



WORKING FOR WETLANDS REHABILITATION PROGRAMME, GAUTENG

BASIC ASSESSMENT REPORT NOVEMBER 2017

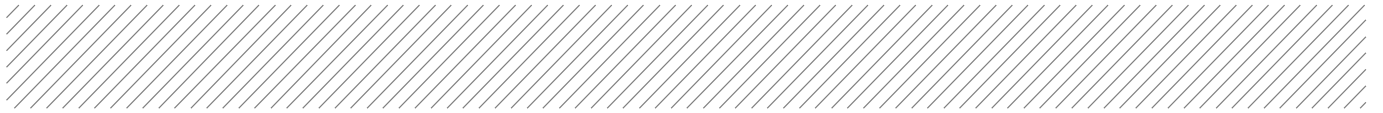


EXPANDED PUBLIC WORKS PROGRAMME
Creating opportunities towards human fulfillment



Agriculture, Forestry and Fisheries
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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


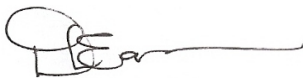
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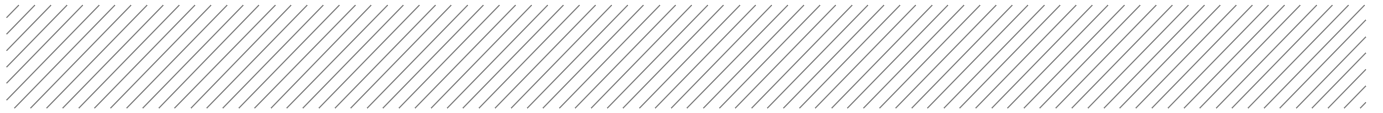
E capetown@aurecongroup.com

W aurecongroup.com

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Document control						aurecon
Report title		Working for Wetlands Rehabilitation Programme, Gauteng				
Document ID		11667	Project number		113223	
File path		P:\Projects\113223 Plan & Env Comp Work for Wetlands\Enviro\7 DEL SERV\701 Provinces\Gauteng\2017_2018\Reports\BAR\GP_2017_Draft BAR for PPP.docx				
Client		Working for Wetlands Programme				
Client contact		Dr Farai Tererai	Client reference		WfWetlands: GP BAR	
Rev	Date	Revision details/status	Author	Reviewer	Verifier (if required)	Approver
0	7 November 2017	Draft for PPP	David Rathobei / Corlie Steyn	Zoë Palmer	Franci Gresse	Diane Erasmus
Current revision		0				
Verifier signature				Approver signature		
Name		Franci Gresse		Name		Diane Erasmus
Title		Project Leader		Title		Associate

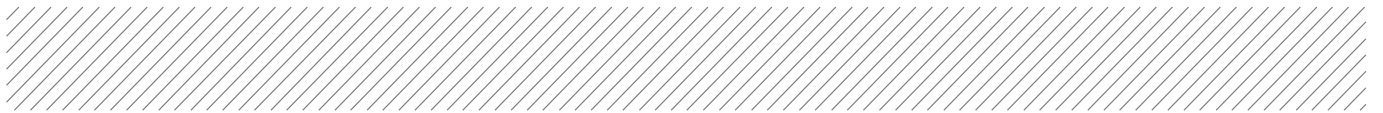


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NEMA requirements for Basic Assessment Reports

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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 (ii) details of the expertise of the EAP, including curriculum vitae;	Section 8.2 Appendix D
(b)	the location of the activity, including- (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 1.1.1 N/A
(c)	a plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Figure 1 Chapter 6 N/A 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 (ii) a description of the activities to be undertaken, including associated structures and infrastructure;	Chapter 2 Section 5.2
(e)	a description of the policy and legislative context within which the development is proposed including - (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;	Chapter 2
(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 - (i) details of all the alternatives considered;	Section 5.3
	(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;	Chapter 6
	(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 - (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;	Chapter 3 and 7
(j)	an assessment of each identified potentially significant impact of risk, including - (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;	Chapter 7
(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;	
(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;	Chapter 8
(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- (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;	Appendix E
(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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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 coordinate 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.

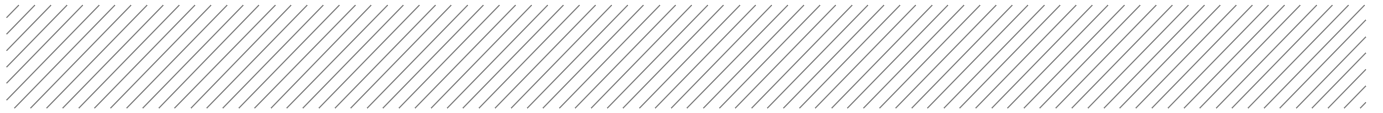
Project: An area of WfWetlands intervention generally defined by a quaternary catchment or similar management unit such as a national park in which a single implementer operates.

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 3.1), 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.

