Glencore Operations South Africa (Pty) Ltd

Lakenvlei Wetland Rehabilitation Project – Phase 2

Environmental Management Programme

Our Ref.: 41106116-REP-00005
May 2025

Public

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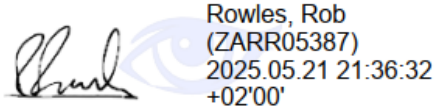
Signature	 Rowles, Rob (ZARR05387) 2025.05.21 21:36:32 +02'00'
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1 INTRODUCTION

1.1 Project Background

WSP Group Africa (Pty) Ltd (WSP) has been appointed by Goedgevonden Colliery (GGV) to undertake a Basic Assessment process (BA) to meet the requirements under the National Environmental Management Act (Act 107 of 1998) (NEMA) as amended for the Proposed Lakenvlei Wetland Rehabilitation Project – Phase 2 (hereafter referred to as the Proposed Project).

This proposed project is motivated by an offset requirement for GGV to rehabilitate 1168 ha of wetland. The proposed wetland rehabilitation interventions for this, the Phase 2 of the rehabilitation initiative require environmental authorisation for the clearing of indigenous vegetation and removing material and infill within a wetland.

WSP has been appointed by GGV as the independent Environmental Assessment Practitioner (EAP) to facilitate the Basic Assessment (BA) process in accordance with the Environmental Impact Assessment (EIA) Regulations (2014, as amended). This EMPr report accompanies the BAR for the proposed project.

1.2 Details of the Applicant

GGV is the project proponent (Applicant) with regards to this application. GGV is responsible for the implementation, operation and maintenance of the proposed wetland rehabilitation structures. **Table 1-1** provides the relevant details of the project proponent.

Table 1-1 – Details of Project Proponent

Proponent:	**Glencore**
Contact Person:	Tebogo Chauke
Postal Address	PO Box 2131 Rustenburg 0300
Telephone:	+27 13 643 4231
Email:	Tebogo.Chauke@glencore.co.za

1.3 Details of the Environmental Assessment Practitioner

WSP has been appointed in the role of Independent EAP to undertake the BA processes for the proposed Project. This Environmental Management Programme (EMPr) was compiled as part of the BA process and must be read in conjunction with the Basic Assessment Report (BAR) in support of the EA application. The EAP declaration of interest and undertaking is included in **Appendix A**. **Table 1-2** details the relevant contact details of the EAP.

Table 1-2 – Details of the EAP

EAP:	**WSP Group Africa (Pty) Ltd**
Contact Person:	Rob Rowles
Physical Address:	1st Floor, Pharos House, 70 Buckingham Terrace, Westville, 3629, South Africa
Postal Address:	As above
Telephone:	+27 31 240 8832
Fax:	N/A
Email:	Rob.Rowles@wsp.com
EAP Qualifications:	MSc Environmental Management
EAPASA Registration Number:	EAPASA (2022/5395)

1.4 Competent Authority

The Competent Authority is the Department of Agriculture, Rural Development, Land and Environmental Affairs (DARDLEA), Nkangala District.

Table 1-3 below provides the relevant details of the competent authority on the Project.

Table 1-3 – Competent Authority

Aspect	**Competent Authority**	**Contact Details**
Competent Authority: Environmental Authorisation	DARDLEA - Nkangala	Charity Mthimunye CNMthimunye@mpg.gov.za Rosina Masango ms.r.masango@gmail.com

1.5 Purpose of the Environmental management Programme

An EMPr is defined as “an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented or mitigated, and that the positive benefits of the projects are enhanced.”

This EMPr has been compiled in accordance with Appendix 4 of GNR 982, in compliance with section 24N of NEMA, with the purpose of ensuring that negative impacts are reduced, and positive effects are enhanced through a process of continual improvement, during the construction, and operational phases of the proposed project.

To facilitate compliance to the EMPr by appointed contractors and sub-contractors, it is required that all onsite personnel are aware of the requirements of the EMPr.

Further to the above, appointed contractors and sub-contractors will also be required to comply with all relevant legislation and standards.

A hard copy of the EMPr must always be in the site office and made available to officials at request.

1.5.1 EMPr Objectives

The EMPr has the following objectives:

- Identify mitigation measures and environmental specifications which are required to be implemented for the planning, construction and rehabilitation, operation, and decommissioning phases of the project in order to manage and minimise the extent of potential environmental impacts associated with the proposed project;
- Ensure that all the phases of the proposed project do not result in undue or reasonably avoidable adverse environmental impacts, and ensure that any potential environmental benefits are enhanced;
- Identify entities responsible for the implementation of the measures and outline functions and responsibilities;
- Create management structures that address the concerns and complaints of interested and affected parties (I&APs) with regards to the proposed project;
- Propose mechanisms and frequency for monitoring compliance, and preventing long-term or permanent environmental degradation; Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Train onsite personnel with regard to their environmental obligations; and
- Facilitate appropriate and proactive responses to unforeseen events or changes in project implementation that was not considered in the BA process.

1.5.2 Environmental Objectives and Targets

To facilitate compliance to the EMPr, GGV must comply with all relevant legislation and standards and make all personnel aware of the requirements of the EMPr.

It is recommended that environmental objectives (as outlined in this document) be emphasised as minimum requirements. Objectives include:

- Encourage good management practices through planning and commitment to environmental issues; and
- Provide rational and practical environmental guidelines to:
    - Minimise disturbance of the natural environment;
    - Ensure surface and groundwater resource protection;
    - Prevent or minimise all forms of pollution;
    - Protect indigenous flora and fauna;
    - Prevent soil erosion;
    - Promote sustainable use of resources;
    - Adopt the best practical means available to prevent or minimise adverse environmental impacts;
    - Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;

- Promote the reduction, reuse, recycling and recovery of waste;
- Describe all monitoring procedures required to identify impacts on the environment;
- Define how the management of the environment is reported and performance evaluated; and
- Train onsite personnel with regard to their environmental obligations.

1.5.3 Applicable Documentation

The following documents are to be read in conjunction with the EMPr:

- BAR for the Proposed GGV Wetland Rehabilitation Project;
- Environmental Authorisation (EA) issued by the DARDLEA in terms of the NEMA, should EA be granted.

1.6 Statement of Independence

Neither WSP nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any business, financial, personal or other interest that could be reasonably regarded as being capable of affecting their independence. WSP has no beneficial interest in the outcome of the assessment.

1.7 Environmental Management Programme Structure

Table 1-4 cross-references the sections within the EMPr with the legislated requirements as per Appendix 4 of GNR 982 of 2014.

