenance inventory of any existing interventions that are damaged and/or failing and thus requiring maintenance is compiled by the ASD, in consultation with the Design Engineer.

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

Phase 2 also requires that Environmental Authorisations are obtained before work can commence in the wetlands during Phase 3. Provincial level BARs and 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 considered to be the primary working document for the implementation of the project via the construction/ undertaking of interventions listed in the Plan.

Phase 3 commence upon approval of the BARs and wetland rehabilitation plans by DEA. The work detailed for the project would be implemented within a year followed by on-going monitoring. It is typically at this point in the process when the final construction drawings are issued to the Implementing Agents (IAs). Seventeen IAs are currently employed in the WfWetlands Programme and are responsible for employing contractors and their teams (workers) to construct the interventions detailed in each of the rehabilitation plans. For all interventions that are based on engineering designs (typically hard engineered interventions), the Design Engineer is required to visit the site before construction commences to ensure that the original design is still appropriate in the dynamic and ever-changing wetland system. The Design Engineer assist the IAs in pegging and setting-out interventions. 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.

Landowner consent is an important component of each phase in each Wetland Project. The flow diagram, **Figure 3**, demonstrates the point at which various consent forms must be approved via signature from the directly affected landowner. The ASDs are responsible for undertaking the necessary landowner engagement and for ensuring that the requisite landowner consent forms required as part of Phase 1 and 2 of this project are signed. Without these signed consent forms the WfWetlands Programme will not be able to implement rehabilitation interventions on the affected property.

3.2 Impact Assessment Methodology

This section outlines the proposed method for assessing the significance of the potential environmental impacts during the construction and operational phase.

For each impact, the **EXTENT** (spatial scale), **MAGNITUDE** and **DURATION** (time scale) is described. These criteria were used to ascertain the **SIGNIFICANCE** of the impact, firstly in the case of no mitigation and then with the most effective mitigation measure(s) in place. The mitigation described in the EIR represents the full range of plausible and pragmatic measures but does not necessarily imply that they will be implemented.

Tables 6-10 on the following pages show the scale used to assess these variables, and defines each of the rating categories.

Table 6: Assessment criteria for the evaluation of impacts

Criteria	Category	Description
Spatial influence of impact	Regional	Beyond a 10 km radius of the candidate site.
	Local	Between 100m and 10 km radius of the candidate site.
	Site specific	On site or within 100 m of the candidate site.
Magnitude of impact (at the indicated spatial scale)	High	Natural and/ or social functions and/ or processes are *severely* altered
	Medium	Natural and/ or social functions and/ or processes are *notably* altered
	Low	Natural and/ or social functions and/ or processes are *slightly* altered
	Very Low	Natural and/ or social functions and/ or processes are *negligibly* altered
	Zero	Natural and/ or social functions and/ or processes remain *unaltered*
Duration of impact (temporal)	Construction period	From commencement up to 2 years after construction
	Short Term	From 2 to 5 years after construction
	Medium Term	From 5 to 15 years after construction
	Long Term	More than 15 years after construction

The **SIGNIFICANCE** of an impact is derived by taking into account the temporal and spatial scales and magnitude. The means of arriving at the different significance ratings is explained in **Table 7**.

Table 7: Definition of significance ratings

Significance ratings	Level of criteria required
High	• High magnitude with a regional extent and long term duration • High magnitude with either a regional extent and medium term duration or a local extent and long term duration • Medium magnitude with a regional extent and long term duration
Medium	• High magnitude with a local extent and medium term duration • High magnitude with a regional extent and construction period or a site specific extent and long term duration • High magnitude with either a local extent and construction period duration or a site specific extent and medium term duration • Medium magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Low magnitude with a regional extent and long term duration
Low	• High magnitude with a site specific extent and construction period duration • Medium magnitude with a site specific extent and construction period duration • Low magnitude with any combination of extent and duration except site specific and construction period or regional and long term • Very low magnitude with a regional extent and long term duration
Very low	• Low magnitude with a site specific extent and construction period duration • Very low magnitude with any combination of extent and construction or short term duration
Neutral	• Zero magnitude with any combination of extent and duration

Once the significance of an impact has been determined, the **PROBABILITY** of this impact occurring as well as the **CONFIDENCE** in the assessment of the impact, was determined using the rating systems outlined in **Table 8** and **Table 9**, respectively. It is important to note that the significance of an impact should always be considered in concert with the probability of that impact occurring. Lastly, the **REVERSIBILITY** of the impact is estimated using the rating system outlined in **Table 10**.

Table 8: Definition of probability ratings

Probability ratings	Criteria
Definite	Estimated greater than 95 % chance of the impact occurring.
Probable	Estimated 5 to 95 % chance of the impact occurring.
Unlikely	Estimated less than 5 % chance of the impact occurring.

Table 9: Definition of confidence ratings

Confidence ratings	Criteria
Certain	Wealth of information on and sound understanding of the environmental factors potentially influencing the impact.
Sure	Reasonable amount of useful information on and relatively sound understanding of the environmental factors potentially influencing the impact.
Unsure	Limited useful information on and understanding of the environmental factors potentially influencing this impact.

Table 10: Definition of reversibility ratings

Reversibility ratings	Criteria
Irreversible	The activity will lead to an impact that is in all practical terms permanent.
Reversible	The impact is reversible within 2 years after the cause or stress is removed.

3.3 Assumptions and Limitations

3.3.1 Assumptions

In undertaking this investigation and compiling the BAR, the following has been assumed:

- The strategic level investigations undertaken during Phase 1 are acceptable and robust.
- The information provided by the applicant and wetland specialists is accurate.
- The scope of this investigation is limited to assessing the over-all environmental impacts that have been identified over time since the WfWetlands Programme commenced in the early 2000's. Additional site specific impacts/ mitigation measures, focusing on the Wetland Unit and proposed intervention, will only be identified during the planning phase and will be included in the applicable rehabilitation plan.

3.3.2 Gaps in knowledge

The planning for the proposed rehabilitation projects is at a wetland system level and the specific details of the interventions that would be required to implement rehabilitation interventions are not available at this stage of the Basic Assessment process. The intention is that rehabilitation plans would be prepared every year after sufficient field work has been undertaken in the wetlands that have an EA. These rehabilitation plans would be made available to registered Interested and Affected Parties (I&APs) before being submitted to DEA for approval as a condition of the EA for each of the Provinces. The rehabilitation plans would 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 of each intervention.

4 PUBLIC PARTICIPATION

4.1 Public Participation Process

South African legislation and guidelines have formalised stakeholder engagement in the BAR process and refer to it as the Public Participation Process (PPP). PPP forms an integral component of the environmental impact assessment process and enables I&APs to identify issues, concerns, and suggestion through the review of documents/ reports at various stages throughout the BAR process as described in Chapter 6 of GN R982, as amended. For more detail on the PPP undertaken to date (e.g. copies of advertisements, poster locations, comments received, etc.), please refer to **Appendix B**.

Table 11 Public Participation Process

Activity	Description
Pre-application	
Advertisements	Adverts were placed in the national newspapers: *Die Rapport* (in Afrikaans) on 5 November 2017 and *Sunday Times* (in English) on 12 November 2017 to allow I&APs the opportunity to register their interest in the project.
Site Posters	Posters, notifying I&APs of the proposed rehabilitation projects, were placed on the boundary fences of the properties and at local municipal offices.
Register of I&APs	The existing provincial I&AP database (from previous planning cycles) will be updated with information from new I&APs responding to advertisements and site notices throughout the application process. Proactive identification of I&APs, municipal representatives, organs of state, competent authorities and surrounding landowners was also undertaken to update the database specific to the new planning year.
Basic Assessment Process	
Availability of BAR for public comment	The BARs were made available for a 30 day comment period from **10 November 2017 to 12 December 2017** on Aurecon's website: http://aurecongroup.com/en/public-participation.aspx. All competent authorities and landowners also received an electronic copy (i.e. CD) of the BAR to review and comment on. Should any registered I&APs have problems accessing the documents, please contact Mr Simamkele Ntsengwane at Tel: 021 526 9560 and/or Email: Simamkele.Ntsengwane@aurecongroup.com.
Written Notification	Written notification was given on **8 November 2017** to all registered I&APs regarding the availability of the Basic Assessment Report. Written notification of the availability of the rehabilitation plans will be provided to all registered I&APs.
Register of I&APs	The register for I&APs will continue to be updated during the Basic Assessment Process.
Comments	No comments have been received to date. Following the 30-day comment period, all comments received will be included in a Comments and Response Report (CRR) and made available in **Appendix B**, with copies of the original comments received. Registered I&APs who submitted comments, will receive a copy of the CRR.

Following the 30 day public comment period, the BARs and rehabilitation plans will be updated by incorporating any I&AP comments received on the reports (where relevant). All comments will be recorded and responded to in a Comments and Response Report which will be circulated to all who have provided comment. The updated BARs and/or rehabilitation plans will then be submitted to DEA for their decision-making process. Once DEA has made their decision on the proposed projects, all registered I&APs will be notified of the outcome of the decision within fourteen (14) calendar days of the decision and the right to appeal.

5 PROJECT DESCRIPTION

5.1 Need and Desirability: National Importance of the WfWetlands Programme

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

The guiding principles of the NWA recognise the need to protect water resources. In responding to the challenge of stemming the loss of wetlands and maintaining and enhancing the benefits they provide, government has recognised that, in order to be truly effective, strategies for wetland conservation need to include a combination of proactive measures for maintaining healthy wetlands, together with interventions for rehabilitating those that have been degraded. These objectives are currently being expressed in a coordinated and innovative way through the WfWetlands Programme.