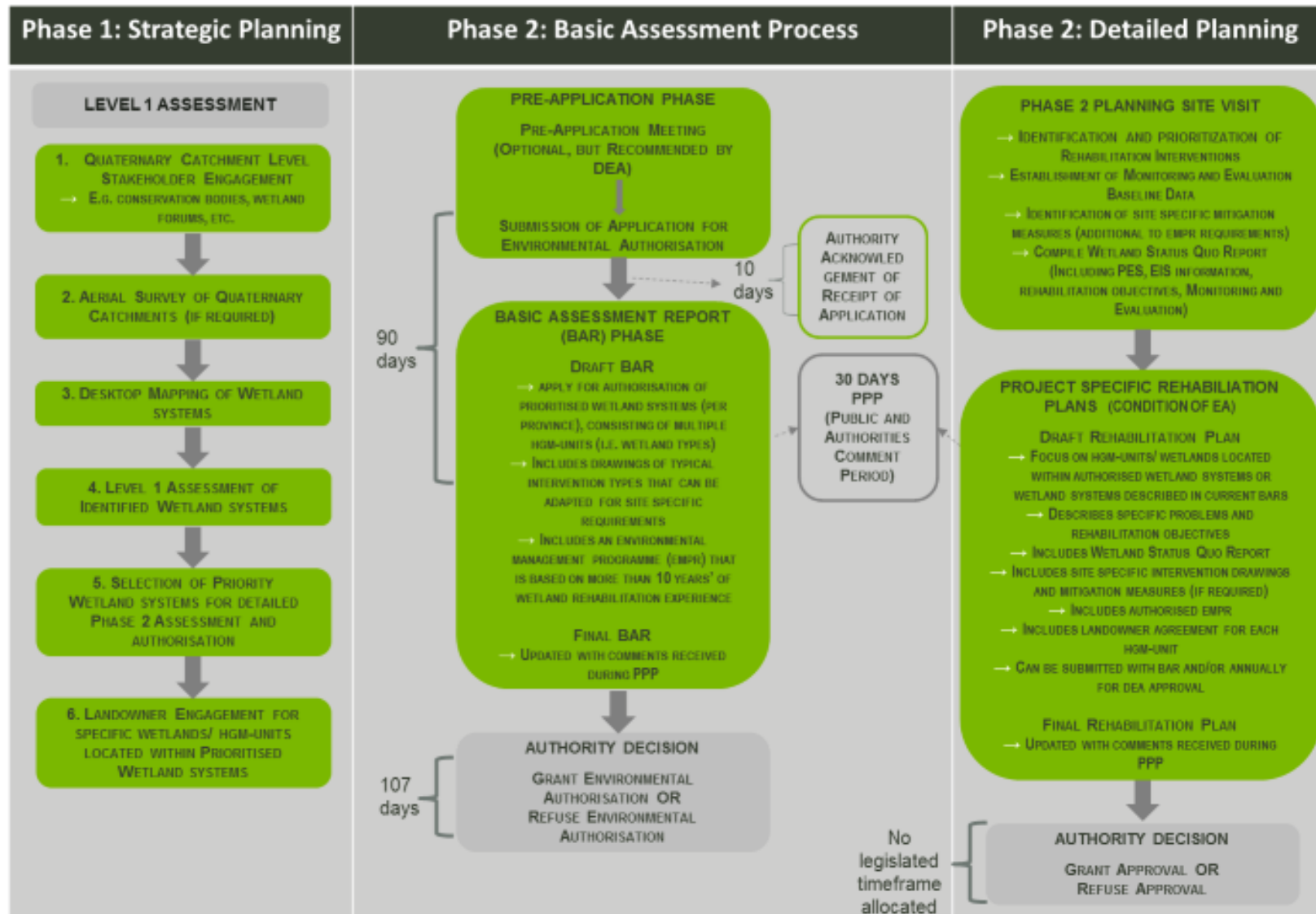


Figure 1: Overview of Phase 1 and Phase 2 as part of the planning process

1.1 Introducing the Project

The WfWetlands Programme is currently managing 37 WfWetlands Projects countrywide, including projects in the Gauteng Province. WfWetlands has actively been rehabilitating wetlands in the Gauteng 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 (NFEPAs) 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 Gauteng Province as shown in **Table 1** and **Table 2** below.

Table 1: Project details

Project Name	Wetland System	Wetland Number	Lat (DDMMSS)	Long (DDMMSS)
Gauteng North	Rietvlei Dam Nature Reserve	A21A-01	25°55'35.75"S	28°18'15.22"E
	Colbyn	A23A-12	25°44'23.28"S	28°15'13.68"E
	Doornrandjies 3	A21C-03	25°53'39.57"S	27°59'40.70"E

Table 2: Farm details for Gauteng projects

Project Name	Wetland System	Property Number	21 digit SG code	Property Size (ha)
Gauteng North	Rietvlei	1/377	TOJR00000000037700001	1658.84
		2/377	TOJR00000000037700002	505.66
		3/377	TOJR00000000037700003	798.14
		4/377	TOJR00000000037700004	380.09
		6/377	TOJR00000000037700006	128.17
		7/377	TOJR00000000037700007	27.58
		9/377	TOJR00000000037700009	99.01
		12/377	TOJR00000000037700012	135.55
		1/393	TOJR00000000039300001	480.91
		2/393	TOJR00000000039300002	361.35
		11/393	TOJR00000000039300011	23.97
		12/393	TOJR00000000039300012	24.19
		13/393	TOJR00000000039300013	23.68
		14/393	TOJR00000000039300014	25.83
		15/393	TOJR00000000039300015	27.58
		16/393	TOJR00000000039300016	24.74
		17/393	TOJR00000000039300017	23.77
		18/393	TOJR00000000039300018	24.02

	22/393	TOJR00000000039300022	134.88
	26/393	TOJR00000000039300026	187.66
	28/393	TOJR00000000039300028	242.92
	34/393	TOJR00000000039300034	662.10
	65/412	TOJR00000000041200065	85.94
Colbyn	6/456	TOJR00000000045600006	10.91
Doornrandjies 3	5/386	TOJR00000000038600005	47.03
	32/386	TOJR00000000038600032	8.58
	34/386	TOJR00000000038600034	8.61
	41/386	TOJR00000000038600041	10.05
	43/386	TOJR00000000038600043	14.19
	44/386	TOJR00000000038600044	14.95
	72/386	TOJR00000000038600072	11.20
	80/386	TOJR00000000038600080	14.77
	82/386	TOJR00000000038600082	13.57
	83/386	TOJR00000000038600083	10.12
	84/386	TOJR00000000038600084	9.65
	85/386	TOJR00000000038600085	10.74
	86/386	TOJR00000000038600086	10.96
	88/386	TOJR00000000038600088	10.74
	89/386	TOJR00000000038600089	10.08
	90/386	TOJR00000000038600090	10.89
	91/386	TOJR00000000038600091	10.91
	92/386	TOJR00000000038600092	11.46
	94/386	TOJR00000000038600094	10.79
	95/386	TOJR00000000038600095	6.54
	96/386	TOJR00000000038600096	12.31
	100/386	TOJR00000000038600100	12.33
	124/386	TOJR00000000038600124	11.37
	135/386	TOJR00000000038600135	2.63
	151/386	TOJR00000000038600151	2.02
	152/386	TOJR00000000038600152	1.97
	155/386	TOJR00000000038600155	1.93
	156/386	TOJR00000000038600156	1.96
	157/386	TOJR00000000038600157	1.80
	160/386	TOJR00000000038600160	25.45
	165/386	TOJR00000000038600165	1.99
	183/386	TOJR00000000038600183	42.66

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 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 province.