Table 1-4 - Legislation Requirements as detailed in Appendix 4 of GNR 326

APPENDIX 4	LEGISLATED REQUIREMENTS AS DETAILED IN APPENDIX 4 OF GNR 326	RELEVANT REPORT SECTION
(a)	details of-	
	(i) the EAP who prepared the EMPr; and	**Section 1.3**
	(ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	**Appendix A**
(b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	**Section 1.5**
(c)	a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that any areas that should be avoided, including buffers;	**Appendix C**
(d)	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	**Section 2**
	(i) planning and design;	
	(ii) pre-construction activities;	
	(iii) construction activities;	
	(iv) rehabilitation of the environment after construction and where applicable post closure; and	
	(v) where relevant, operation activities;	

APPENDIX 4	LEGISLATED REQUIREMENTS AS DETAILED IN APPENDIX 4 OF GNR 326	RELEVANT REPORT SECTION
(f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to -	**Section 6**
	(i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
	(ii) comply with any prescribed environmental management standards or practices;	
	(iii) comply with any applicable provisions of the Act regarding closure, where applicable; and	
	(iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable	
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	**Section 5**
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	**Section 5**
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	**Section 5 / Section 6**
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	**Section 6**
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	**Section 5**
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations	**Section 5 / Section 6**
(m)	an environmental awareness plan describing the manner in which-	**Section 5.2**
	(i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
	(ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	any specific information that may be required by the competent authority	N/A

2 PROJECT DESCRIPTION

This section provides a description of the location of the project site location and a summary of the project details. The descriptions encompass the activities to be done during the construction, operational and decommissioning (should it be decided that the proposed project will be decommissioned) phases, as well as the consideration for the needs and desirability of the project in accordance with Appendix 3 of GNR 326.

2.1 Project Location

The GGV Wetland Rehabilitation Project is located within The Lakenvlei Protected Area within Belfast, Wards 4&6 of eMakhazeni Local Municipality, Nkangala District Municipality (**Figure 2-1**).

The proposed project is located in 7 of 8 wetland clusters within the greater Lakenvlei Protected area. These wetland clusters are located on 7 privately owned farms. The coordinates of the planned wetland rehabilitation initiatives are provided in Appendix D.

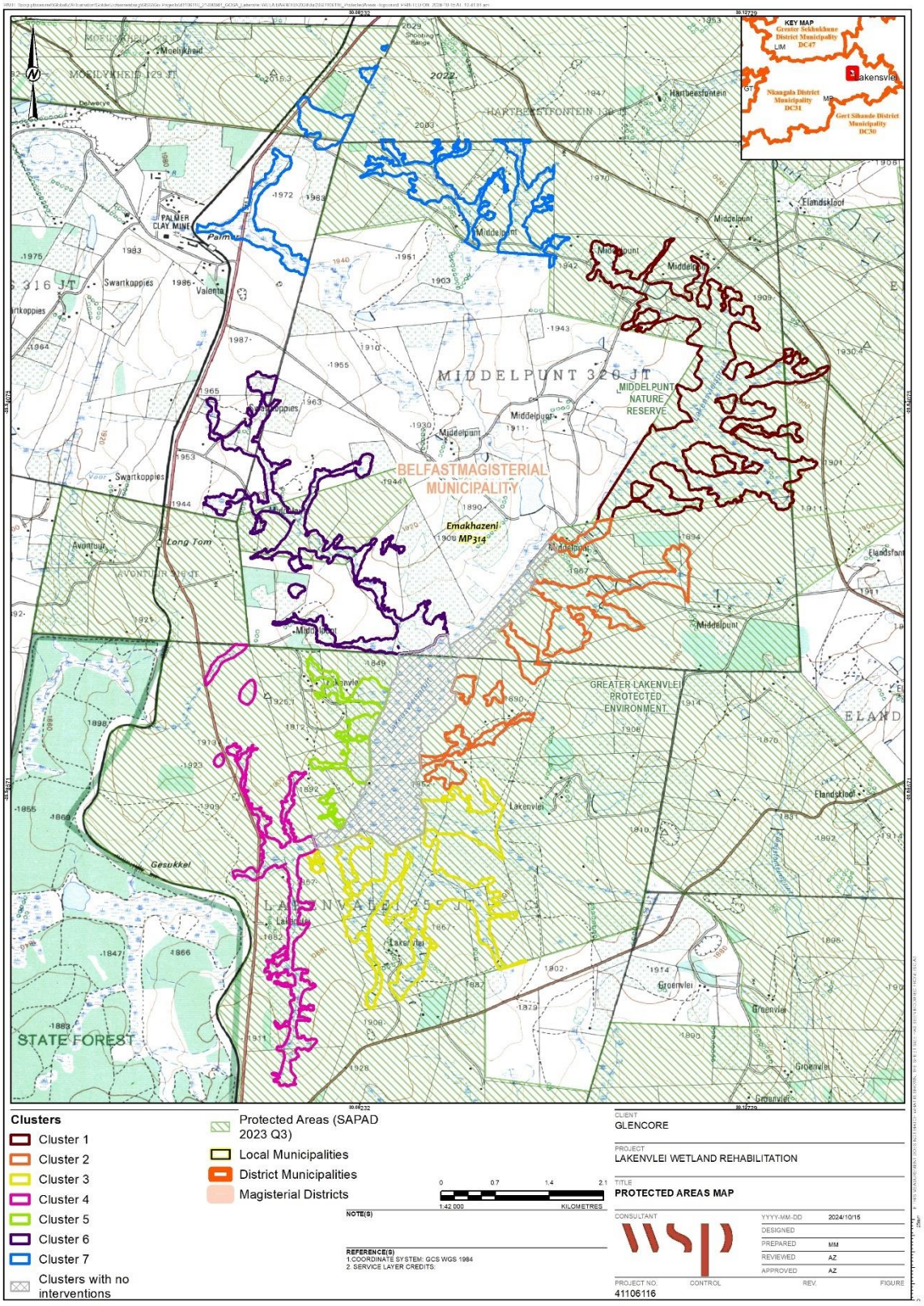


Figure 2-1 - Location of the GGV Wetland Rehabilitation Project

Appendix C provides individually mapped Clusters that show where each proposed rehabilitation initiative will be undertaken (section 3.6 of the BAR).

2.2 The Rehabilitation initiatives

The main objective of the GGV wetland offset strategy is to help improve the Present Ecological Status (PES) in all the wetland Clusters within the GLPE through rehabilitation and management initiatives. One-hundred and sixty-two (162) rehabilitation initiatives have been proposed for the project area for Phase 2. These rehabilitation structures associated with Phase 2, are planned for Clusters 2-7.

Cluster 8 is the biggest and most ecologically sensitive wetland cluster. No rehabilitation measures have been proposed for Cluster 8, as Clusters 1-7 feed into Cluster 8. Improving the PES of Clusters 1-7 is anticipated to positively impact the PES of Cluster 8.