Working for Wetlands pursues its mandate of wetland protection, wise use and rehabilitation in a manner that maximises employment creation, supports small emerging businesses, and transfers skills amongst **vulnerable** and **marginalised** groups. In the 13 years since 2004, the WfWetlands Programme has invested just under R1 billion in wetland rehabilitation and has been involved in over 1 300 wetlands, thereby improving or securing the health of over 70 000 hectares of wetland environment. The WfWetlands Programme has a current budget of just over R 130 million, of which approximately 35% is allocated directly to paying wages. Being part of the EPWP, the WfWetlands Programme has created more than 27 000 jobs and over 3 million person-days of paid work. The local teams are made up of a minimum of 55% women, 55% youth and 2% disabled persons.

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

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

Other activities that form part of the WfWetlands Programme include:

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

5.2 Activities to be undertaken

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

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

Typical activities undertaken within the projects include:

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

Methods of wetland rehabilitation may include hard engineering interventions (see **Appendix A)** such as:

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

Soft engineering interventions (see **Appendix A)** also offer successful rehabilitation methods, and the following are often used together with the hard engineering interventions:

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

5.3 Alternatives

"Alternatives", in relation to a proposed activity, refers to different means of meeting the general purpose and requirements of the activity, which may include alternatives to—

a) the property on which or location where it is proposed to undertake the activity;
b) the type of activity to be undertaken;
c) the design or layout of the activity;
d) the technology to be used in the activity;
e) the operational aspects of the activity; and
f) the option of not implementing the activity.

Due to the WfWetlands Programme not being a development proposal, the use of alternatives as normally applied in terms of the NEMA is not appropriate. As explained earlier in Chapter 3, a comprehensive phased approached is applied each year to identify wetlands with a high rehabilitation priority (Phase 1), rehabilitation objectives for each wetland unit and the most appropriate interventions to achieve these objectives (Phase 2). During Phase 3, these interventions are again scrutinised during setting-out to take into account changes that have occurred within the landscape since the original planning took place. Should any significant changes be required to the intervention, the Project Team will be informed by the engineer to ensure that the proposed design changes would not compromise the rehabilitation objectives identified for the specific wetland. For more information on how alternatives are being considered for the WfWetlands Programme, please refer to **Table 12**.

Table 12: Approach to alternatives for the WfWetlands Programme

Alternative	Applicability to WfWetlands
Site Alternatives	All quaternary catchments within the province are considered for possible wetland rehabilitation work in the earlier stages of the WfWetlands Programme (Phase 1 catchment and wetland prioritisation processes), and only those that meet the prioritisation criteria are selected for the current planning cycle. Wetlands within the selected Quaternary Catchments undergo a similar prioritisation process, which includes a consultation component with the relevant stakeholders and interest groups, and the Wetland Projects presented in this report are those that are finally selected. Wetland Units within each Wetland Project are investigated by the Wetland Specialist and these are selected based on their suitability in terms of the overall WfWetlands Programme objectives[6]. The earlier site selection processes to determine feasible and reasonable Wetland Projects are described in detail in Section 3.1. All wetland site alternatives have therefore already been considered in the earlier phases of the WfWetlands Programme, and only the preferred wetland systems (site locations) are presented here. For the purpose of this report, no feasible or reasonable wetland site alternatives exist.
Other Alternatives	One form of alternative considered during the WfWetlands Programme is a design alternative, where all possible intervention options that may achieve a desired rehabilitation objective are contemplated during the Phase 2 field work component of a particular Wetland Unit. The design team comprising a Wetland Specialist, a Design Engineer, an EAP, and an ASD (and in some instances other interested stakeholders such as authorities and/or landowners who may attend the site visit) will discuss and select the most appropriate intervention option for a particular problem. Each of the intervention options selected, as well as the determination of the most appropriate location for these within the Wetland Unit are therefore based on expert opinion and are thus considered to be the most suitable and effective interventions to achieve the rehabilitation objectives for the wetland. Decisions regarding the choice of interventions will only be made if EA is granted for a Wetland Project. It is therefore not possible to present the preferred interventions for each Wetland Project in this report. Rather all possible types of interventions are presented as the preferred

[6] Wetland conservation and poverty reduction through job creation and skills development amongst vulnerable and marginalised groups.

Alternative	Applicability to WfWetlands
	design alternative and a booklet of potential intervention designs that are appropriate to the WfWetlands Programme is presented in **Appendix A** The intention is that rehabilitation plans would be prepared on an annual basis and submitted to DEA for approval as a condition of the EA. The rehabilitation plans would describe the combination and number of interventions selected from this booklet for each Wetland Project.
No-Go Alternative	If the no-go alternative is pursued, the prioritised wetlands will continue to deteriorate, resulting in an overall negative impact on aquatic and terrestrial ecosystems, habitats and species of conservation significance. In the absence of rehabilitation, the important role of these wetlands in flood attenuation, nutrient retention and water quality amelioration, as well as ecological services will not be realised. In many instances the current degradation results in severe erosion, which may impact on the agricultural or land use potential of adjacent sites, as well as result in sedimentation and eutrophication impacts for downstream users.

6 BASELINE DESCRIPTION OF KWAZULU-NATAL PROJECTS

6.1 KZN Project: Background

Wetland Projects for the 2017/2018 planning cycle were identified during the Phase 1 activities associated with the WfWetlands Programme. Catchment and wetland prioritisation assessments were undertaken by the Wetland Specialist/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. The Programme'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.

The aim of the projects undertaken within the KwaZulu-Natal Province is to protect, rehabilitate and promote sustainable use of the wetlands. The KwaZulu-Natal Maputaland rehabilitation project to date has mostly been located within the Greater Mkuze Swamp, which extends across three quaternary catchments namely W32A, W32B and W32H. The Phase 1 desktop review included additional priority wetlands including Mfolozi, Mvamanzi, Muzi and Mkuze. It should be noted that even though the afore-mentioned priority wetlands were reviewed in terms of the rehabilitation potential at a desktop level, some of the systems were eliminated from additional interrogation due to location and/or likeliness of being able to rehabilitate the system due to site conditions. For example, the Mfolozi wetland system was excluded to the agricultural activities within the system. Originally, the Muzi swamps were going to be excluded from further planning mostly due to distance, however, following further investigation the system was included. Portions of the system had been subjected to a 14-month fire, resulting in the desiccation of portions of the peatland.

The KwaZulu-Natal North (KZN North) rehabilitation activities to date have mostly been focused on the Blood River priority wetland. However, the phase 1 review of the priority wetlands included the desktop review of the Aloeboom, Boschoffvlei, Groenvlei, and Stilwater wetlands. It should be noted that even though the four priority wetlands were reviewed in terms of their rehabilitation potential at a desktop level, one of the systems was eliminated at the outset due to limited potential (Aloeboom) whilst landowner consent largely dictated the site visits of the other systems. Based on the landowner consent, Groenvlei and Stilwater wetlands were the two wetlands which were visited during the site visit. Boschoffvlei was excluded from the site visits as the landowner details were unavailable.

The Midlands Project was historically based in the upper Thukela catchment in KwaZulu-Natal, and rehabilitation efforts focussed on the Hlatikulu complex and the Ntabamhlope wetland. During 2011 planning shifted to the Midlands area, and Phase 1 activities focussed on the Umgeni Vlei and the associated wetlands, often referred to as the "Mgeni Sponge", which are the source of the Mngeni River in the upper reaches of the uMngeni River catchment.

6.2 Biophysical Environment

The following new wetland systems were identified in the KwaZulu-Natal (also see **Table 1**) and will be the focus of this Basic Assessment Process. The tables below provide an overview of the biophysical environment of the wetland systems with the location of the quaternary catchments provided.

- Quaternary catchment W31L:
    - Kleinspan

- Quaternary catchment W32B:
    - Mkhuze
    - Tshenetshe Pan
- Quaternary catchment W70A:
    - Muzi Swamp
- Quaternary catchment W21A:
    - Stilwater
- Quaternary catchment U20A:
    - Heatherdon

Please refer to Appendix C for a selection of maps that show the location and biodiversity sensitivity of the above listed wetland systems.

6.2.1 Quaternary catchment W31L and associated wetlands

Quaternary Catchment W31L	
General description	Quaternary Catchments W31L is located in the Mkuze River floodplain, in the Usutu to Mhlathuze Water Management Area. Part of the catchment falls within the boundaries of the iSimangaliso Wetland Park, a World Heritage Site, which encompasses a variety of wetlands including approximately 25% of South Africa's peatlands and four Ramsar wetland sites.
Climate	The summer months is extremely hot and can be very humid. Summer rainfall occurs and the average temperature ranges from 5.5°C in winter to around 35°C in summer. The W31L quaternary catchment has a Mean Annual Precipitation (MAP) of 700.7mm, Potential Evapotranspiration (PET) of 1965.3mm and hydrological sensitivity, rated as moderately high.
Geology and topography	Waterlogged, clayey soils of Champagne and Arcadia forms, containing certain levels of decaying organic matter, especially in very productive reed beds. These wetlands are underlain mostly by Cenozoic alluvium. Furthermore, these waterlogged habitats regularly see water forming columns of variable depth with the highest water levels found in summer, during periods of maximum seasonal rainfall (Mucina and Rutherford, 2006). The catchments topography ranges from the deeply incised undulating hillside slopes (180m to 480m above mean sea level (MSL)) in the west and south to the flat Mkuze floodplains in the east and north (approximately 30m to 40m above MSL).
Terrestrial ecology	The flat topography supports wetland areas (waterlogged meadows) dominated by reeds, sedges and rushes. Grasses are typically dominant along edges of often seasonal pools in aeolian depressions as well as fringing alluvial backwater pans or artificial dams (Mucina and Rutherford, 2006). The iSimangaliso Wetland Park (which is mapped as an IBA) supports in excess of 500 bird species and is one of the most important breeding areas for waterbirds in Southern Africa. Several IUCN Red Data species and numerous endemic species can be found in the park. Red Data plants include *Warburgia salutaris, Lumnitzera racemosa* and *Diospyros rotundifolia* with only known population of the climbing orchid *Vanilla roscheri* found in the park. Other plant species of not include the localised forest-edge climber *Ceropegia arenaria* the *Ficus bubu* (fig tree spp.) with *Brachystelma vahrmeijeri* present in the grassland areas. Of the mammals, hippopotamus *Hippopotamus amphibius*, aardwolf *Proteles cristatus*, aardvark *Orycteropus afer*, pangolin *Manis temminckii* and suni *Neotragus moschatus* occur naturally. Also of note is that Black rhinoceros *Diceros bicornis* has been re-introduced to the park with significant habitat for this species also found adjacent the parks borders. There are eight known Red Data fish species that occur, including freshwater mullet *Myxus capensis* and Sibayi goby