The project team for Gauteng Province included in **Table 3** below:

Table 3: Planning Team for Gauteng Province

Role	Representative	Company
ASD	Keitumetse Mekgoe	Department of Environmental Affairs
EAP	Zoë Palmer	Aurecon South Africa (Pty) Ltd
Engineer	Cilliers Blaauw	Aurecon South Africa (Pty) Ltd
Wetlander	Retief Grobler	Imperata

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 6.3) a heritage specialist will be appointed to undertake the necessary permitting procedures in terms of the National Heritage Resources Act (Act 25 of 1999) (NHRA). This will not be required for the Gauteng Province.

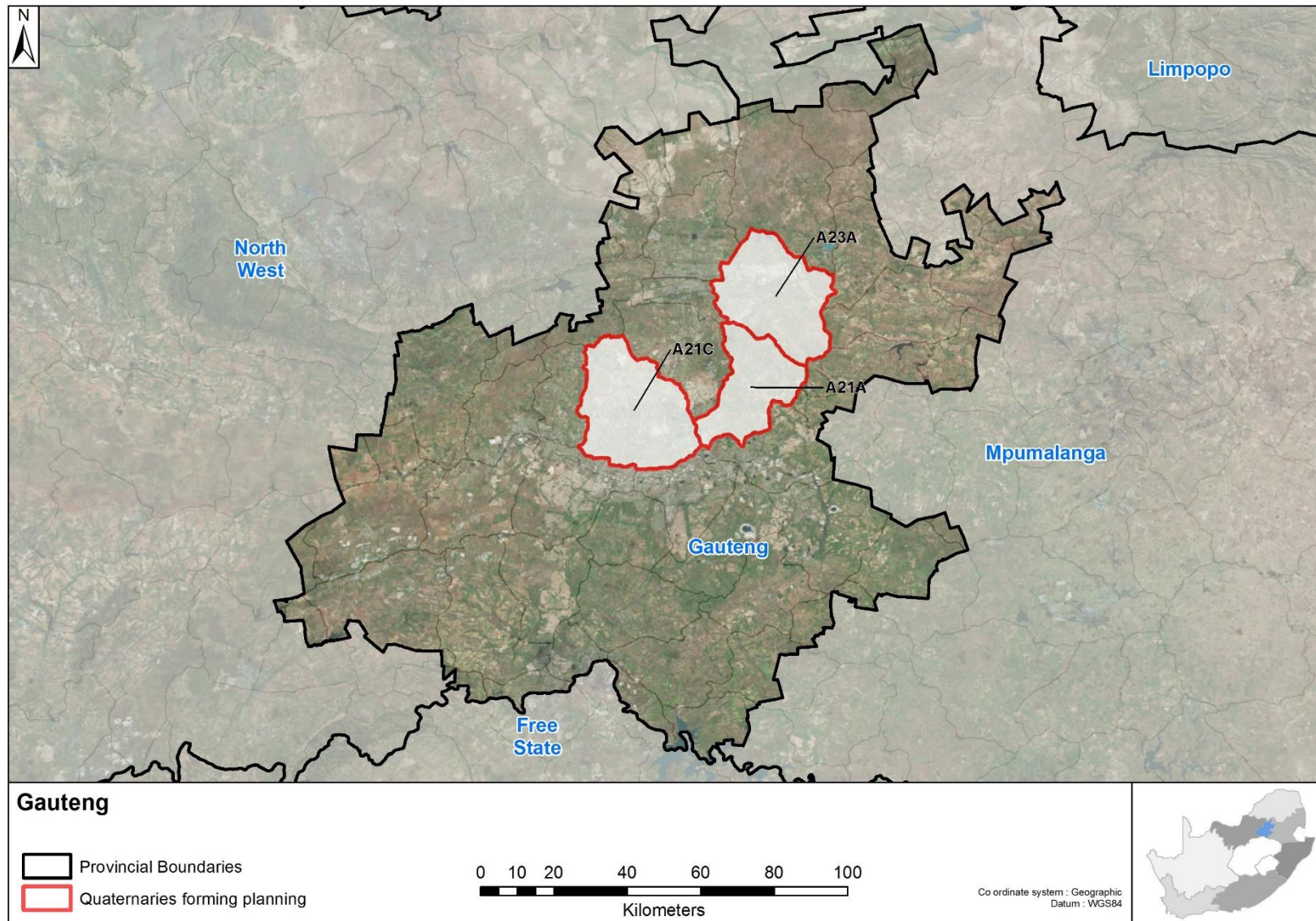


Figure 2: Locality map showing the location of quaternary catchments included in this BAR

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 an 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			
Gauteng 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.	Gauteng Department of Agriculture and Rural Development	2014
Gauteng Conservation Plan			2011
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 Gauteng Projects

Listed activity	Description of project activity that triggers listed activity
Listing Notice 1 (GN R983, as amended)	
Activity 12: The development of- <ol style="list-style-type: none"> 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- <ol style="list-style-type: none"> 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: <ul style="list-style-type: none"> • 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- <ol style="list-style-type: none"> i. infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or ii. weirs, where the weir, including infrastructure and water surface area, is expanded by 100 square metres or more; 	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: <ul style="list-style-type: none"> • The expansion of existing concrete or gabion weirs within watercourses (wetlands).