The rehabilitation initiatives proposed for GLPE that require environmental authorisation include:

- Maintaining existing wetland rehabilitation structures already in place (44 x structures). Some of the existing structures in the wetlands require repair and maintenance, some additional structural construction, and others no intervention at all. Forty-four (44) existing structures have been identified for maintenance and repair work,
- Repairing and formalising damaged spillways. Seventeen (17) spillways have been identified for repair and upgrade,
- Formalising existing wetland crossings/access routes. Twenty (20) crossings within the wetlands have been identified for formalising/upgrade,
- Stabilizing headcuts. Six (6) headcuts have been identified for stabilising,
- Constructing new wetland rehabilitation structures (dongalocks) in strategic locations within the wetlands. Five (5) single-sheet dongalock, sixty (60) double-sheet dongalock and two (2) triple-cascading dongalock systems have been proposed,
- Erecting bird-friendly fences to restrict future and further agricultural infringement in the wetlands. Seven (7) areas have been identified for fencing. This activity does not require EA, and
- Removing heavy alien invasive vegetated areas within the GLPE area. Eight areas (up to 97.78ha) of alien invasive vegetation have been identified for clearing from within the wetland areas. This activity does not require EA.

The larger structures and instream rehabilitation activity planned for clusters 2, 3, 4, 5, 6 and 7 trigger the need for a Water Use Licence under the ambits of a General Authorisation (for obstructing and diverting flow) in terms of WULA Regulations GN R 267 and environmental authorisation (for infill and removal of more than 10m^3 of material within a watercourse and the clearance o^f more than 300m^2 of indigenous vegetation within a protected ecosystem type) in terms of the EIA Regulations GN R.324 to GN R.327 as amended, published under the National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) (NEMA). Table 2-1 presents the activities and associated clusters that require EA.

Table 2-1 - Activities that require Environmental Authorisation

Location	Activity	NEMA Listed activity	Farm
Cluster 1	Removal of 20.06ha of alien vegetation		Portion 15 of Middlepunt 320 JT
Cluster 2	Install 2 x double donga lock structures. Clearing Approx 8.75m^2 within the proposed structure footprints. Infill approx. 4.3m^3 within wetland	LN1, Activity 12 LN1, Activity 19	Lakenvlei 355 JT, Portions 6 Portion 0, and 19 of Middlepunt 320 JT
Cluster 3	The formalisation of 7 x spillways, Stabilize 1 x headcut Install 3 x double dongalock structures, Infill – 5 628m^3 within wetland, Indigenous vegetation "clearance" – 879m^2 within the proposed structure footprints.	LN1, Activity 12 LN1, Activity 19 LN 3, Activity 12	Lakenvlei 355 JT, Portions 6
	Remove 71.37 ha of alien vegetation	LN3, Activity 19	
Cluster 4	Install 25 new dongalock structures, Repair 36 existing rehabilitation structures, Upgrade/formalise 6 road crossings, Upgrade 3 spillways Construction footprint – 665m^2 of "structure" within wetland and clearance of indigenous vegetation. Infill – 87.33m^3 within wetland	LN1, Activity 12 LN1, Activity 19 LN 3, Activity 12 LN 3 Activity 14	Lakenvlei 355 JT, Portions 11
	Removal of 6.35ha of alien vegetation	LN3, Activity 19	
Cluster 5	Install 23 new dongalock structures, Existing Structure maintenance/ repair, Upgrade 2 spillways, Upgrade/formalise 6 road crossings Infill of 243.13m^3 within wetland Indigenous vegetation "clearance" – 923.5m^2	LN1, Activity 19 LN1, Activity 12 LN 3 Activity 14	Lakenvlei 355, Portion 4
Cluster 6	Installing one dongalock structure Repairing one dam wall Upgrading 2 wetland road crossings, Infill of 206.2m^3 within wetland Indigenous vegetation "clearance" – 370m^3	LN1, Activity 19 LN1, Activity 12	Middelpunt 320 JT, Portions 3, 11, 18, 19 Zwartkoppies 316 JT, Portions 7
Cluster 7	Installing 16 new dongalock structures, Repairing 2 x spillways, Installing 2 x headcuts, Formalising 6 x Farm Tracks. Infill of 969.8m^3 within wetland Removal of 945m^2 of indigenous vegetation within the proposed structure footprints.	LN3, Activity 12 and 14	Zwartkoppies 316 JT, Portions 9 – no new structures Middelpunt 320 JT, Potions 7, 17, 2
Totals	The cumulative area of indigenous vegetation to be cleared – 3971.75m^2 /0.39ha Cumulative infill in the watercourse/wetland – 7192.56m^3	LN1, Activity 12 LN1, Activity 19 LN3, Activity 12 LN 3 Activity 14	

The coordinates of the proposed structures are provided in Appendix D.

2.3 Proposed Implementation Plan

2.3.1 Construction Phases

GGV plan to implement this rehabilitation plan in a phased approach. The majority of the dongalock installations will take place in the first two years (2025-2026), thereafter the other interventions will be phased in, cluster by cluster. Table 2-2 presents the proposed implementation schedule.

Table 2-2 – Proposed implementation schedule

CLUSTER	Dongalock Structures	Other Measures
CLUSTER 1	NA	NA
CLUSTER 2	2025-2026	2028 - 2029
CLUSTER 3	2025-2026	2028 - 2029
CLUSTER 4	2025-2026	2026 -2029
CLUSTER 5	2025-2026	2029-2030
CLUSTER 6	2025-2026	2030-2031
CLUSTER 7	2025-2026	2025-2027

2.3.2 Construction Phase

The construction process will follow “best practice” methods and techniques. Key activities associated with the construction phase are described in Table 2-3.

Table 2-3 – Construction Activities

ACTIVITY	DESCRIPTION
Establishment and access	Access to the proposed project will be via existing farm roads. Contractors will set up the laydown areas within designated areas on the farms. No new roads or ad-hoc access routes may be established in the wetland areas.
Establishment of a laydown area on site	Construction materials, machinery and equipment will be kept in designated laydown areas on the farms. All materials used for the rehabilitation works must be stored in the laydown areas, not within the wetland areas. The laydown areas will limit potential environmental impacts associated with the construction phase by limiting the extent of the construction activities to one designated area in a “non-sensitive area”..
Construction Activities	All construction activities will take place within the wetland areas. The contractor must try to keep the “construction footprint” as small as possible, limiting clearing activity and soil disturbance, and the time taken in each wetland site.
Rehabilitation	Once all construction is completed on site and all equipment and machinery has been removed from the site, the site will be rehabilitated.

2.3.3 Operational Phase

During operation, the key activities will include inspection and maintenance of the erected structures. The wetland sites will be inspected and managed for alien vegetation encroachment, quarterly.

2.3.4 Decommissioning Phase

The proposed wetland rehabilitation structures are permanent features so no decommissioning activity is planned.

2.4 Need and Desirability of the Project

The proposed project has been motivated through an offset commitment. GGV has an obligation to offset the loss of 584ha of wetland. The protected Lakenvlei wetland clusters is comprised of 1131ha of delineated wetland in a broader 9000ha boundary. The implementation of the proposed project seeks to improve the wetland and systems Present Ecological Status (PES). Phase 1 is already implemented, and phase 2 requires EA to construct the larger structures within the protected area.

Improving the PES of the Lakenvlei wetlands has both socio-economic and ecological benefits. If successfully implemented, the protected Lakenvlei wetlands will function at a higher ecological level, affording greater opportunities for the protected species living within the system to thrive. This has knock-on effects for eco-tourism and conservation in this area.