	Silhouettea sibayi. Reptiles include the two local endemic lizards i.e. the coastal dwarf burrowing skink *Scelotes vestigifer* and Setaro's dwarf chameleon *Bradypodion setaroi* with the endangered gaboon adder *Bitis gabonica* to be found in the forest leaf litter. Significantly, the park plays host to KwaZulu-Natal's largest population of crocodile *Crocodylus niloticus*. Five butterfly species are endemic to the park.[7]
Aquatic ecology	The quaternary catchment is associated with a moderately modified Present Ecological State (PES). The overall importance and sensitivity therefore ranges from moderate to high.
Land use	The catchment is substantial in size and activities include among others conservation (iSimangaliso Wetland Park), subsistence farming (livestock and crops), commercial farming (limited), tourism and forestry. Most dwellings are situated outside the iSimangaliso Wetland Park towards the east of the catchment in village areas of Mhlekezi, Fakude and Mpileni. These low density rural village areas are situated far away from the wetlands area in the east of the catchment.
Kleinspan Wetland System	
Location	The Kleinspan Wetland is located in the eastern part of quaternary catchment W31L, in the central interior of the iSimangaliso Wetland Park, on the north coast of KwaZulu-Natal (Aurecon, May 2014).
District and Local municipality	Umkhanyakude District Municipality. The Big 5 False Bay Local Municipality.
Reason for selection	The Kleinspan Wetland has been selected for rehabilitation in the previous planning cycles 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 (Aurecon, May 2014).
Wetland type and size[8]	Floodplain / channel valley-bottom. 481 ha
Conservation status (terrestrial and aquatic)	The system is located within the Isimangaliso Wetland Park (formal protected area) and also falls within the Indian Ocean Coastal Belt Group 1 Floodplain, a NFEPA wetland. The whole Isimangaliso Wetland Park has been mapped as an ecological support area (ESA) and the nearest national protection area expansion strategy (NPAES) focus area is located directly adjacent the Isimangaliso Wetland Park border in the west and south of the catchment (SANBI, 2017).
Land use	Historically the wetland was cultivated for agricultural purposes, however, this system now falls within a protected area and is subject to some level of livestock grazing and reed harvesting (GroundTruth, June 2017).
Wetland problems	Berms/dams left alongside drains (excavated material); Historic cultivation within wetland areas; Straightening of section of the natural channel in lower reaches of the wetland; Erosion in drains leading to localised increased sediment inputs; Livestock grazing within the wetland; and Alien woody species, for example Seringa.

[7] http://www.birdlife.org.za/get-involved/join-birdlife-south-africa/item/546-sa128-isimangaliso-wetland-park

[8] The approximate size of each wetland system is provided as the intention is to positively influence the entire area through the implementation of smaller interventions. Since the specific interventions required to address specific problems are only determined during Phase 2 site visits, the actual intervention footprints will only be available for inclusion in the rehabilitation plans which will also be made available to registered I&APs for review before being submitted to DEA for approval.

6.2.2 Quaternary catchment W32B and associated wetlands

Quaternary Catchment W32B	
General description	Quaternary Catchments W32B is located in the Mkuze River floodplain, in the Usutu to Mhlathuze Water Management Area. Part of the catchment falls within the boundaries of the iSimangaliso Wetland Park, a World Heritage Site, which encompasses a variety of wetlands including approximately 25% of South Africa's peatlands and four Ramsar wetland sites.
Climate	The summer months is extremely hot and can be very humid. Summer rainfall occurs and the average temperature ranges from 5.5°C in winter to around 35°C in summer. The W32B quaternary catchment has a Mean Annual Precipitation (MAP) of 700.7mm, Potential Evapotranspiration (PET) of 1965.3mm and hydrological sensitivity rated as moderately high. The catchments topography ranges from approximately 30m above MSL in the west to the coast in the east and can be describe as flat with slow gradients shifts.
Geology and topography	The geology consists of recent alluvial deposits with deep fine-structured sandy to loamy soils (Dundee, Estcourt, Valsrivier, Sterkspruit, Oakleaf forms), waterlogged as it is often exposed to floods (especially during the rainy summer season). Salt often accumulates in the alluvial soils (due to high evaporation) (Mucina and Rutherford, 2006).
Terrestrial ecology	Flat alluvial riverine terraces supporting an intricate complex of macrophytic vegetation (channel of flowing rivers and river-fed pans), marginal reed belts (in sheltered oxbows and along very slow-flowing water courses) as well as extensive flooded grasslands, ephemeral herb lands and riverine thickets (Mucina and Rutherford, 2006). The iSimangaliso Wetland Park (which is mapped as an IBA) supports in excess of 500 bird species and is one of the most important breeding areas for waterbirds in Southern Africa. Several IUCN Red Data species and numerous endemic species can be found in the park. Red Data plants include *Warburgia salutaris, Lumnitzera racemosa* and *Diospyros rotundifolia* with only known population of the climbing orchid *Vanilla roscheri* found in the park. Other plant species of not include the localised forest-edge climber *Ceropegia arenaria* the *Ficus bubu* (fig tree spp.) with *Brachystelma vahrmeijeri* present in the grassland areas. Of the mammals, hippopotamus *Hippopotamus amphibius*, aardwolf *Proteles cristatus*, aardvark *Orycteropus afer*, pangolin *Manis temminckii* and suni *Neotragus moschatus* occur naturally. Also of note is that Black rhinoceros *Diceros bicornis* has been re-introduced to the park with significant habitat for this species also found adjacent the parks borders. There are eight known Red Data fish species that occur, including freshwater mullet *Myxus capensis* and Sibayi goby *Silhouettea sibayi*. Reptiles include the two local endemic lizards i.e. the coastal dwarf burrowing skink *Scelotes vestigifer* and Setaro's dwarf chameleon *Bradypodion setaroi* with the endangered gaboon adder *Bitis gabonica* to be found in the forest leaf litter. Significantly, the park plays host to KwaZulu-Natal's largest population of crocodile *Crocodylus niloticus*. Five butterfly species are endemic to the park.[9]
Aquatic ecology	The modifications to the wetland's PVS is primarily linked to land use practices and the encroachment of *Ipomea carnea* along the outskirts of the system. The majority of the system, i.e. the seasonal and permanent zones of wetness, are considered to be relatively intact. The quaternary catchment is associated with a Present Ecological State (PES) category of Moderately modified (C). A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.
Land use	Although the Ngwenya Pan catchment is considered to be part of the Greater Mkuze River Floodplain catchment, for the purpose of the rehabilitation activities, only the immediate catchment was considered, as the majority of the impacts on the system are associated with the immediate catchment. The immediate catchment has been substantially modified, through peri-urban development (local community) and subsistence agriculture and livestock grazing.

[9] http://www.birdlife.org.za/get-involved/join-birdlife-south-africa/item/546-sa128-isimangaliso-wetland-park

Ngwenya Pan Wetland System	
Location	The Mkuze priority wetland is located across the W32A and W32B quaternary catchments and is located near the town of Hluhluwe.
District and Local municipality	Umkhanyakude District Municipality.
Reason for selection	Rehabilitation of this system was considered to be important, as the community requested the input from WfWetlands. Should WfWetlands consider to not work in the area, the community would consider implementing their own crossing regardless of the input from WfWetlands.
Wetland type and size	Floodplain / pan 63.3 ha
Conservation status (terrestrial and aquatic)	The system is located within the Isimangaliso Wetland Park (formal protected area) and also falls within the Indian Ocean Coastal Belt Group 1 Floodplain, a NFEPA wetland. The whole Isimangaliso Wetland Park has been mapped as an ecological support area (ESA) and the nearest national protection area expansion strategy (NPAES) focus area is located directly adjacent the Isimangaliso Wetland Park border in the west and south of the catchment (SANBI, 2017).
Land use	The Ngwenya pan still retains water for short periods during the rainy season, which is then used by the local community for a variety of things, including livestock drinking and household use. The narrowing of the pan at the bottom of the system is regularly used by the community and livestock as a crossing point to gain access to both sides of the pan (GroundTruth, August 2017).
Wetland problems	The trampling by livestock of the natural levee at the base of the wetland; Encroachment of *Ipomea carnea* along the periphery of the system and within the broader community.
Tshenetshe Pan Wetland System	
Location	The Tshanetshe – Mpempe Channel is located approximately 1.5 kilometres east of the iSimangaliso Wetland Park in Quaternary Catchment W32B on the east coast of KwaZulu-Natal.
District and local municipality	Umkhanyakude District Municipality. The Big 5 False Bay Local Municipality.
Reason for selection	This wetland system is located within the buffer zone of the iSimangaliso Wetland Park. It was identified as apriority area in terms of the iSimangaliso Wetland Authority Wetland Rehabilitation Priority Process (IWRRPP). The eroding channel is a source of sediment into Lake St Lucia and gully erosion is resulting in wetland desiccation.
Wetland type and size[10]	3 351 ha
Conservation status (terrestrial and aquatic)	The system is not located within a critical biodiversity area, nor is it located on an ecological support area (ESA). No protected areas (state or private) are located in close proximity to the wetland, and there are no national protection area expansion strategy (NPAES) located within close proximity to the wetland (Mucina & Rutherford, 2006).
Land use	Land use within the wetland is predominantly conservation. However, livestock grazing still occurs as well as biomass harvesting (e.g. reed cutting). Past practises included cultivation (Aurecon , September 2015).