Listed activity	Description of project activity that triggers listed activity
<p>where such expansion or expansion and related operation occurs-</p> <p>a. within a watercourse;</p> <p>c. if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse.</p>	<ul style="list-style-type: none"> 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 100m².
Listing Notice 3 (GN R985, as amended)	
<p>GN 985: Activity 14 The development of-</p> <p>i. weirs, where the weir, including infrastructure and water surface area exceeds 10 square metres; or</p> <p>ii. infrastructure or structures with a physical footprint of 10 square metres or more;</p> <p>where such development occurs -</p> <p>a. within a watercourse;</p> <p>c. if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>(c) In Gauteng:</p> <p>iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans;</p> <p>v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act 10 of 2004);</p> <p>vi. Sensitive areas identified in an environmental management framework adopted by relevant environmental authority;</p> <p>x. Sites zoned for conservation or public open space or equivalent zoning.</p>	<p>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:</p> <ul style="list-style-type: none"> 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. <p>The wetlands selected within the Gauteng Province are located in CBAs and ESAs as demarcated in the Gauteng Conservation Plan. Furthermore, the vegetation types in which they occur is considered vulnerable in terms of NEMBA.</p> <p>The wetlands within the Rietvlei and Colbyn projects fall within properties that are zoned for conservation and open space respectively.</p>
<p>Activity 23: The expansion of-</p> <p>i. weirs where the weir is expanded by 10 square meters or more in size;</p> <p>ii. infrastructure or structures where the physical footprint is expanded by 10 square metres or more;</p> <p>where such development occurs</p> <p>a. within a watercourse;</p> <p>c. if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>(c) In Gauteng:</p>	<p>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:</p> <ul style="list-style-type: none"> 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

Listed activity	Description of project activity that triggers listed activity
iv. Sites identified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) in the Gauteng 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.	part of the educational component of the project. The wetlands selected within the Gauteng Province are located in CBAs and ESAs as demarcated in the Gauteng Conservation Plan. Furthermore, the vegetation types in which they occur is considered vulnerable in terms of NEMBA. The wetlands within the Rietvlei and Colbyn projects fall within properties that are zoned for conservation and open space respectively.

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

In terms of Section 39 of the NWA, a General Authorisation¹ (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*²' and '*altering the bed, banks, course or characteristics of a watercourse*³' where they are specifically undertaken for the purposes of rehabilitating 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 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.

¹Government Notice No. 1198, 18 December 2009

²Section 21(c) of the NWA, No. 36 of 1998

³Section 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)⁴ 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.

⁴ Also referred to as Provincial Coordinators (PCs).

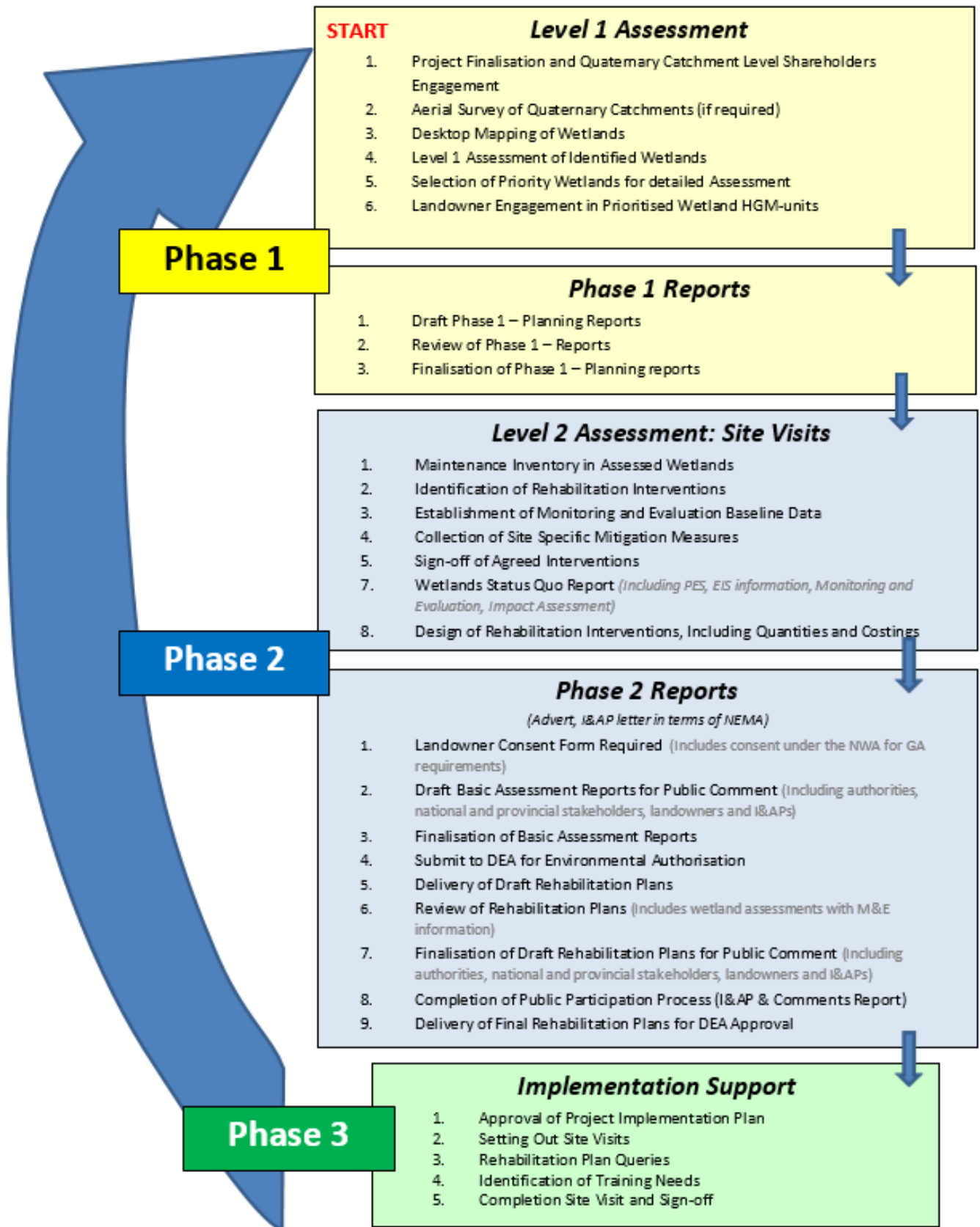


Figure 3: The Working for Wetlands planning process

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.