3 FINDINGS OF THE IMPACT ASSESSMENT

A summary of the identified impacts and corresponding significance ratings for the proposed project is provided in **Table 3-1** below.

Table 3-1 – Impact Summary Table

ASPECT	IMPACT	OUTCOME	Significance pre-Mitigation	Significance post- Mitigation
CONSTRUCTION PHASE				
Wetlands				
Wetland habitat	Disturbance of wetland habitat	Loss of biodiversity	Low	Very Low
		Loss of wetland habitat		
		Disturbance of the vegetation communities		
		Increased sediment entry to downstream systems		
		Contamination of water bodies by construction		

ASPECT	IMPACT	OUTCOME	Significance pre-Mitigation	Significance post- Mitigation
		materials/vehicles (hydrocarbons etc)		
Wetland hydrology	Interruption of wetland hydrology	Disrupted natural flow regimes	Low	Very Low
Soil Erosion	Wetland soil erosion	Reduction in natural surface absorption	High	Very Low
Alien Invasive Species	Spread of AIS in the wetlands	Loss of wetland vegetation	Moderate	Low
Water Quality	Water Quality Deterioration	Vegetation removal	Moderate	Very Low
		Increased risk of erosion and sediment transport		
		contaminants from machinery and construction materials		
Fauna				
Biodiversity Loss	Presence of people and machinery in the wetland areas	Disturbance of resident biodiversity – endangered species	Moderate	Very Low
Terrestrial Fauna	Localised loss and disturbance of wetland habitat	Constructing the proposed interventions	High	Low
	Injury, mortality and disturbance of fauna	During earth-moving activities, Vehicle collisions when accessing the sites, Hunting and snaring by construction workers	Medium	Very Low
	Loss of fauna species of conservation concern	Constructing the proposed interventions	Very high	Low
Flora /Vegetation				
Vegetation	Clearing within the project footprints	Loss of Indigenous vegetation	High	Low
		Loss of Flora Species of conservation concern	Very High	Very low
		Spread of AIS	High	Very Low

ASPECT	IMPACT	OUTCOME	Significance pre-Mitigation	Significance post- Mitigation
	Disturbance to the project footprints	Soil erosion and sedimentation	High	Very Low
Surface Water				
Water Quality	Increased sediment loads to the system	Upgrade of road crossings that are currently just gravel roads through the riverbed Formalisation of farm dam spillways Instream Dongalock improvements. Alien vegetation removal.	Low	Positive
Aquatic Ecology				
Cluster 4	Fencing springs	Increased sediment load and loss of aquatic habitat.	Very Low	Very Low
	Removal of alien vegetation	River water quality modifications; Increased sediment load and loss of habitat; Erosion; increased flows due to bare surfaces following vegetation removal	Low	Very Low
	Development of required service infrastructure on the site	Erosion and sedimentation in the aquatic environment.	Low	Very Low
	Construction of project components	Erosion and sedimentation in the aquatic environment.	Low	Very Low
Cluster 6 and Cluster 7	Installation of dongalocks	Vegetation disturbance; Erosion; Water quality modifications	Very Low	Very Low
	Improve road crossings, Stabilizing dam spillways, Removal of alien vegetation	River water quality modifications; Increased sediment load and loss of habitat; Erosion; increased flows.	Low	Very Low

ASPECT	IMPACT	OUTCOME	Significance pre-Mitigation	Significance post- Mitigation
	Fencing off springs	Increased sediment load and loss of habitat	Very Low	Very Low
Hydropedology				
Vegetation clearance and soil disturbance (surface levelling and shaping	Disturbance of soil, resulting in changes in soil water flow regimes	changes in soil water flow regimes.	Moderate	Low
Soil compaction and sealing of soil surface	Covering of soil, preventing precipitation to recharge soil	Resulting in change in the soil profile water flow regimes.	Moderate	Low
	Localized increased overall overland flow	Increase in overall overland flow	Moderate	Low
Palaeontology				
Earth-moving activity for constructing the proposed interventions	Exposing and damaging fossils	Damaging a palaeontological resource	Low	Very-Low
Housekeeping during the construction phase				
Waste management	Construction waste in left in the wetlands	Leaving pollution in the natural environment	High	Very low
	Concrete management	Wet concrete contaminating the water systems	High	Low
	Material sourcing	Utilising natural materials for construction activity (Rocks and sand)	High	Very Low
Socio-Economic				
Socio-Economic	Presence of contractors working on the properties for the duration of the Construction phase.	Increase in localised crime	High	Low
Traffic				
Traffic	Increase of traffic on local and	Increase in road kills.	Low	Very Low

ASPECT	IMPACT	OUTCOME	Significance pre-Mitigation	Significance post- Mitigation
	national road routes.	Increased deterioration of local farm roads.		
OPERATIONAL PHASE				
Wetlands – None negative impacts anticipated. The rehabilitation interventions are expected to maintain and/or improve the functionality of the wetlands through the deactivation of old farm drains, restoration of more natural diffuse wetland flow regimes through the removal/lowering of farm dams and spillway formalisation, as well as increasing subsurface water availability and soil stability through the removal of alien vegetation in the catchment (WSP, 2024).				
Wetland Functionality - Improved Wetland Health (PES)	Proposed rehabilitation initiates	Restore natural flow	Moderate	High (Positive)
		Restoration of natural diffuse wetland flow regimes	Moderate	Moderate (Positive)
		Increased subsurface water availability and soil stability	Moderate	Moderate (Positive)
Surface Water – No operational impacts are anticipated				
Terrestrial Fauna – No operation phases are anticipated				
Flora				
Establishment and spread of alien invasive species	Disturbed project footprints	AIS Colonisation	Low	Very Low
Soil erosion and sedimentation		Smothering effect on indigenous vegetation	Medium	Very low
Aquatic Ecology				
Cluster 4 Cluster 6	Fenced Springs, Alien vegetation removal, Improved road crossings	Increased flows; improve water quality	High (Positive)	High (Positive)
Cumulative Impacts				
Wetlands				
Terrestrial Fauna (SCC)	Installed proposed wetland rehabilitation measures	Improved wetland integrity and functioning	Medium (Positive)	High (Positive)
Terrestrial Flora	Installed proposed wetland rehabilitation measures	Improved wetland integrity and functioning	Medium (Positive)	High (Positive)

4 GOVERNANCE FRAMEWORK

4.1 National Legal and Regulatory Framework

The South African regulatory framework establishes well-defined requirements and standards for environmental and social management of infrastructure developments. Different authorities at both national and regional levels carry out environmental protection functions. The applicable legislation and policies are shown in Table 4-1.