[10] The approximate size of each wetland system is provided as the intention is to positively influence the entire area through the implementation of smaller interventions. Since the specific interventions required to address specific problems are only determined during Phase 2 site visits, the actual intervention footprints will only be available for inclusion in the rehabilitation plans which will also be made available to registered I&APs for review before being submitted to DEA for approval.

Wetland problems	Channel excavation Channel outflanked Failed to force water into course –Mkuze River Sedimentation Avulsion

6.2.3 Quaternary catchment W70A and associated wetlands

Quaternary Catchment W70A	
General description	The W70A catchment is classified as a peatland, but the greater Muzi Swamps is considered to be a mosaic of woodland, grassland and wetland vegetation (Macfarlane et al. 2011) and thus a variety of inter-connected and isolated wetland types. The catchment includes both parts of the Tembe Elephant Park in the northwest and iSimangaliso Wetland Park along the coastal strip in the east. Peatland wetland systems contain soils with high organic compounds which form a core component of a peat wetland. These peatlands hold vast amounts of carbon and therefore important to manage from a carbon management point of view as well as ecologically.
Climate	The summer months is extremely hot and can be very humid. Summer rainfall occurs and the average temperature ranges from 5.5°C in winter to around 35°C in summer. The Mean Annual Precipitation (MAP), Potential Evapotranspiration (PET) and hydrological sensitivity of the W31L quaternary catchment are 700.7mm, 1965.3mm and moderately high.
Geology and topography	Waterlogged, clayey soils of Champagne and Arcadia forms, containing certain levels of decaying organic matter, especially in very productive reed beds. These wetlands are underlain mostly by Cenozoic alluvium, less so by Karoo Supergroup volcanic rocks and sediments, as well as by the Cretaceous (and younger coastal) sediments of the Zululand and Maputaland Groups. Waterlogged habitats with water regularly forming columns of variable depth. The highest water levels are found in summer, during periods of maximum seasonal rainfall (Mucina and Rutherford, 2006).
Terrestrial ecology	Flat alluvial riverine terraces supporting an intricate complex of macrophytic vegetation (channel of flowing rivers and river-fed pans), marginal reed belts (in sheltered oxbows and along very slow-flowing water courses) as well as extensive flooded grasslands, ephemeral herb lands and riverine thickets (Mucina and Rutherford, 2006). The iSimangaliso Wetland Park (which is mapped as an IBA) supports in excess of 500 bird species and is one of the most important breeding areas for waterbirds in Southern Africa. Several IUCN Red Data species and numerous endemic species can be found in the park. Red Data plants include *Warburgia salutaris, Lumnitzera racemosa* and *Diospyros rotundifolia* with only known population of the climbing orchid *Vanilla roscheri* found in the park. Other plant species of not include the localised forest-edge climber *Ceropegia arenaria* the *Ficus bubu* (fig tree spp.) with *Brachystelma vahrmeijeri* present in the grassland areas. Of the mammals, hippopotamus *Hippopotamus amphibius*, aardwolf *Proteles cristatus*, aardvark *Orycteropus afer*, pangolin *Manis temminckii* and suni *Neotragus moschatus* occur naturally. Also of note is that Black rhinoceros *Diceros bicornis* has been re-introduced to the park with significant habitat for this species also found adjacent the parks borders. There are eight known Red Data fish species that occur, including freshwater mullet *Myxus capensis* and Sibayi goby *Silhouettea sibayi*. Reptiles include the two local endemic lizards i.e. the coastal dwarf burrowing skink *Scelotes vestigifer* and Setaro's dwarf chameleon *Bradypodion setaroi* with the endangered gaboon adder *Bitis gabonica* to be found in the forest leaf litter. Significantly, the park plays host to KwaZulu-Natal's largest population of crocodile *Crocodylus niloticus*. Five butterfly species are endemic to the park.[11]

[11] http://www.birdlife.org.za/get-involved/join-birdlife-south-africa/item/546-sa128-isimangaliso-wetland-park

	The Thembe Elephant park Situated in Northern Zululand adjoining the Mozambique border. As the name states the park is mostly known for its population of elephants although it also hosts a diversity of birdlife but is not mapped as a IBA. The vegetation in the park mainly consists of closed woodland and secondary thicket formation. The park falls within sand veld ecological zone, which is a transition area (ecotone) between tropical and sub-tropical forms which means there is a great diversity of vegetation and consequently habitat for terrestrial species.
Aquatic ecology	The Muzi Swamps fall within the greater Mkuze catchment, yet this system is not associated with any major river system. The Muzi Swamp is a large emergent, palustrine, flat wetland in where it flows as the Rio Futi into the Indian Ocean. The Muzi Swamp is a palustrine system because it has a greater than 30 percent cover of trees, shrubs, emergent macrophytes, mosses or lichens (Dini and Cowen, 2000). Furthermore, it is classified into a flat subsystem on the basis that it exists on comparatively level land with little or no relief. The quaternary catchment is associated with an unmodified and natural Present Ecological State (PES). This quaternary catchment is also associated with a high Ecological Importance and Sensitivity rating.
Land use	The catchment is substantial in size and therefore, the catchment activities are varied and include among others subsistence and commercial farming, limited forestry, residential housing and etc.
Muzi Swamp Wetland System	
Location	The Muzi Swamps are located within W70A quaternary catchment and is partially located within the Tembe Elephant Park and is surrounded by numerous communities. To date no rehabilitation activities have been undertaken in the Muzi Swamps.
District and local municipality	Umkhanyakude District Municipality. The Big 5 False Bay Local Municipality.
Reason for selection	The Muzi wetland was affected by a 14 month fire and that was considered to be important, as the fire has resulted in the desiccation of portions of the system. The phase 1 site visits were undertaken prior this area being identified as a candidate system and to be included in the Phase 2 planning.
Wetland type and size[12]	Unchannelled valley-bottom (peatland). 481ha
Conservation status (terrestrial and aquatic)	The system is not located within a critical biodiversity area (CBA) and there is no ecological support area (ESA) surrounding the wetland. The system falls within protected area, namely the Tembe Elephant Park (Mucina and Rutherford, 2006).
Land use	Tembe Elephant Park the portion of the system with the reserve is a combination of provisioning and cultural benefits, including the harvesting of reeds and tourism.
Wetland problems	Loss of peatland associated with fire that burnt for over 14 months. Loss of 10-50cm of peatland and cannot be reinstated due to the formation process.

6.2.4 Quaternary catchment W21A and associated wetlands

Quaternary Catchment W21A

[12] The approximate size of each wetland system is provided as the intention is to positively influence the entire area through the implementation of smaller interventions. Since the specific interventions required to address specific problems are only determined during Phase 2 site visits, the actual intervention footprints will only be available for inclusion in the rehabilitation plans which will also be made available to registered I&APs for review before being submitted to DEA for approval.

General description	The quaternary catchment W21A forms part of the Mfolozi catchment. The White Mfolozi River runs through the Stilwater wetland and is a tributary of the Mfolozi River.
Climate	The summer months is extremely hot and can be very humid. Summer rainfall occurs and the average temperature ranges from 5.5°C in winter to around 35°C in summer. The Mean Annual Precipitation (MAP), Potential Evapotranspiration (PET) and hydrological sensitivity of the W21A quaternary catchment are 879.3mm, 18619mm and moderate respectively.
Geology and topography	Mainly undulating with moderately steep slopes, but valley basins are wide and flat and mountainous areas occur mostly along the northern and eastern boundary. Tall closed grassland rich in forbs and dominated by *Tristachya leucothrix, Themeda triandra* and *Hyparrhenia hirta*. Evergreen woody vegetation is characteristic on rocky outcrops (Mucina and Rutherford, 2006).
Terrestrial ecology	The catchment is dominated by a combination of plantations and alien invasive vegetation, thus substantially altering the water inputs into the system. Flows through the wetland have been altered by a dirt road crossing. The road crossing has led to a combination of changes to the system, with the first including the distribution of flows through the system, whilst the second includes a head cut erosion downstream of the crossing (Mucina and Rutherford, 2006).
Aquatic ecology	The quaternary catchment is associated with moderately modified Present Ecological State (PES), a moderate change in the ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact. This quaternary catchment is also associated with a low/marginal Ecological Importance and Sensitivity rating, yet it is considered to be an important fish support area.
Land use	The main land uses in the quaternary catchment W21A include agriculture (grazing and crop lands), plantations.
Stilwater Wetland System	
Location	The Stilwater wetland is located in the W21A quaternary catchment near the town of Vryheid in the KwaZulu-Natal Province.
District and local municipality	Zululand District Municipality. Abaqulusi Local Municipality.
Reason for selection	Rehabilitation opportunities available. Identified head cut erosion.
Wetland type and size[13]	Hillslope seepage wetland 6.4 ha
Conservation status (terrestrial and aquatic)	The system is not located within a critical biodiversity area, however two small portions of the wetland do overlap with an ecological support area (ESA). No protected areas (state or private) are located in close proximity to the wetland, and the nearest national protection area expansion strategy (NPAES) area is located approximately 7 km north of the wetland. The wetlands themselves have been classified a NFEPA wetlands and the river through Stilwater is considered to be a Fish Support Area (FSA).
Land use	The main land use in the wetland W21A-02 include agriculture.
Wetland problems	Agricultural drainage networks; Head cut erosion; and Alien invasive vegetation.