The tables 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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	<ul style="list-style-type: none"> 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: <i>Die Rapport</i> (in Afrikaans) on 5 November 2017 and <i>Sunday Times</i> (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. 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 periods, 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 250 000 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. Examples of typical interventions are provided in detail in **Appendix A**. The following points provide a summary of the objectives, and activities.

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 Section 5.3 and **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 Section 5.3 and **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 approach 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	<p>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 objectives⁵. The earlier site selection processes to determine feasible and reasonable Wetland Projects are described in detail in Section 3.1.</p> <p>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.</p>
Other Alternatives	<p>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.</p> <p>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</p>

⁵ Wetland conservation and poverty reduction through job creation and skills development amongst vulnerable and marginalised groups.

Alternative	Applicability to WfWetlands
	<p>Project in this report. Rather all possible types of interventions are presented as the preferred 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.</p>
No-Go Alternative	<p>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.</p>

6 BASELINE DESCRIPTION OF GAUTENG PROJECTS

6.1 Gauteng North Project: Background

Wetlands has actively been rehabilitating wetlands in the Gauteng Province since the early 2000s. Over the years, the number of active projects have diminished forming an amalgamation of the projects that occur in the northern and southern areas of the province, namely Gauteng South and Gauteng North Projects.

The split between Gauteng North and South occurs at the continental catchment divide that separates the province in two near equal halves with the boundary running from east to west through Johannesburg. The Gauteng North Project incorporates all the northern Quaternary Catchments that drain towards the Indian Ocean, predominately areas associated with the Crocodile and Olifants River drainage networks. Quaternary Catchments considered as part of the phase 1 approach that fall within this area include A21A, A21B, A21C, A21D, A21E, A21F, A21G, A21H, A23A, B20C, B20D, B20H, and B31A. One of these catchment (A21F) has however been incorporated as part of the Gauteng South Project for logistical reasons. Catchments that have been specifically targeted as part of this year's assessments in the Gauteng North Project include A21A, A23A, and A21C.

Despite the declining number of projects, the wetland areas covered by the programme are substantial, considering the highly urbanised and dense population of the Gauteng Province.

6.2 Biophysical Environment

The following new wetland systems were identified in the Gauteng Province (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.

- Quaternary catchment A21A:
 - Rietvlei Dam Nature Reserve
- Quaternary catchment A23A:
 - Colbyn
- Quaternary catchment A21C:
 - Doornrandjies 3

6.2.1 Quaternary catchment A21A and associated wetlands

Quaternary Catchment A21A	
General description	Rietvlei Nature Reserve falls inside quaternary catchment A21A, located southeast of Pretoria.
Geology and topography	The quaternary catchment is characterized by red, yellow and / or greyish soils with low to medium base status. According to Gauteng Conservation Plan version 2, the catchment is partially underlain by dolomite that may be associated with a dolomite aquifer and groundwater discharge. Wetland habitat occurs in association with a perennial river in the form of the Rietvlei River, while the system also forms a corridor between ridges and other surface watercourses and is therefore considered of importance from a landscape ecological consideration (SANBI BGIS, 2017).

Terrestrial ecology	Mucina and Rutherford (2006) recently classified the regional vegetation of the surrounding area as the Carletonville Dolomite Grassland and Rand Highveld Grassland (vulnerable) vegetation types. It is expected that the study area is located in a gradient between these two regional vegetation components. The wetland area is not directly associated with these two terrestrial vegetation types, as it forms an azonal system that is considered to be more consistent with the Eastern Temperate Freshwater Wetlands vegetation type
Aquatic ecology	Quaternary catchment A21A is characterised by 683mm of annual precipitation and around 2124mm of potential evaporation. This suggests that wetlands inside the catchment have a moderately high vulnerability to hydrological modifications. Portions of Wetland A21A-02 located within the reserve are known to contain peat soils that were previously partially mined. Peatlands such as Wetland A21A-02, have the potential to function as carbon sinks by actively sequestering atmospheric carbon into organic carbon as long as peat growth occurs.
Land use	The wetland catchment area is characterized by urban development in its upper reaches, with agricultural holdings and agricultural activities in the form of dry land cropping, central pivot irrigation cultivation, and chicken batteries dominating the majority of the area. Urbanisation is on the increase and it is predicted that the nature of the catchments would change over the next five to ten years. The Rietvlei Dam Nature Reserve is a conservation area.
Rietvlei Wetland System	
Location	A large portion of the Rietvlei wetland system is located with the Rietvlei Dam Nature Reserve, located near Irene, southeast of Pretoria. The Nature Reserve was a focus of wetland rehabilitation efforts for numerous years before 2010. The reserve is bordered by the R50 (Delmas Road) on its eastern boundary, with the R21 Highway situated parallel to its western boundary.
District and local municipality	City of Tshwane (both the District and Local municipality)
Reason for selection	The wetland within the Rietvlei Dam Nature Reserve forms one of the largest wetlands in close proximity to the urban edge in Gauteng. Hence the system is regarded of strategic importance as it contributes to the delivery of wetland related ecosystem services in an urban to near urban setting. Furthermore, as the wetland is located within a protected area, it is unlikely to be encroached by future infrastructure development. The wetland is also associated with rare and protected biodiversity such as the Near Threatened Red Data plant species <i>Kniphofia typhoides</i> , and provides a sensitive habitat as a peatland. Rehabilitation work planned for the new rehabilitation cycle will address maintenance needs of existing interventions, and include new interventions that will protect and enhance existing structures and contribute to the rehabilitation of larger portions of wetland habitat inside as well as outside of the reserve.
Wetland type and size⁶	Wetland A21A-02 is located inside Rietvlei Nature Reserve on the left-hand and right-hand banks of the perennial Rietvlei River. The identified system is a valley bottom with a channel hydro-geomorphic unit (HGM unit) and covers an area of approximately 704 ha.
Conservation status (terrestrial and aquatic)	The system is located within a critical biodiversity area, an ecological support area as well as a protected area (SANBI BGIS, 2017).
Land use	Nature Conservancy/ low income residential settlement