Table 4-1 – Applicable National Legislation

Applicable Legislation and Policy	Description of Legislation
The Constitution of South Africa (No. 108 of 1996)	The Constitution cannot manage environmental resources as a stand-alone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld in an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.
National Environmental Management Act (No. 107 of 1998) **The DARDLEA is the competent District Authority**	In terms of Section 24(2) of the NEMA, the Minister may identify activities, which may not commence without prior authorisation. The Minister thus published GNR 983 (as amended) (Listing Notice 1), GNR 984 (as amended) (Listing Notice 2) and GNR 985 (as amended) (Listing Notice 3) listing activities that may not commence prior to authorisation. The regulations outlining the procedures required for authorisation are published in the EIA Regulations of 2014 (GNR 982) (as amended). Listing Notice 1 identifies activities that require a BA process to be undertaken, in terms of the EIA Regulations, prior to the commencement of that activity. Listing Notice 2 identifies activities that require an S&EIR process to be undertaken, in terms of the EIA Regulations, prior to the commencement of that activity. Listing Notice 3 identifies activities within specific areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to the commencement of that activity. The EAP and DARDLEA agree that LN1, Activity 12 and 19 and LN3, Activity 12 require authorisation: A BA process must be followed. An EA is required and will be applied for through DARDLEA.
Listing Notice 1: GNR 983	***Activity 12*** *– The development of—* *dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or* *infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs—* *(a) within a watercourse;*

Applicable Legislation and Policy	Description of Legislation
	Description: *Some of the dongalock structures may result in more than 100m^2 of water surface area within the wetland.* *Some of the existing structures that will be repaired or replaced have a footprint of more than 100m^2 within the wetland.* *The total cumulative construction footprint area will be approximately 0.39ha (39 m^2).*
	Activity 19** – The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* ***The larger wetland rehabilitation structures (dongalock structures), dam wall repair, headcut repair and road crossing infrastructure will result in more than 10m^3 of material being removed and infilled within the wetlands. ***The total anticipated infill volumes within the wetlands will be 7192.56m^3***
Listing Notice 3: GNR 985	***Activity 12 –** The clearance of an area of 300 square metres or more of Indigenous vegetation* *f. Mpumalanga* *Within any critically endangered or endangered ecosystem Type;* *Within critical biodiversity areas identified in bioregional plans; or* *On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA.* ***Approximately 0.39ha (3971m^2) of indigenous vegetation will be "cleared" within the project footprint for the rehabilitation sites.*** ***The GLPA is located within an endangered ecosystem type (Dullstroom Plateau grasslands EN).***
	***Activity 14 –** The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *(ii) infrastructure or structures with a physical footprint of 10 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *f. Mpumalanga* *i. Outside urban areas:*

Applicable Legislation and Policy	Description of Legislation
	(aa) A protected area identified in terms of NEMPAA, excluding conservancies; ***Some of the double-line dongalock structures and drop structures will result in more than 10m² of water surface area within the wetland.*** ***Some of the existing structures that will be repaired or replaced have a footprint of more than 10m² within the wetland.*** ***The total cumulative construction footprint area will be approximately 0.39ha (3971 m²) within the wetland areas, within the GLPA.***
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) was promulgated in June 2004 within the framework of NEMA to provide for the management and conservation of national biodiversity. The NEMBA's primary aims are for the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from bioprospecting involving indigenous biological resources. In addition, the NEMBA provides for the establishment and functions of a South African National Biodiversity Institute (SANBI). SANBI was established by the NEMBA with the primary purpose of reporting on the status of the country's biodiversity and conservation status of all listed threatened or protected species and ecosystems. The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) Regulations with regards to alien and invasive species have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014. Specific management measures for the control of alien and invasive plants will be included in the Environmental Management Programme (EMPr). The proposed Project is located within an ESA and is located in the Endangered *Dullstroom Plateau grasslands* as mapped by the KZN Biodiversity Sector Plan (2016). Therefore, the clearance of more than 300m² of indigenous vegetation within this ecosystem and vegetation type requires EA. Note: no protected species were observed within the project footprint that will require clearing or removal.
National Environmental Management Protected Areas Act (No. 57 of 2003)	The purpose of the National Environmental Management Protected Areas Act (No. 57 of 2003) (NEMPAA) is to, *inter alia*, provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. To this end, it provides for the declaration and management of various types of protected areas. Section 50(5) of NEMPAA states that "no development,

Applicable Legislation and Policy	Description of Legislation
	construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority." According to the National Protected Areas Expansion Strategy (NPAES) (2016) dataset, the Project does not intersect with a priority area as defined within the National Environmental Management Protected Areas Act. The GLPE is however, a formally protected area that has been classified and is planned to expand in the future. A significant portion of the study area lies within the Greater Lakenvlei Protected Environment, with additional protection afforded to the north-eastern section as a declared nature reserve (i.e., Middelpunt Nature reserve) and Ramsar site. Areas outside this protected environment are also prioritised for protected area expansion, under both national and provincial protected area expansion strategies.
Occupational Health and Safety Act (No. 85 of 1993)	The National Occupational Health and Safety Act (No. 85 of 1993) (OHSA) and the relevant regulations under the Act are applicable to the proposed project. This includes the Construction Regulations promulgated in 2014 under Section 43 of the Act. Adherence to South Africa's OHSA and its relevant Regulations is essential.
National Water Act, 1998 (Act No. 36 of 1998) [NWA]	The NWA provides for the sustainable and equitable use and protection of water resources. It is founded on the principle that the National Government has overall responsibility for and authority over water resource management, including the equitable allocation and beneficial use of water in the public interest, and that a person can only be entitled to use water if the use is permissible under the NWA. The construction of any development that will divert or obstruct flow within a watercourse/ wetland or 500m from a wetland requires licencing through the National Water Act, 1998 (Act No. 36 of 1998) [NWA], under Section 21 C and I. The proposed project will obstruct and divert flow within a watercourse and therefore require a General Authorisation under the NWA. A water use licence application through DWS is being applied for concurrently with this BA Process.
Nkangala Integrated Development Plan (2021/22)	The main purpose of the Integrated Development Plan (IDP) is to foster more appropriate service delivery by providing the framework for economic and social development within the municipality. In doing so it contributes towards eradicating the development legacy of the past, operationalises the notion of developmental local government and foster a culture of co-operative governance amongst the three spheres. Integrated development planning is a process whereby municipalities prepare strategic development plans for a five-year period. IDPs are the main platform through which sustainable