[13] The approximate size of each wetland system is provided as the intention is to positively influence the entire area through the implementation of smaller interventions. Since the specific interventions required to address specific problems are only determined during Phase 2 site visits, the actual intervention footprints will only be available for inclusion in the rehabilitation plans which will also be made available to registered I&APs for review before being submitted to DEA for approval.

6.2.5 Quaternary catchment U20A and associated wetlands

Quaternary Catchment U20A	
General description	The catchment U20A (which includes the Heatherdon wetland U20A) is characterised by untransformed grassland in the upper reaches with some croplands bordering the mid-to lower reaches of the wetland. The catchment includes the Umgeni Vlei Nature Reserve.
Climate	The summer months is extremely hot and can be very humid. Summer rainfall occurs and the average temperature ranges from 5.5°C in winter to around 35°C in summer. The local climate is characterized by a Mean Annual Precipitation of 1008.1mm (summer rainfall region) and a Mean Annual Potential Evapotranspiration of 1626.7mm.
Geology and topography	Geological substrate is formed by the uppermost (youngest) part of the Karoo Supergroup. Jurassic basalts and dolerites of the Drakensberg Group as well as sandstones and mudstones of the Clarens and Elliot Formations (both Triassic) forming the Eastern Escarpment. These bedrocks support heavy, clayey soils (e.g. Champagne, Arcadia, Katspruit soil forms) often with high humus content. The water bodies are either stagnant (or slow-flowing) and fed either from springs or slope seeps or to an extent also from abundant rainfall and snowfall (especially in the Eastern Cape (Mucina and Rutherford, 2006). The catchment lies at an altitude of 1840m to 2080m above msl.
Terrestrial ecology	According to Mucina and Rutherford (2006), the natural vegetation type of the wetland unit is the Eastern Temperate Freshwater Wetlands (AZf 3). These wetlands occur around water bodies of stagnant water, and are embedded within the Grassland Biome. These wetlands are typically shallow depressions filled with (temporary) water bodies supporting zoned systems of aquatic and hygrophilous vegetation of temporarily flooded grasslands and ephemeral herblands. This vegetation type has a conservation target of 24%, although only 5% is statutorily conserved. Some 15% has been transformed, and cultivation, intensive grazing and the use of the pans for stock watering cause major damage to the wetland vegetation. The natural vegetation type for areas immediately surrounding the Runnymeade and Fold wetland units is the Drakensberg Foothill Moist Grassland (Gs 10). These grasslands occur at altitudes ranging between 880m and 1860m, and are indicative of a cooler submontane form of warm-temperate climate. This vegetation type is considered to be 'least threatened', with a conservation target of 23%, although only 2-3% is statutorily conserved (a portion of this is in the Umgeni Vlei Nature Reserve). The extensive vlei regularly sees breeding pairs of Wattled Crane *Bugeranus carunculatus* and Grey Crowned Crane *Balearica regulorum*.[14]
Aquatic ecology	The quaternary catchment is associated with a moderately modified Present Ecological State (PES). A moderate change in ecosystem and processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact.The vlei is a large sponge that is the source of the Umgeni River and the main habitat types include marsh areas dominated by sedges, flooded grassland and areas of Drakensberg Foothill Moist Grassland around the vlei.
Land use	The main land uses in the quaternary catchment areas include agriculture - pasture lands, dryland cropping and limited forest plantation.
Heatherdon Wetland System	
Location	The U20A Heatherdon Wetlands (U20A-02) extends through the Ivanhoe Farm in the midlands before flowing east into the uMngeni River. It forms part of a much larger wetland system referred to as the Mgeni "sponge" wetland.
District and local municipality	UMgungundlovu District Municipality. UMngeni Local Municipality.

[14] http://www.birdlife.org.za/conservation/important-bird-areas/iba-directory/item/216-sa075-umgeni-vlei-nature-reserve

Reason for selection	The need for rehabilitation work in wetlands associated with the Mngeni catchment had previously been highlighted by members of the KZN Wetland Forum as these wetlands form part of the greater Mgeni "sponge" wetland complex which is regarded as one of KwaZulu-Natal's priority wetland complexes.
Wetland type and size[15]	It forms part of a much larger wetland system referred to as the Mgeni "sponge" wetland. 39.01
Conservation status (terrestrial and aquatic)	The system is not located within a critical biodiversity area or any ecological support area (ESA) According to Mucina and Rutherford (2006), there system falls within the Fresh Water Wetlands (Drakensberg Wetlands). No protected areas (state or private) are located in close proximity to the wetland, and the nearest national protection area expansion strategy (NPAES) area is located approximately 4 km north of the wetland.
Land use	Agricultural (cultivation, adjacent potato lands). The wetland is near the Umgeni Vlei Nature Reserve with a small area of pine plantations is located directly above the wetland with some trees planted just within the edges of the wetland unit.
Wetland problems	Historic drainage that has affected water distribution and retention patterns in wetland. Forest plantation; Trees growing along wetland edge; Encroachment by pastured grasses and; and Encroachment by alien vegetation.

6.3 Cultural and Heritage Environment

As the project aims to rehabilitate wetlands threatened by erosion, no impact is expected to occur on cultural or historic features. However, should any such features be identified during the Phase 2 site visit, a heritage specialist will be consulted and the relevant heritage authorities will be notified.

6.4 Socio-economic Environment

Table 13 below provides a summary of the socio-economic profile of the local municipalities within which the proposed wetland rehabilitation projects will take place. Being part of the EPWP, the WfWetlands Programme has created more than 27 000 jobs and over 3 million person-days of paid work by using local SMMEs to implement the approved wetland rehabilitation plans. Local teams generally consist of a minimum of 55% women, 55% youth and 2% disabled persons.

The EPWP focus on local unemployed people with the intent of making them part of the productive economic sector, assist with skills development and increase their capacity to earn an income. In terms of basic education and training of adults and skills transfer, the WfWetlands Programme has provided 250 000 days of training in vocation and life skills.

Table 13: Economic profile of applicable local municipalities

	The Big 5 False Bay	Abaqulusi	Umngeni
Population			
Young (0-14)	37.5%	36.7%	24.3%
Working age (15-64)	58.1%	56.6%	67.4%

[15] The approximate size of each wetland system is provided as the intention is to positively influence the entire area through the implementation of smaller interventions. Since the specific interventions required to address specific problems are only determined during Phase 2 site visits, the actual intervention footprints will only be available for inclusion in the rehabilitation plans which will also be made available to registered I&APs for review before being submitted to DEA for approval.

Elderly (65+)	4.4%	4.7%	8.3%
Dependency ratio	72%	70.5%	48.4%
Level of education (aged 20+)			
No schooling	26%	28.1%	6.3%
Higher education	5%	6.6%	15.5%
Matric	24.4%	28.1%	29%
Level of Employment (%)			
Unemployment rate	26.5%	35.4%	23.9%
Youth Unemployment rate	31.6%	45.1%	32%
Economic Profile			
No income	12.4%	14.7%	12.8%
R1 - R4,800	8.5%	5.1%	3%
R4,801 - R9,600	12.8%	9.7%	5%
R9,601 - R19,600	23.9%	22.9%	18.3
R19,601 - R38,200	22.9%	0.9%	20.4%
R38,201 - R76,4000	8.5%	0.9%	13.4%
R76,401 - R153,800	6.3%	7.2%	10.2%
R153,801 - R307,600	3.4%	5%	7.8%
R307,601 - R614,400	1.4%	2.6%	5.8%
R614,001 - R1,228,800	0.3%	0.6%	2.4%
R1,228,801 - R2,457,600	0.1%	0.2%	0.6%
R2,457,601+	0.4%	0.2%	0.3%

Source: http://www.statssa.gov.za/?page_id=964

The anticipated benefit of the WfWetlands Programme nationally is presented below in **Table 14.**

Table 14: Socio-economic value of the WfWetlands Programme

Aspect	Response
What is the expected capital value of the activity on completion?	~ R 130 000 000
How many new employment opportunities will be created in the development and construction phase of the activity/ies?	~ 120[16]
What is the expected value of the employment opportunities during the development and construction phase?	~R54.4 million in wages
What percentage of this will accrue to previously disadvantaged individuals?	~70%

[16] Employment opportunities are created only during the construction phase and for many of the projects there are already EPWP teams (team size averages around 20-35 individuals) working on them. However, Working for Wetland principles ensure that a very large percentage of those employed are from local communities.

7 IMPACT ASSESSMENT

The WfWetlands Programme has been rehabilitating wetlands across South Africa since the early 2000's and are considered to be specialists when it comes to working in sensitive wetland environments. Their significant experience and knowledge is actively being transferred to Implementing Agents and Contractors not only verbally by the provincial ASDs, but also through training and the use of important tools such as the Environmental Management Programme (EMPr). It must be noted that the EMPr is considered a living document and is updated on a regular basis to incorporate lessons learned and/or in response to changing environments (legal, biological, etc.). In addition, the requirements of the EMPr are supplemented with site specific mitigation measures, included in the relevant rehabilitation plan, as identified by the wetland specialist and EAP during the Phase 2 planning site visits.

This chapter focus on the key potential impacts (direct, indirect and cumulative) that have been identified for the WfWetlands Programme over time. For each impact assessed, mitigation measures have been proposed to reduce and/or avoid negative impacts and enhance positive impacts. These mitigation measures are also incorporated into the EMPr to ensure that they are implemented during the planning/pre-construction, construction and operational phases. The EMPr forms part of the BAR (**Appendix D**), and as such its implementation will become a binding requirement should environmental authorisation be received from DEA.