⁶ 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	<ul style="list-style-type: none"> • Encroachment of invasive species and clearing of indigenous wetland vegetation <ul style="list-style-type: none"> ○ Invasive species such as the willow tree <i>Salix babylonica</i> and the poplar tree <i>Populus x canescens</i> occupy wetland habitat and exclude indigenous species in the process. ○ Natural vegetation is also cleared by activities such as cultivation and infrastructure development. • Historic peat mining. • Wetland desiccation through furrows and drains. • The incision and widening of existing channels, as well as channel development in furrows and drains. • Head cut erosion initiation and migration. • Flow concentration through pipes and road crossings. • Dam construction and flooding of wetland habitat. • Woody debris causing flow obstructions and potential points for future erosion damage
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6.2.2 Quaternary catchment A23A and associated wetland system

Quaternary Catchment A23A	
General description	<p>Quaternary catchment A23A covers a wide area, including the upper catchment of the Rietvlei River draining into Rietvlei Dam, as well as the upper catchments of the Wilge and Pienaars Rivers in the northeastern part of Gauteng. The upper catchment of the Wilge River forms part of the Olifants River's catchment, which is currently under serious threat from coal mining-related pollution, mainly in the Mpumalanga Province. Any sources of good quality water that can be secured and improved via rehabilitation efforts inside the Olifants River Catchment is of increasing importance.</p>
Geology and topography	<p>The geology in the region are predominantly Dolomitic limestone formations (Dolomite) with Syenite intrusions and Granit areas. In many areas, instability may occur naturally and is exasperated by human activities. The primary triggering mechanisms include the ingress of water-bearing services, poorly managed surface water drainage and groundwater-level drawdown.</p> <p>The quaternary catchment is characterized by red, yellow and / or greyish soils with low to medium base status. The soil may receive water runoff from associated rock; water-intake areas. Furthermore, the soil has one or more of: low base status, restricted soil depth, excessive or imperfect drainage, as well as high erodibility. The soils structures are undifferentiated shallow and structure less soils as well as land classes (SANBI BGIS, 2017).</p>
Terrestrial ecology	<p>The area falls within the Rocky Highveld zone of the Grassveld biome, and the area is covered by the threatened ecosystem of Marikana Thornveld which is considered vulnerable. Approximately 48% of the Marikana Thornveld vegetation unit is transformed, mainly by cultivated lands or urban and built up areas.</p> <p>Although most of the area has been urbanised in a residential suburb, the vegetation present in the open spaces is characteristic of natural grassland vegetation with woody components. There is also a presence of invasive alien plants including <i>Arundo donax</i>, <i>Ipomoea purpurea</i>, <i>Morus alba</i>, <i>Pennisetum clandestinum</i>, <i>Verbena bonariense</i> and <i>Xanthium strumarium</i>.</p>
Aquatic ecology	<p>Quaternary catchment A23A provides the sources of the Edendalespruit, Pienaars, Moreleta and Hartebeespruit rivers which drain in a northerly direction towards the Roodeplaat Dam. The confluence of the rivers continues as the Pienaars River which meet the Crocodile River, turning into the Limpopo River before it reaches the coastline in Mozambique.</p>
Land use	<p>Ridges and outcrops (often associated with fire refugia along with crevices and narrow valleys). Low density residential households in a small holding setting with large gardens. It has a Tar road (R25) and dirt road crossings.</p>

Colbyn Wetland System	
Location	The Colbyn Wetland Nature Reserve is approximately 60 ha in extent and was proclaimed as a municipal nature reserve by the Gauteng Province in June 2014 (Provincial Gazette, 25 June 2014) and is managed by the City of Tshwane Metropolitan Municipality. The area is now known as Colbyn Valley and is located next to the suburb of Colbyn in the west and the N1/N4 intersection in the east. It forms part of a “green corridor” together with adjoining areas Meintjieskop and the Pretoria National Botanical Garden.
District and local municipality	City of Tshwane (both the District and Local municipality)
Reason for selection	The Colbyn valley bottom wetland is a fairly unique wetland. This a large wetland in fair condition, located within the urban environment. Peat is present in the wetland and is approximately 3000 years old (Grundling et al 2015). Approximately 4 ha of peat is present to the south-east of the wetland channel, to the north of the railway line. The depth of the peat varies across the wetland unit and an estimate of the peat volume has not been calculated (Van der Walt 2015). Based on the information provided in the study by Van der Walt (2015), the peat volume is estimate at between 15 000 and 20 000 m ³ . The Colbyn Wetland has been undergone a monitoring exercise in 2016, and more information on this will be provided in the rehabilitation plan.
Wetland type and size⁷	The Colbyn valley bottom wetland is approximately 15ha in extent.
Conservation status (terrestrial and aquatic)	The system is located within a critical biodiversity area, an ecological support area and a protected area.
Land use	The Colbyn Wetland Nature Reserve is used for conservation as well as public open space.
Wetland problems	<p>Development took place on the edges of the wetland unit and the historical extent from the wetland unit is therefore unknown.</p> <p>The wetland unit extends upstream of the site, but is crossed by a major highway. The upstream wetland unit is located on the University of Pretoria research farm. This portion of the wetland is highly impacted by surrounding development and a dam. The downstream portion of the Hartebeespoortspruit passes through Kilnerpark and is severely channelized upslope of its natural flow path. No wetland features are present in this highly channelized portion of the system.</p> <p>Channel incision was taking place in the wetland unit, previously an unchannelled valley bottom system, on site and this threatened the wetness of the wetland unit, as well as the portion with peat. A headcut was also present in the channel.</p>

⁷ 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.