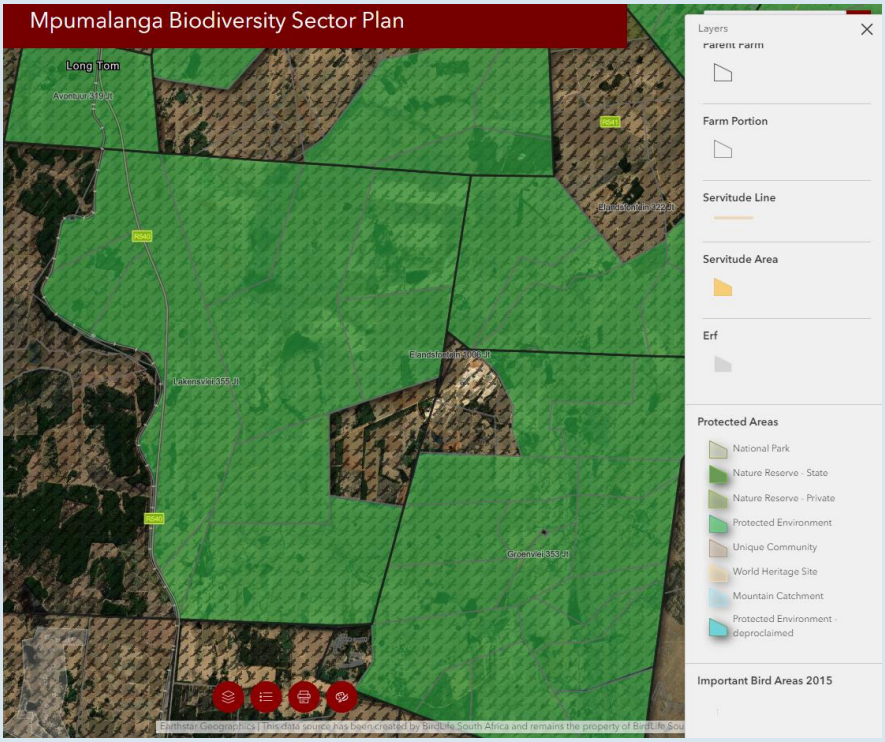
Applicable Legislation and Policy	Description of Legislation
	provision of service delivery could be achieved. They intend to promote co-ordination between local, provincial and national government. Once adopted by Council, these plans should inform planning, decision making, budgeting, land management, promotion of local economic development, and institutional transformation in a consultative systematic and strategic manner. Further protecting the District's natural resources and protected areas is in line with the Nkangala IDP.

4.2 Provincial and Municipal Legal and Regulatory Framework

The following table outlines the applicable provincial legislative framework for this project.

Table 4-2 – Provincial Plans

Applicable Plan	Description of Plan
Mpumalanga's Biodiversity Sector Plan 2022	The Mpumalanga Biodiversity Sector Plan (MBSP) is such a spatial tool which serves to provide such information to end-users and guide decision making to ensure that the biodiversity objectives are achieved. Critical Biodiversity Areas (CBAs) are areas required to meet biodiversity targets for ecosystems, species and ecological processes, as identified in a systematic biodiversity plan – and may be terrestrial or aquatic. The primary purpose of a map of CBAs is to guide decision-making about where best to locate development. It should inform land-use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity. It is the biodiversity sector's input into multi-sectoral planning and decision-making processes. The proposed Project is located within an ESA and CBA, Important Bird area, MBSP Terrestrial CBA, Freshwater CBA and is located in the Endangered *Dullstroom Plateau grasslands* as mapped by SANBI (2006). The study area is primarily designated as a Protected Area under the MBSP (2022), and contains numerous Critical Biodiversity Areas (CBAs) that were designated as such based-on attributes such as the confirmed presence or potential presence of several flora and fauna SCC, and various essential ecological processes

Applicable Plan	Description of Plan
	 **Figure 4-1 - MBSP Lakenvlei Area (MBSP 2022)**
eMakhazeni Municipality Integrated Development Plan	The Mpumalanga Biodiversity Conservation Plan identifies 33.1 % of the eMakhazeni Local Municipal area as contributing towards the biodiversity conservation targets for the province. The EMF outlines geographic areas in terms of environmental attributes, such as water resources, cultural and heritage resources and agricultural potential; assesses the current status quo against the vision or desired state for the ELM; and identifies environmental control zones to guide land use planning and development in the municipal jurisdiction. This project is in line with the municipal targets for environmental conservation and protection as outlined in the IDP (eMakhazeni, 2022).
Mpumalanga Heritage Authority	The Mpumalanga Heritage Authority. The aim of the of the Institute and Act is to identify, conserve, protect, manage and administer heritage resources, whilst researching and generating relevant knowledge to provide solutions within the field of heritage in the province. Due to the existing facility being transformed and zoned as industry, no application for a heritage permit is required

5 MANAGEMENT PROCEDURES AND ADMINISTRATIVE REQUIREMENTS

5.1 Organisational Structure and Responsibility

Formal responsibilities are necessary to ensure that key management measures/procedures are executed. The holder of the EA, together with the Contractor, will be responsible for the overall control and management of the project sites during the construction and rehabilitation phases of the project. GGV's responsibilities will include the following:

- Appointing an environmental control officer (ECO) for the duration of the Construction Phase;
- Being fully familiar with the BA Report, EA conditions and the EMPr;
- The overall implementation of the EMPr;
- Ensuring compliance, by all parties;
- Implementing corrective and preventive actions, where required;
- Preventing pollution and actions that will harm or may cause harm to the environment;
- Ensuring the activity does not commence within 30 days of the EA being issued;
- Notifying DARDLEA within 30 days that construction activity will commence;
- Notifying DARDLEA in writing if any condition in the EA cannot be or is not adhered to; and
- Notifying DARDLEA 14 days prior to commencement of the operational phase.

Specific roles and responsibilities for the construction phase of this project are as defined in **Table 5-1**.

Table 5-1 – Roles and Responsibilities

RESPONSIBLE PERSON	RESPONSIBILITIES
Project Manager (GGV)	▪ Ensure that the relevant contractor/s are aware of all specifications, legal constraints pertaining to the project specifically with regards to the environmental management protocol on site. ▪ Ensure that all stipulations within the EMPr and conditions of the EA are communicated and adhered to by the contractor(s). ▪ Monitor the implementation of the EMPr and conditions of the EA throughout the project by means of site inspections and meetings. This will be documented as part of the site meeting minutes. ▪ Be fully conversant with the BAR for the project, the conditions of EA and all relevant environmental legislation.
Site Manager (Contractor)	▪ Be fully conversant with the BAR, the conditions of the EA and the EMPr. ▪ Approve method statements. ▪ Provide support to the ECO. ▪ Be fully conversant with all relevant environmental legislation and ensure compliance thereof. ▪ Have overall responsibility for the implementation of the EMPr and conditions of the EA. ▪ Liaise with the Project Manager or his delegate, the ECO and others on matters concerning the environment. ▪ Prevent actions that will harm or may cause harm to the environment, and take steps to prevent pollution and unnecessary degradation onsite. ▪ Confine construction activities to demarcated areas.