The following subsections assess each impact according to the construction and operational phase in which they are likely to occur. It should be highlighted that this assessment does not consider the decommissioning of the proposed interventions. The purpose of the implementation of a specific intervention is to rehabilitate the affected wetland system and prevent further degradation. Furthermore, many of the soft interventions are made from biodegradable materials (see **Appendix A**). If these begin to degrade, they will not have a negative impact on the system. The hard interventions serve as a more permanent feature within the wetland, as the sensitive environments (which includes dispersive soils in some of them, for example) could be negatively impacted by new soil disturbance activities when removing interventions. Maintenance surveys are undertaken by WfWetlands and if a hard structure should begin to lose its function/ require maintenance, the intervention would be reconsidered either for maintenance, or the need to redesign the structure in response to landscape changes.

7.1 CONSTRUCTION PHASE

7.1.1 Job creation

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	One of the primary objectives of the WfWetlands Programme is to create jobs and to teach transferrable skills to unemployed members of the local community so that they can be drawn into the permanent job market. The potential impact of this is significant and has a number of indirect positive impacts such as improvement in quality of life of the workers, increased spending in the local economy and the support of small business in the local area. Cumulatively, the impact of the WfWetlands projects is judged to be of high positive significance. The programme has a budget of approximately R130 million per annum, has created in the region of 27 000 jobs and transferred skills to numerous previously unskilled persons. Should the project not be authorised or implemented, the potential jobs would not be created. Where projects already have active teams implementing interventions, this would have a high negative impact as the contractors would not be able to keep their teams busy. Where projects do not have			

	active teams, the impact would however be neutral as the impact would not be worse against the baseline, i.e. jobs would not be taken away, they just would not be created.		
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**
Type	Positive	Positive	Negative
Extent	Site Specific	Site Specific	Site Specific
Magnitude	Medium	Low	High
			Zero
Duration	Long-term	Long-term	Long-term
Significance	**MEDIUM (+)**	**HIGH (+)**	**High (-)**
			Neutral
Probability	Definite	Definite	Definite
Confidence	Certain	Certain	Certain
Reversibility	Irreversible	Irreversible	Irreversible
Mitigation measures			
• Ensure that the required project workers are sourced from local communities and that maximum employment numbers are maintained throughout the project duration. • Project implementers to support local businesses (e.g. local quarry owners to obtain rock for gabions) where possible.			

7.1.2 Fire risk

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	Construction usually takes place in the dry months when the danger of veld fires is highest. There is a possibility that construction workers could light a fire on site that could become out of control. The risk of this happening is assessed to be low, although the significance in terms of the economic damage that could be caused (especially in a commercial forestry area) is high. Adequate site supervision would considerably mitigate this impact. Fires are part of a natural biophysical cycle in most ecosystems and are therefore likely to still occur without the construction activities of the WfWetlands construction teams taking place.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Low	
Duration	Short-term	Short-term	Short-term	
Significance	**MEDIUM (-)**	**LOW (-)**	**LOW (-)**	
Probability	Unlikely	Unlikely	Likely	
Confidence	Sure	Sure	Sure	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• Ensure that workers are aware of the potential for fires and the damage that could be caused. • Ensure that a fire response procedure is in place and that all dry season work is organized in liaison with the landowners so that it fits into their firebreak/fire protection programme.				

7.1.3 Nuisance impacts

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	Construction can result in nuisance impacts, particularly for landowners. These impacts include: • Noise from construction activities, personnel and vehicles. • An increase in the amount of litter being generated. • Dust. • Security concerns such as theft or leaving gates open. • Non-use of sanitation facilities. • Temporary loss of access to areas due to construction activities. Given the isolated working environment (i.e. far from communities and public routes), the relatively few number of people on site and constant supervision by the project implementer, the above impacts are likely to be of low magnitude. Should the project not be authorised or implemented, no nuisance impacts would occur.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Neutral	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Zero	
Duration	Short-term	Short-term	Long-term	
Significance	**LOW (-)**	**VERY LOW (-)**	**NEUTRAL**	
Probability	Definite	Definite	Definite	
Confidence	Certain	Certain	Certain	
Reversibility	Reversible	Reversible	Reversible	
Mitigation measures				
• All site workers to undergo environmental induction training (“toolbox talks”) before undertaking work so that they are aware of the various environmental requirements. • Landowners should be consulted regarding the placement of stockpile sites and toilets as well as access routes. This must be indicated on the site camp layout plan. • Ensure that closed gates are kept closed. When in doubt, the landowner should be consulted. • Follow the EMPr with regard to sanitation facilities, waste management, noise and site management • Utilise local labour wherever possible to reduce potential friction within the community caused by bringing outside personnel in. • Ensure that all workers wear the yellow/blue attire indicative of WfWetlands personnel so that they are not mistaken for trespassers.				

7.1.4 Heritage resources

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	No significant heritage resources within the wetlands were identified during the desktop research, I&AP interactions or site visit (where rehabilitation work has been undertaken in the wetland in previous years) for the proposed projects. Given the low likelihood of heritage sites being disturbed and provided that construction is immediately stopped should a heritage resource be encountered then the magnitude of this impact should be zero. Should the interventions not be implemented, natural weathering would still occur. However, given the low potential of heritage resources in the area, this is anticipated to remain neutral for the no-go alternative.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Zero	Zero	
Duration	Long-term	Long-term	Long-term	
Significance	**VERY LOW (-)**	**NEUTRAL**	**NEUTRAL**	
Probability	Definite	Definite	Definite	
Confidence	Sure	Sure	Sure	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• Should any heritage resource or suspected resources be identified during the Phase 2 planning site visit, a suitably qualified heritage specialist shall be consulted. • Should any artefact or suspected artefact (including fossils and grave sites), or any site of cultural significance be encountered during construction, then the Contractor must immediately stop work in the vicinity of the artefact and alert the relevant authorities. The area around the discovery shall be cordoned off until such time that work is authorised to proceed.				

7.1.5 Worker safety

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	Alien clearing requires very specific training and involves high risk equipment such as chainsaws. It sometimes involves large trees and therefore extreme caution needs to be exercised. Crime and poor water quality could also have a negative impact on worker safety and health, especially in urban areas. Furthermore, workers may also come into contact with dangerous animals such as snakes or even predators when working in conservation areas. If the interventions are not implemented, the construction workers will not be affected by the dangers associated with working within the selected wetlands.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Zero	
Duration	Long-term	Long-term	Long-term	
Significance	**MEDIUM (-)**	**LOW (-)**	**NEUTRAL**	
Probability	Definite	Definite	Definite	
Confidence	Certain	Certain	Certain	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• All site workers to undergo specific safety training before undertaking this work so that they are aware of the various risks and measures to be taken in emergency situations. • Where required, security teams must be provided to protect the teams on site. • Follow Occupational Health and Safety requirements. • Personal Protective Equipment (PPE) shall be worn at all times on site.				

7.1.6 Flora and fauna

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	Habitat disturbance Habitat disturbance during the construction stage is typically temporary. In addition most species are relatively tolerant of disturbance and would be able to utilise the similar alternative habitat available in the study area. The area of habitat loss is also likely to be small and limited to the immediate surroundings of the intervention being constructed. Disturbance of protected species Construction activities could potentially result in disturbance to habitats required by protected species). It can however be almost completely mitigated by liaising with the appropriate conservation bodies whose local representatives can advise on appropriate measures and construction timeframes. Alien species invasion A potential construction-related impact on vegetation is the possibility of an increase in alien invasive species due to disturbance and weed seeds being brought in with borrow and construction material. The no-go alternative would mean that the positive impacts identified above would not be realised. Continued wetland degradation and habitat loss is likely to result in exponential increase in the significance of the no-go alternative, leading to an eventual loss of biodiversity and disruption of floral and faunal ecosystems. In addition, it would also negatively affect the achievement of conservation objectives for the area.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Low	
Duration	Long-term	Long-term	Long-term	
Significance	**MEDIUM (-)**	**LOW (-)**	**MEDIUM (-)**	
Probability	Definite	Definite	Likely	
Confidence	Certain	Certain	Sure	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• Should any protected species need to be removed or relocated, e.g. indigenous tree ferns, the appropriate permits shall be required. These activities shall take place under strict guidance from the ASD and/or appropriate authority. • Should any protected species occur on site, the ASD and project manager or implementer must liaise prior to site establishment with the relevant conservation body to determine measures required during the construction period to limit potential disturbances to protected species. • Implement the provisions of the EMPr regarding stockpiling borrowed material and rehabilitation after construction				

7.1.7 Aquatic ecosystems

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	Temporary alteration to stream flow patterns Construction must often take place in areas that are permanently wet. This requires that water be diverted away from working areas, leading to temporary alterations in the current drainage characteristics. Water diversion is typically done using sand bags to slow/block flow and then a pump to remove water and discharge it further downstream. This can result in a slight drying in the working areas and may affect aquatic organisms. This will however be of a temporary nature and is unlikely to significantly alter flow patterns. Sedimentation Construction activities can result in additional sediment ending up in the water course (e.g. due to earthworks or breakage of sandbags used to divert water away from working areas). Sediment can result in silt build-up downstream, increase the turbidity of the water and result in habitat changes. However, as wetlands are typically low-energy systems, much of the excess sediment is likely to be trapped before it is washed far downstream. Also, given the limited nature of the earthworks, sedimentation is not anticipated to occur to a significant degree. Pollution of water-courses Construction activities close to a water-course/wetland carry the attendant risk that construction-related pollutants could end up in the wetland system. Typical pollutants include hydrocarbons (e.g. from fuel leaks, shutter oil and lubricating fluid spills), litter, cement and contaminated wash-down water. Disturbance of wetland vegetation and stream banks Some disturbance to stream banks and wetland vegetation will be inevitable in order to construct the proposed interventions. This impact generally occurs on a small scale and can be mitigated via good management practices. Pursuing the no-go option would result in the current negative ecosystem impacts continuing. These impacts would include desiccation, erosion, channel incision, etc.			