6.2.3 Quaternary catchment A21C and associated wetlands

Quaternary Catchment A21C	
General description	<p>Quaternary Catchment A21C is located east of Centurion and drains towards the north of Johannesburg into the Jukskei River, before its flows into the Crocodile River. A recent study commission by the City of Tshwane targeted the southwestern quadrant of Tshwane (including portions of Quaternary Catchment A21C) as being of particularly important to biodiversity and ecological processes, as large areas of undeveloped land are still intact along tributaries of the Jukskei and Crocodile Rivers present within the catchment. Some of these open spaces include areas inside conservancies, including Doornrandjie, Renosterspruit and Laezonia Conservancies.</p> <p>Identified impacts include concentrated stormwater outflows; roads, pipeline and railway line crossings; infrastructure encroachment (including formal and informal residential development); channelisation; dumping and mining.</p>
Climate	<p>The quaternary catchment is within the Crocodile (West) and Marico water management area. Quaternary Catchment A21C is characterised by 694.4 mm of mean annual precipitation (MAP) and in excess of 2 170.8 mm of potential evapotranspiration (PET). The MAP/PET ration indicates that wetlands inside the catchment have a large susceptibility to alterations of water inputs, referring specifically to reduced water inputs (i.e. changes in water input volumes and patterns).</p>
Geology and topography	<p>According to Mucina and Rutherford (2006) the geology and soils in the area consists of Archaean granite and gneiss of the Halfway House Granite. The quaternary catchment is characterized by red, yellow and / or greyish soils with low to medium base status. The soil has one or more of: low base status, restricted soil depth, excessive or imperfect drainage, as well as high erodibility. The soils structure is undifferentiated structure less (SANBI BGIS, 2017). Soils with clay accumulation are comment in the valley bottom wetland environments.</p>
Terrestrial ecology	<p>The catchment is located within the Egoli Granite Grassland vegetation unit described by Mucina & Rutherford (2006). The Egoli Granite Grassland vegetation unit is a listed Threatened Ecosystem area with an Endangered status (GM 10), according to the 2011 Schedule (Government Gazette of December 2011) of the National Environmental Biodiversity Act (Act 10 of 2004).</p> <p>The landscape features of this vegetation type are moderately undulating plains with low hills. Woody species are mainly limited to rocky outcrops throughout the unit. This vegetation type has a conservation target of 24%, of which only 3% is statutorily conserved.</p> <p>The entire wetland target area overlaps with land indicated as an Important Area in the provincial C-Plan 3 spatial dataset. The Important Area is associated with Red Listed plant, bird and mammal habitat, as well as primary vegetation (GDARD, 2011).</p>
Aquatic ecology	<p>The entire site forms part of the Crocodile (West) and Marico Water Management Area (WMA) as well as Quaternary Catchment A21C. The latter is associated with a Largely modified (class D) Present Ecological State (PES) and a Moderate Ecological Importance and Sensitivity (EIS) category (Middleton & Bailey, 2008).</p> <p>Sections of the Jukskei and Crocodile Rivers with known low-quality water content within catchment A21C, makes the area of strategic importance with regards to water quality benefits related to health wetlands and associated higher quality water inputs from them.</p>
Land use	<p>Land use within the A21C quaternary catchment mainly consist of urban development, which has resulted in numerous negative impacts associated with wetland habitat destruction, lowered water tables, erosion, sedimentation, etc.</p>

Doornrandjies 3 Wetland System	
Location	The wetland is located within the City of Tshwane Metropolitan Municipality on Koedoe road, approximately 6km northeast of Lanseria Airport, and approximately 5km north of Diepsloot Informal Settlement.
District and local municipality	The Doornrandjies 3 wetland systems falls within the southern boundaries of the City of Tshwane.
Reason for selection	The wetland has been impacted negatively by historic ridge and furrow cultivation and as a result active erosion features threaten the wetland. The area has e been incorporated into the Egoli Granite Grassland Nature Reserve as part of an offset agreement (LRI, 2009). Some of the historical furrows, especially in the upstream portion of the wetland, have become incised with a larger desiccation effect, while predominately downstream portions, including areas with and without gullies, have been affected by sediment deposition in a typical “cut and fill” erosion process. Currently identified head cut erosion features remain active and their risk for advancement is increased by unregulated grazing pressure within the system (LRI, 2009).
Wetland type and size⁸	The delineated target area of Doornrandjies 3 is regarded as an unchanneled valley bottom wetland that currently contains a discontinuous channel resulting from erosion from a road crossing and historic ridge and furrow cultivation activities. Seepage is a common contributor to the hydrology of the wetland, which contains sandy soils in its outer margins specifically. The wetland system is approximately 54.51ha in size.
Conservation status (terrestrial and aquatic)	Mesic Highveld Grassland Group 34 wetland ecosystem type that is Critically Endangered (CSIR 2011). The regional vegetation unit belongs to Egoli Granite Grassland (Gm 10) which is considered to be Endangered (Mucina & Rutherford, 2006). No NFEPA wetland overlaps with the Doornrandjies Wetland but there are Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) according to C-Plan 3 from the Gauteng Department of Agriculture and Rural Development (GDARD)
Land use	The predominant landuse in the area is urban development, which has resulted in numerous negative impacts associated with wetland habitat destruction, lowered water tables, erosion, sedimentation. The target area of the Doornrandjies 3 wetland is located on a few farm portions which are used as private small holdings are currently open grassland.
Wetland problems	The biophysical drivers of the wetlands in the target area have been impacted upon by historical activities and will be further impacted upon into the future, including <i>inter alia</i> : <ul style="list-style-type: none"> • Ridge and furrow cultivation • Road crossing through the wetland • Created channel that developed in response to the furrows and road crossing • Headcut erosion features located in the created channel, especially downstream of the road crossing, smaller headcut are present within agricultural furrows. • Continued channel incision and habitat desiccation in the discontinuous channel and furrows in response to future catchment hardening. • Encroachment of alien plants • Future urban development in the wetland catchment, which is currently characterised by smallholdings, will change the timing and magnitude of flood peaks, resulting in further degradation of the integrity of the wetland.

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.

6.3 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.