RESPONSIBLE PERSON	RESPONSIBILITIES
	▪ To communicate with each relevant landowner prior to construction activity to agree on laydown areas, site access routes, and correct protocol when present on the private land (closing farm gates etc.)
Environmental Officer (EO)	The EO is responsible for managing the day-to-day onsite implementation of the EMPr. In addition, the EO must act as liaison and advisor on all environmental and related issues, seek advice from the ECO when necessary, and ensure that any complaints received from I&APs are duly processed and addressed and that conflicts are resolved in an acceptable manner and timely manner. The EO's responsibilities include: ▪ Monitoring, on a daily basis, environmental specifications onsite and compliance with the conditions of the EA, environmental legislation and EMPr. ▪ Keeping a register of compliance / non-compliance with the environmental specifications. ▪ Identifying and assessing previously unforeseen, actual or potential impacts on the environment. ▪ Advising the Contractor on the rectification of any pollution, contamination or damage to the construction site, rights of way and adjacent land. ▪ Attending site meetings (scheduled and ad hoc). ▪ Presenting environmental awareness training to all staff, Contractors and Sub contractors, and monitoring the environmental awareness training for all new personnel onsite, as undertaken by the Contractor. ▪ Ensuring that a copy of the EA and the latest version of the EMPr are available onsite at all times, and maintaining a records-keeping system of all compliance and environmental documentation. ▪ Ensuring that the Contractor is made aware of all applicable changes to the EMPr that are approved by DARDLEA ▪ Assisting the Contractor in drafting environmental method statements and/or the Environmental Policy where such knowledge/expertise is lacking. ▪ Undertaking daily environmental monitoring to ensure the Contractor's activities do not impact upon the receiving environment. Such monitoring shall include dust, noise and water monitoring. ▪ Maintaining the following onsite: • A weekly site diary. • A non-conformance register (NCR). • An I&AP communications register, and • A register of audits. • Records of all communication received in relation to compliance actions. The EO will remain employed until all rehabilitation measures, as required for implementation due to construction damage, are completed and the site is operational.
ECO (Independent)	A suitably qualified independent ECO must be appointed to monitor the project compliance with the EMPr and conditions of the EA monthly. Responsibilities of the ECO include: ▪ Be fully conversant with the BAR, the conditions of the EA and the EMPr. ▪ Be fully conversant with all relevant environmental legislation and ensure compliance thereof. ▪ Approve method statements. ▪ Remain employed until the completion of the construction activities. ▪ Report to the Project Manager, including all findings identified onsite. In addition, the ECO will:

Responsible Person	Responsibilities
	▪ Undertake monthly inspections of the site and surrounding areas during construction in order to audit compliance with the EMPr and conditions of the EA. ▪ Take appropriate action if the specifications contained in the EMPr and conditions of the EA are not followed. ▪ Monitor and verify that environmental impacts are kept to a minimum, as far as possible. ▪ Ensure that activities onsite comply with all relevant environmental legislation.
Contractors, Staff and Service Providers	▪ Complying with GGV's environmental management specifications. ▪ Be conversant with all EMPr and conditions of the EA, and ensure compliance thereto. ▪ Adhering to any environmental instructions issued by the Site Manager/Project Manager on the advice of the ECO.

5.2 Environmental Awareness and Competence

It is important to ensure that all relevant personnel have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and ongoing minimisation of environmental degradation and harm.

To achieve effective environmental management, it is important that employees, contractors (including subcontractors) are aware of the responsibilities in terms of the relevant environmental legislation, the contents of the EMPr and conditions of the EA.

GGV will provide appropriate resources to facilitate social and environmental awareness training during the construction phase of the project. GGV will require that all managers associated with the project adhere to the mitigation/management measures detailed in the EMPr and identify, evaluate, and minimise risks to the social, physical and biophysical environments.

Contractors, and their associated sub-contractors, must demonstrate compliance to mitigation/ management measures included in the EMPr.

The following methodology will be used to implement and ensure environmental and social awareness and competence.

5.2.1 Internal Communication

Internal communication of environmental and social issues to ensure environmental awareness will be achieved by using any combination of the following means:

- Meetings;
- Notice boards;
- Reports;
- Toolbox talks;
- E-mail;
- Telephone; and
- Induction training.

5.2.2 Meetings

The following standard meetings will be held at specific times to ensure that environmental and social awareness; potential problems; complaints etc. are communicated and addressed proactively:

- Safety, Health and Environmental Meetings will be held weekly (during construction) by the relevant personnel, environmental and social issues will form part of the agenda;

Minutes of all meetings must be compiled and kept on file.

5.2.3 Environmental and Social Talk Topics

Monthly environmental and social talk topics will be compiled and distributed to relevant personnel and will be displayed on appropriate notice boards. As a minimum, the following topics must be covered:

- Water Quality;
- Water Use and Consumption;
- Waste Management;
- Fauna and Flora;
- Emergency Procedures;
- Incidents Reporting;
- Heritage Impacts;
- Landowner Etiquette; Speed Limits;
- Health Risks (such as HIV/ Aids and COVID-19);
- Policy awareness; and
- Code of Conduct.

5.2.4 General Communication

Communication to the community, government, landowners, neighbouring farmers, environmental groups, non-government organisations and other stakeholders will be communicated to ensure environmental and social awareness by means of the following:

- E-mail;
- Telephone; and
- Formal meetings.

5.2.5 Training

It is important to ensure that all personnel, contractors and their sub-contractors have the appropriate level of environmental awareness and competence to ensure continued environmental due diligence and on-going minimisation of environmental harm. As a minimum environmental training must include the following:

- Employees must have a basic understanding of the key environmental features of the site and the surrounding environment;
- Employees will be thoroughly familiar with the requirements of the EMPr and the environmental specifications as they apply to the project;
- Employees must undergo training for the operation and maintenance activities associated with project and have a basic knowledge of the potential environmental impacts that could occur and how they can be minimised and mitigated;
- Awareness of any other environmental matters, which are deemed to be necessary by the Environmental Officer; and
- Training must include the environment, health and safety as well as basic HIV/AIDS education.

5.3 Monitoring

The EO will monitor the day-to-day site activities on an ongoing basis and will produce weekly monitoring reports. The external ECO will undertake monthly audits to ensure compliance with the EMPr and conditions of the EA during the construction activities and will report to the Site Manager should any non-compliance be identified, or corrective action deemed necessary.

During the operational phase, GGV will continue to monitor the PES of the wetlands and the effectiveness of the implemented rehabilitation structures as has been taking place for the Phase 1 structures.

5.4 Non-Conformance and Corrective Action

The auditing of the construction and operational activities may identify non-conformances to the EMPr and conditions of the EA. Non-conformances may also be identified through incidents, emergencies or complaints recorded. In order to correct non-conformances, the source must be determined, and corrective actions must be identified and implemented.

5.4.1 Compliance with the EMPr and Conditions of the EA

- A copy of the EMPr and conditions of the EA will be available onsite at all times for the duration of the construction and operational activities;
- All persons employed by GGV or their sub-contractors will abide by the requirements of the EMPr and conditions of the EA;
- Any members of the workforce found to be in breach of any of the specifications contained within the EMPr and conditions of the EA may be ordered by the Site Manager to leave the site. A contractor will not direct a person to undertake any activity which would place them in contravention of the specifications contained within the EMPr and conditions of the EA; and
- Departmental officials will be given access to the property referred to in the BAR and EMPr for the purpose of assessing and/or monitoring compliance with the EMPr and conditions of the EA, at all reasonable times.

5.4.2 Duty of Care

All personnel involved with the construction and operational activities onsite will be responsible for implementing measures to prevent pollution or degradation of the environment from occurring, continuing or recurring. Insofar as such harm to the environment is authorised by law, or cannot reasonably be avoided or stopped, personnel shall minimise and rectify such pollution or degradation of the environment.