	Pre-Mitigation	Post-Mitigation	No-go Alternative
Type	Negative	Negative	Negative
Extent	Site Specific	Site Specific	Site Specific
Magnitude	Medium	Low	Medium
Duration	Long-term	Long-term	Long-term
Significance	**MEDIUM (-)**	**LOW (-)**	**MEDIUM (-)**
Probability	Definite	Definite	Definite
Confidence	Certain	Certain	Certain
Reversibility	Irreversible	Irreversible	Irreversible

Mitigation measures

- Work shall predominantly take place during low rainfall periods.
- No foreign vegetation matter (e.g. mulch) shall be allowed on site (especially from alien species).
- Soils shall be stockpiled according to the different soil layers as per the soil profile in order not to mix layers of leached and organic soils.
- Stockpiles and revegetated areas shall be covered with mulch or cloth (geotextile) and kept moist.
- Implement the provisions of the EMPr regarding stockpile location and site management.
- Sandbags used to temporarily divert water shall be in a good condition to prevent additional sedimentation and/ or failure.
- Sand/ earth to fill the bags shall be obtained from and returned to existing excavation points where feasible.

- Soil required for the construction of interventions shall be stabilised as per the engineer's recommendations to counteract dispersive tendencies.
- Water abstracted above the General Authorization limits must be authorized by DWS prior to such abstraction taking place.

7.1.8 Sourcing borrow material

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	Borrow material (earth and rocks) is not always sufficiently available on site, and has to be sourced elsewhere. This can have a negative biophysical impact to the area where it is sourced. The quantities required are not such that they require a borrow pit licence. Costs increase the further one gets from site and therefore borrow material is sourced as close to site as possible. Sources include existing borrow areas on neighbouring farms, decommissioned dam walls, man-made berms which are no longer required. Should the borrow material not be required, the potential impact would be neutral.			

	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**
Type	Negative	Negative	Negative
Extent	Site Specific	Site Specific	Site Specific
Magnitude	Medium	Low	Zero
Duration	Long-term	Long-term	Long-term
Significance	**MEDIUM (-)**	**LOW (-)**	**NEUTRAL**
Probability	Definite	Definite	Definite
Confidence	Certain	Certain	Certain
Reversibility	Irreversible	Irreversible	Irreversible

Mitigation measures

- Implement the provisions of the EMPr.
- Any quantities in excess of the minimum requirements for a borrow pit licence will require authorisation through Department of Mineral Resources.
- Borrow areas will need to be properly re-sloped and re-vegetated after use.

7.1.9 Work within conservation areas

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	A number of the projects fall within conservation areas which requires a more astute attitude on the part of the implementers to the surrounding environment and the possible negative impacts they can have on it.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Zero	
Duration	Long-term	Long-term	Long-term	
Significance	**MEDIUM (-)**	**LOW (-)**	**NEUTRAL**	
Probability	Definite	Definite	Definite	
Confidence	Certain	Certain	Certain	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• Close cooperation is required with the conservation authorities. Any specific requirements need to be included in the applicable wetland rehabilitation plan. • Implement the provisions of the EMPr.				

7.1.10 Working in peatlands

Phase	Pre-Construction	**Construction**	Operational	Decommissioning
Impact description	Peatlands are sensitive ecosystem types and construction activities could degrade the soils if not properly mitigated, resulting in habitat destruction, loss of carbon storage capacity and water retention ability of the system. The direct impact of working within peatlands is the potential harm that can be caused through incorrect management on site. By not implementing interventions in peatlands, sensitive environments would be lost and carbon would be released into the atmosphere. In addition, once peatlands are dried out, they become hydrophobic and prone to fires that are very difficult to manage and stop.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	High	
Duration	Long-term	Long-term	Long-term	
Significance	**MEDIUM (-)**	**LOW (-)**	**HIGH (-)**	
Probability	Definite	Definite	Definite	
Confidence	Certain	Certain	Certain	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• Mitigation measures included in the EMPr shall be implemented. • Topsoil stockpiles should be protected from drying out as per the requirements of the EMPr. • No fires are permitted on site.				

7.2 OPERATIONAL PHASE

7.2.1 Changes in land use

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	The increase in wetland area may have both positive and negative impacts for landowners. Wetlands are often utilised for grazing during the dry season and an increase in wetland area will thus improve grazing conditions for the farmer. However the increase in wet areas may also make previously accessible areas inaccessible for farming purposes. The extent and magnitude of this impact will depend to a large degree on how much value each individual landowner places on wetland conservation. It is however assumed that if the landowner is willing to allow wetland rehabilitation to take place on their property that they see the value in the WfWetlands Programme and are willing to accept the increase in wetland area. Potential positive impacts associated with increased wetland area and improved grazing conditions would not be realised should rehabilitation activities not be implemented. Furthermore, drained wetlands are often more susceptible to erosion, resulting in the removal of fertile topsoil and thereby reducing the agricultural potential of the site.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Positive and Negative	Positive and Negative	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Medium	
Duration	Long-term	Long-term	Long-term	
Significance	**LOW (+)** **MEDIUM (-)**	**MEDIUM (+)** **LOW (-)**	**MEDIUM (-)**	
Probability	Definite	Definite	Likely	
Confidence	Certain	Certain	Sure	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• Ensure good access for landowners in the form of crossing points, where such measures be of the lowest impact type and design possible. • Provision of watering points for stock to minimise extensive trampling in the wetlands (especially in the wetter times of year).				

7.2.2 Increased water storage and reduced treatment costs

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Wetlands can offer valuable stream flow regulation and filtration services. By restoring wetland area, it is likely that downstream users will benefit by having a more reliable and possibly cleaner source of water. In addition, by addressing erosion, wetland rehabilitation can decrease the amount of sediment downstream. This can help to reduce water treatment costs for downstream users and will also reduce the sedimentation of downstream water storage facilities such as dams. The no-go alternative would mean that the positive impacts identified above would not be realised. In addition, the water retention and storage potential of the system and catchment would continue to decrease, while damage to properties and infrastructure resulting from flood events would increase. Furthermore, with lower water quality in the systems, more human treatment processes (i.e. water treatment plants) would be required to ensure that water is fit for human use which would require significant engineering and procurement cost.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Positive	Positive	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Medium	
Duration	Long-term	Long-term	Long-term	
Significance	**MEDIUM (+)**	**MEDIUM (+)**	**MEDIUM (-)**	
Probability	Definite	Definite	Definite	
Confidence	Certain	Certain	Certain	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• No mitigation measures are proposed				

7.2.3 Reduced soil erosion

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	By reducing exposed ground surfaces and surface runoff velocity, the sediment load in surface runoff is reduced, thereby contributing to better water quality in the sub-catchment area. If the proposed interventions are not implemented, erosion would continue and even accelerate over time. This would reduce the agricultural potential of farmland, as well as increase damages to properties and infrastructure during flood events.			
	Pre-Mitigation		**Post-Mitigation**	**No-go alternative**
Type	Positive		Positive	Negative
Extent	Site Specific		Site Specific	Site Specific
Magnitude	Medium		Low	Medium
Duration	Long-term		Long-term	Long-term
Significance	**MEDIUM (+)**		**MEDIUM (+)**	**MEDIUM (-)**
Probability	Definite		Definite	Definite
Confidence	Certain		Certain	Certain
Reversibility	Irreversible		Irreversible	Irreversible
Mitigation measures				
• No mitigation measures are proposed				

7.2.4 Employment opportunities

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Ideally, the skills learned by the project team during the construction phase – such as how to work with concrete, build gabions etc. – can be used to assist them to find permanent employment. If the interventions are not implemented, and the teams are not provided with these skills, the impact will be neutral as there will be no change to the *status quo*.			
	Pre-Mitigation		**Post-Mitigation**	**No-go Alternative**
Type	Positive		Positive	Positive
Extent	Site Specific		Site Specific	Site Specific
Magnitude	Medium		Low	Zero
Duration	Long-term		Long-term	Long-term
Significance	**MEDIUM (+)**		**MEDIUM (+)**	**NEUTRAL**
Probability	Definite		Definite	Definite
Confidence	Certain		Certain	Certain
Reversibility	Irreversible		Irreversible	Irreversible
Mitigation measures				
• No mitigation measures are proposed				

7.2.5 Public safety

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Interventions such as gabion weirs, for example, could potentially be used for stream crossings or a swimming hole by local communities which could potentially have serious health and safety risks. However, the purpose of the rehabilitation interventions is not to provide watering holes or public infrastructure, but to trap sediment (i.e. filling up dongas, erosion channels, etc.) and reduce overland flow-velocities. It is possible that even if the interventions are not implemented, the individuals who might be at risk from the use of the wetlands would still be at risk in degraded wetlands. It is even possible that degraded systems could have hidden risks such as stuck branches or boulders that could become dislodged.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Medium	
Duration	Long-term	Long-term	Long-term	
Significance	**MEDIUM (-)**	**LOW (-)**	**MEDIUM (-)**	
Probability	Definite	Definite	Likely	
Confidence	Certain	Certain	Certain	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• Consult with landowners and the local community to ensure that they are aware of, and educated in, the ecological values and sensitivity of the wetland environments, as well as the exact location of the intervention structures to be implemented.				