Socio-economic Environment Table 13 **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

	City of Tshwane		
Population			
Young (0-14)	23.2%		
Working age (15-64)	71.9%		
Elderly (65+)	4.9%		
Dependency ratio	39		
Level of education (aged 20+)			
No schooling	4.2%		
Higher education	23.4%		
Matric	34%		
Level of Employment (%)			
Unemployment rate	24.2%		
Youth Unemployment rate	32.6%		
Economic Profile			
No income	14.9%	R76,401 - R153,800	11.8%
R1 - R4,800	2.9%	R153,801 - R307,600	11.3%
R4,801 - R9,600	4.2%	R307,601 - R614,400	9.3%
R9,601 - R19,600	10.6%	R614,001 - R1,228,800	4.5%
R19,601 - R38,200	15.5%	R1,228,801 - R2,457,600	1.2%
R38,201 - R76,4000	13.3%	R2,457,601+	0.6%

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 ⁹
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%

⁹ 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.

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			
<ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p>			
	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				
<ul style="list-style-type: none"> • 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: <ul style="list-style-type: none"> 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				
<ul style="list-style-type: none"> 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	<p>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.</p> <p>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.</p> <p>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.</p>			
	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				
<ul style="list-style-type: none"> 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	<p>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.</p> <p>Crime and poor water quality could also have a negative impact on worker safety and health, especially in urban areas.</p> <p>Furthermore, workers may also come into contact with dangerous animals such as snakes or even predators when working in conservation areas.</p> <p>If the interventions are not implemented, the construction workers will not be affected by the dangers associated with working within the selected wetlands.</p>			
	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				
<ul style="list-style-type: none"> 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	<p><u>Habitat disturbance</u> 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.</p> <p><u>Disturbance of protected species</u> 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.</p> <p><u>Alien species invasion</u> 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.</p> <p>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.</p>				
	Pre-Mitigation		Post-Mitigation		No-go Alternative
	Type	Negative	Negative	Negative	Negative
	Extent	Site Specific	Site Specific	Site Specific	Site Specific
	Magnitude	Medium	Low	Low	Low
Duration	Long-term	Long-term	Long-term	Long-term	
Significance	MEDIUM (-)	LOW (-)	MEDIUM (-)	MEDIUM (-)	
Probability	Definite	Definite	Likely	Likely	
Confidence	Certain	Certain	Sure	Sure	
Reversibility	Irreversible	Irreversible	Irreversible	Irreversible	
Mitigation measures					
<ul style="list-style-type: none"> 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	<p><u>Temporary alteration to stream flow patterns</u></p> <p>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.</p>			
	<p><u>Sedimentation</u></p> <p>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.</p>			
	<p><u>Pollution of water-courses</u></p> <p>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.</p>			
	<p><u>Disturbance of wetland vegetation and stream banks</u></p> <p>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.</p>			
	<p>Pursuing the no-go option would result in the current negative ecosystem impacts continuing. These impacts would include desiccation, erosion, channel incision, etc.</p>			
	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				
<ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p> <p>Should the borrow material not be required, the potential impact would be neutral.</p>			
	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				
<ul style="list-style-type: none"> • 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				
<ul style="list-style-type: none"> 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	<p>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.</p> <p>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.</p>			
	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				
<ul style="list-style-type: none"> 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	<p>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.</p> <p>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.</p>			
	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 (-)	
	MEDIUM (-)	LOW (-)		
Probability	Definite	Definite	Likely	
Confidence	Certain	Certain	Sure	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
<ul style="list-style-type: none"> • 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	<p>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.</p> <p>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.</p>			
	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				
<ul style="list-style-type: none"> No mitigation measures are proposed 				

7.2.3 Reduced soil erosion

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	<p>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.</p> <p>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.</p>			
	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				
<ul style="list-style-type: none"> No mitigation measures are proposed 				

7.2.4 Employment opportunities

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	<p>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.</p> <p>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 <i>status quo</i>.</p>			
	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				
<ul style="list-style-type: none"> No mitigation measures are proposed 				

7.2.5 Public safety

Phase	Pre-Construction	Construction	Operational	Decommissioning
Impact description	<p>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.</p> <p>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.</p>			
	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				
<ul style="list-style-type: none"> 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	<u>Restoring wetland corridors</u> 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.			
	<u>Changes in water quality and quantity</u> 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				
<ul style="list-style-type: none"> • 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 objectives¹⁰ and the EPWP requirements would not be realised. • No mitigation measures are proposed. 				

¹⁰ Wetland conservation and poverty reduction through job creation and skills.

7.2.7 Flora and fauna

Phase	Pre-Construction	Construction	Operational	Decommissioning	
Impact description	<p><u>Increased habitat</u> 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 Eastern Cape wetlands are utilised by the vulnerable and endangered species</p> <p><u>Increased biodiversity</u> 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.</p> <p><u>Change in species composition</u> 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.</p> <p>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.</p>				
	Pre-Mitigation		Post-Mitigation		No-go Alternative
	Type	Positive	Positive	Positive	Negative
	Extent	Site Specific	Site Specific	Site Specific	Site Specific
Magnitude	Medium	Low	Medium	Medium	
Duration	Long-term	Long-term	Long-term	Long-term	
Significance	MEDIUM (+)	MEDIUM (+)	MEDIUM (+)	MEDIUM (-)	
Probability	Definite	Definite	Definite	Definite	
Confidence	Certain	Certain	Certain	Certain	
Reversibility	Irreversible	Irreversible	Irreversible	Irreversible	
Mitigation measures					
<ul style="list-style-type: none"> • 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	Positive	Negative	Negative	
Extent	Local	Local	Local	
Magnitude	Low	Medium	High	
Duration	Long-term	Long-term	Long-term	
Significance	LOW (+)	MEDIUM (+)	HIGH (-)	
Probability	Definite	Definite	Likely	
Confidence	Certain	Certain	Certain	
Reversibility	Irreversible	Irreversible	Irreversible	
Mitigation measures				
<ul style="list-style-type: none"> 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 EMP. 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 - low	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
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 (-)
	Medium (-)	Low (-)	
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 country as a whole.
- 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.

9 REFERENCE LIST

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