7.2.6 Ecosystem functioning

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Restoring wetland corridors In areas where wetlands have been artificially drained, restoration can result in the re-wetting of areas and link up previously wet areas, thus creating and extending a network of wetland areas. These wetland corridors can provide valuable refuges for wetland species and allow for greater ecosystem connectivity. Changes in water quality and quantity More natural stream flow patterns within the wetland, as well as an improvement in water quality and quantity (due to improved ecosystem services) can be expected after rehabilitation. This improvement in water quality and a more reliable supply of water is particularly important given the water scarcity that faces South Africa. Should the proposed interventions not be implemented, the wetland systems selected as priority wetlands for rehabilitation, would continue to degrade. This degradation would lead to a loss in ecosystem services, and could result in large downstream impacts such as flooding.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternatives**	
Type	Positive	Positive	Negative	
Extent	Site Specific	Site Specific	Site Specific	
Magnitude	Medium	Low	Medium	
Duration	Long-term	Long-term	Long-term	
Significance	**MEDIUM (+)**	**HIGH (+)**	**MEDIUM (-)**	
Probability	Definite	Definite	Likely	
Confidence	Certain	Certain	Sure	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• ***Note:*** The interventions identified for the proposed rehabilitation project were identified during a screening process that was undertaken to ensure that the most suitable intervention was identified, developed and assessed for each rehabilitation site. During this screening process, the project team also took into account environmental, social and economic considerations, as well as the rehabilitation objectives identified for the wetland. • Should these interventions not be implemented, the current rate of degradation at the assessed wetlands would continue and in some cases even result in the permanent loss of the integrity and functioning of these systems. It would also not be possible to achieve the rehabilitation objectives identified for the wetlands. Without the implementation of wetland rehabilitation as part of the WfWetlands project, the overall programme objectives[17] and the EPWP requirements would not be realised. • No mitigation measures are proposed.				

[17] Wetland conservation and poverty reduction through job creation and skills.

7.2.7 Flora and fauna

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Increased habitat Increasing the wetland area through rehabilitation will result in an increase in habitat for wetland-dependent species. This is a positive impact, especially in light of the fact that a number of the KwaZulu-Natal wetlands are utilised by the vulnerable and endangered species Increased biodiversity A large proportion of the natural vegetation in the greater area has already been lost to forestry and agriculture. Restoring wetland habitat will help to increase the species richness of the overall area by encouraging the re-establishment of wetland species. Change in species composition In wetlands that have been subject to desiccation, plants that are tolerant of drier conditions are likely to have become established. With the restoration of the wetland, these species are likely to be replaced with wetland-adapted vegetation. This change in composition reflects a shift back to historical species composition and is thus considered positive. Should the interventions not be implemented, the positive benefits described above would not be realised. The fauna and flora would respond to the wetland degrading, and would likely result in a loss of biodiversity.			

	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**
Type	Positive	Positive	Negative
Extent	Site Specific	Site Specific	Site Specific
Magnitude	Medium	Low	Medium
Duration	Long-term	Long-term	Long-term
Significance	**MEDIUM (+)**	**MEDIUM (+)**	**MEDIUM (-)**
Probability	Definite	Definite	Definite
Confidence	Certain	Certain	Certain
Reversibility	Irreversible	Irreversible	Irreversible

Mitigation measures

- ***Note:*** The interventions identified for the proposed rehabilitation project were identified during a screening process that was undertaken to ensure that the most suitable intervention was identified, developed and assessed for each rehabilitation site. During this screening process the project team also took into account environmental, social and economic considerations, as well as the rehabilitation objectives identified for the wetland.
- Should these interventions not be implemented, the current rate of degradation at the assessed wetlands would continue and in some cases even result in the permanent loss of the integrity and functioning of these systems. It would also not be possible to achieve the rehabilitation objectives identified for the wetlands. Without the implementation of wetland rehabilitation as part of the WfWetlands project, the overall programme objectives and the EPWP requirements would not be realised.
- No mitigation measures are proposed.

7.2.8 Working in peatlands

Phase	Pre-Construction	Construction	**Operational**	Decommissioning
Impact description	Peatlands, only covering 3% of the Earth's land, store a third of the global soil carbon (Joosten 2010). This means that as an **indirect positive impact**, undertaking this rehabilitation project would ensure that carbon is stored in the soils and not released into the atmosphere as a greenhouse gas, which has been shown to contribute to global warming.			
	Pre-Mitigation	**Post-Mitigation**	**No-go Alternative**	
Type	Negative	Negative	Negative	
Extent	Local	Local	International	
Magnitude	Medium	Medium	High	
Duration	Long-term	Long-term	Long-term	
Significance	**MEDIUM (-)**	**MEDIUM (+)**	**HIGH (-)**	
Probability	Definite	Definite	Likely	
Confidence	Certain	Certain	Certain	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
• Mitigation measures included in the EMPr shall be implemented. • Topsoil stockpiles should be protected from drying out as per the requirements of the EMPr. • No fires are permitted on site.				

8 CONCLUSION AND WAY FORWARD

8.1 Conclusion

Based on the above, it is the opinion of the EAP that the positive long-term bio-physical and socio-economic aspects of the project as a whole greatly outweigh the minor negative construction related impacts, particularly since effective mitigation measures to reduce the negative impacts exist. There are no indications to suggest that the preferred alternative will have a significant detrimental impact on the environment. Instead, a long-term positive impact is anticipated. This is discussed in further detail below:

Construction Phase:

It is most likely that all identified construction related impacts would be limited to the duration of this phase. Impacts on the bio-physical environment are generally considered to be of **Medium (-)** to **Low (-)** significance, which can be reduced to **Low (-)** and **Very Low (-)** with the implementation of appropriate mitigation measures. Construction related impacts can generally be very effectively managed through the implementation and regular auditing of an EMPr. Given that no significant heritage resources have been found for these project sites to date, the anticipated impact on heritage resources is **Very Low (-)** which can be mitigated to **Neutral**. The impact on the socio-economic environment is expected to be **Medium** to **High (+)** due largely to the creation of jobs and up-skilling of local workers.

Operational Phase:

Potential Operational Phase related impacts for both the bio-physical and socio-economic environments are generally considered to be of **Medium to High (+)** significance. These positive impacts are expected to arise due to the following:

- Improved wetland habitat for red data species;
- Improved wetland services (which has benefits for downstream as well as local users); and
- Empowering of local community.

The impacts detailed above in **Chapter 7** are summarised below in **Table 15.**

Table 15: Impact summary table

COLOUR KEY			
High Negative	Red	Neutral	White
Medium Negative	Orange	Low Positive	Light Blue
Low Negative	Yellow	Medium Positive	Blue
Very Low Negative	Light Yellow	High Positive	Green

Construction Phase: Description of Impact	**Significance of Impact**		
	Preferred Alternative		**No-Go**
	No Mitigation	**With mitigation**	
Job creation	Medium (+)	High (+)	Medium (-) / Neutral
Increased awareness of wetland importance	Medium (+)	High (+)	Medium (-)
Fire risk	Medium (-)	Low (-)	Neutral
Nuisance impacts	Low (-)	Very Low (-)	Neutral
Impact on heritage resources	Very Low (-)	Neutral	Neutral
Worker safety	Medium (-)	Low (-)	Neutral
Flora and fauna	Medium (-)	Low (-)	Medium (-)
Aquatic ecosystem impacts	Medium (-)	Low (-)	Medium (-)
Sourcing borrow material	Medium (-)	Low (-)	Neutral
Work within conservation areas	Medium (-)	Low (-)	Neutral
Working in peatlands	Medium (-)	Low (-)	High (-)
Operational Phase: Description of Impact			
Changes in land use	Low (+) / Medium (-)	Medium (+) / Low (-)	Medium (-)
Increased water storage and reduced treatment costs	Medium (+)	Medium (+)	Medium (-)
Reduced soil erosion	Medium (+)	Medium (+)	Medium (-)
Employment	Medium (+)	Medium (+)	Neutral
Ecosystem functioning	Medium (+)	High (+)	High (-)
Flora and fauna	Medium (+)	Medium (+)	Medium (-)
Public safety	Medium (-)	Low (-)	Medium (-)
Working in peatlands	Low (+)	Medium (+)	High (-)

8.2 Level of Confidence in Assessment and Recommendation of the EAP

Based on the information provided in this report, the outcome of the impact assessment and the supporting documentation it is the recommendation of the EAP that authorisation be granted for the following reasons:

a) The proposed rehabilitation activities are likely to have significant positive bio-physical and socio-economic benefits, not just for the local community for the whole country.

b) Effective mitigation measures exist to manage the limited negative impacts that were identified.

c) The proposed rehabilitation activities are in line with the principles of NEMA (in particular: people and their needs – particularly women and children – are placed at the forefront of development via the EPWP; the development can be considered to be socially, environmentally and economically sustainable; the environmental impacts of the activity are not unfairly distributed and the potential environmental impacts have been assessed and evaluated).

d) The WfWetlands Programme is an important part of the government's EPWP and given that the impacts of the proposed activities are not likely to be detrimental to the environment, this programme should be supported in the spirit of co-operative governance.

It is recommended that the following conditions should be included by the Department of Environmental Affairs in the Environmental Authorisation (should a positive decision be reached):

- Mitigation measures listed in this BAR should be referenced as conditions of approval.
- Construction activities must take place in accordance to the requirements of the attached EMPr, which also includes general requirements from the WfWetlands Best Management Practices Plan.
- Regular auditing of the EMPr must take place.

Please find a signed EAP declaration signed in **Appendix E.**

8.3 Way Forward

The work proposed in the above-mentioned wetland systems will be further detailed in a project specific Rehabilitation Plan, consisting of work that will be planned for the following years' implementation cycle.

Each Rehabilitation Plan will include a detailed description of the wetland system, the problems affecting the wetland as well as the proposed rehabilitation strategy. Input into this report is provided by the project engineer, wetland specialist, EAP, and WfWetlands ASD. The Rehabilitation Plan will also include the engineering drawings and bill of quantities of the specific intervention planned to address the site-specific issue.

A general Environmental Management Programme (EMPr) (**Appendix D**) is included in both the BAR and Rehabilitation Plan and provides a set of guidelines and requirements for the implementing teams to ensure that each intervention does not do unnecessary harm to the environment. Where site-specific mitigation measures are required, these will be included in the intervention booklets provided as an annexure to the Rehabilitation Plan.

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