5.5 Documentation and Reporting

The following documentation must be kept onsite in order to record compliance with the EMPr and conditions of the EA:

- Record of complaints; and
- Record of emergencies and incidents.

GGV will be required to report on the following:

- Environmental incidents involving contractor/ employees and/or the public;
- Environmental complaints and correspondence received from the public; and
- Incidents that cause harm or may cause harm to the environment.

The above records will form an integral part of the ECO's reports and records thereof maintained for the duration of the project. These records will be kept with the EMPr and conditions of the EA, and will be made available for scrutiny if so requested by the Site Manager or his delegate and the ECO.

The contractor will ensure that the following information is recorded for all environmental complaints/incidents/emergencies:

- Date of complaint/incident/emergency;
- Location of complaint/incident/emergency;
- Nature of complaint/incident/emergency;
- Causes of complaint/incident/emergency;
- Party/parties responsible for causing complaint/incident/emergency;
- Immediate actions undertaken to stop/reduce/contain the causes of the complaint/incident/emergency;
- Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint/incident/emergency;
- Timeframes and the parties responsible for the implementation of the corrective or remedial actions;
- Copies of all correspondence received regarding complaints/incidents/emergency.

5.6 Public Complaints

A signboard must be erected at the entrance to the project site/ farm, informing the public of the construction activities taking place. The signboard must include the following information:

- The name of the contractor; and
- The name and contact details of the site representative to be contacted in the event of emergencies or the location of the complaint registration.

6 SITE SPECIFIC ENVIRONMENTAL CONTROLS

The EMPr contains guidelines, operating procedures, rehabilitation and pollution control requirements which will be binding to the onsite personnel working for, or on behalf of GGV. It is essential that the EMPr be carefully studied, understood, implemented and adhered to at all times.

In instances where the method statements provided by the contractor conflict with the EMPr, such conflicts will be discussed between the Site Manager, ECO and contractor and if unresolved the EMPr will take precedent.

The columns in the structure of the EMPr have been described **Table 6-1** below.

Table 6-1 – Structure of EMPr

COLUMN	DESCRIPTION
Activity/Aspect	Highlights the various activities/aspects associated with the project i.e. the contractors' activities that will interact with the environment.
Environmental Measures and Action Plans	Indicates the actions required to prevent and /or minimise the potential impacts on the environment that are associated with the project.
Responsibility	Indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr. Please note that the Site Manager will have the authority to stop works if/as necessary.
Priority Timeframe	Indicates when the actions for the specific aspect must be implemented and/or monitored.

The following assumptions have been made in the development of the environmental specification in this EMPr:

- An environmental file containing the information/documentation required by this EMPr is to remain onsite and to be made available at the request of the auditor or similar monitoring body; and
- For ease of reference, any person(s) employed to assist in the project i.e. contractors, sub-contractor and permanent and temporary staff, will be collectively referred to as ‘onsite personnel’.

Table 6-2 outlines the EMPr for the proposed project.

Table 6-2 – Environmental Management Programme

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
Construction periods			
Objectives: -To minimise the impacts of the biodiversity in key breeding seasons Compliance mechanisms : -Monitoring and audit reports -Environmental awareness training			
Construction windows	Construction activities must take place between **May and August** inclusive to avoid the White-winged Flufftail breeding season, which will minimise the risk of erosion and sedimentation during rainfall events.	ECO Contractor	Construction
No-Go time periods	High rainfall periods (usually November to March) must be avoided during the construction phase to avoid increased surface runoff from the construction sites to limit erosion and the entering of external material (i.e. contaminants and/or dissolved solids) into associated aquatic systems.	ECO Contractor	Construction
CONTRACTOR LAYDOWN AREA AND SITE ACCESS			
Objectives: — To implement measures to minimise impacts on the environment from the initiation of construction activities through planning, careful site access route selection and implementation of mitigation measures.			

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
Indicator and Compliance Mechanisms: — Health, safety, environmental and community incident and complaints management system register. — Close-out on incidents. — Monitoring and audit reports. — Inductions training and register. — Environmental awareness programme/toolbox talks.			
Project Initiation of Construction Activities	Appoint an ECO to manage and verify compliance with the EA and EMPr.	Project Manager	Construction
	Ensure construction activities remain within the demarcated project footprint.	ECO Contractor	Construction
	Site clearing must be limited to the footprint of the infrastructure requirements.	ECO Contractor Project Manager	Construction
	Provide firefighting measures onsite, such as fire extinguishers, and make personnel aware of fire prevention and firefighting measures.	ECO Contractor	Construction
VEHICLE, EQUIPMENT AND MACHINERY MANAGEMENT			
Objectives: — To implement measures to minimise impacts on the environment from poorly maintained equipment, machinery and vehicles onsite. Indicator and Compliance Mechanisms: — Health, safety, environmental and community incident and complaints management system register. — Close-out on incidents. — Monitoring and audit reports. — Transport route identification. Access to the rehabilitation sites must be agreed upon by the private landowner. — Equipment, machinery and vehicle checklists. — Incident Classification and Reporting Procedure.			
Vehicle Maintenance	No major maintenance activities should occur onsite. All servicing and repair works must take place off-site.	ECO Contractor	Construction Operation

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
Operation of Equipment, Machinery and Vehicles	Adequately maintain equipment, machinery and vehicles so as to: — Reduce the potential for spillages of oil, diesel, fuel or hydraulic fluid. — Ensure roadworthiness. — Reduce emissions.	ECO Contractor	Construction
	Drip trays must be used for decanting of fuel, oil and placed under all parked plant, on site and in the laydown yards. Vehicles bearing open loads of potentially wind-borne materials must be covered or wet down in order to minimise dust entrainment.	Contractor	Construction
FUEL MANAGEMENT			
Objectives: — To ensure the correct storage, handling and disposal of fuels to prevent impacts to the surrounding environment. Indicator and Compliance Mechanisms: — Maintenance records. — Safe disposal certificates (if applicable). — Health, safety, environmental and community incident and complaints management system register. — Waste Management Procedure — Monitoring and audit reports. — Training records.			
Fuel Management	Develop an Incident Classification and Reporting Procedure (if not in place already) for fuel management including storage, handling and spillages.	ECO Contractor	Construction
	All fuel must be stored in impermeable facilities (steel or concrete bunds) in the laydown yards. No accidental spillages must be able to contaminate the soil or watercourses. Drip trays must be used to store fuel on-site near the wetland, at all times. No fuel may be stored temporarily within 32m of the wetlands at any time.	ECO Contractor	Construction
	Keep fuels, oils or other chemicals used outside of the bunded area to a minimum and use suitable secondary containment in the form of drip trays.	ECO Contractor	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
WASTE MANAGEMENT			
Objectives: — To ensure the correct handling, storage, transportation and disposal of general waste and hazardous waste. Indicator and Compliance Mechanisms: — Induction training and records. — Waste Management Procedure. — Health, safety, environmental and community incident and complaints management system register. — Monitoring and audit reports.			
General Waste Management	No waste may be left on site within the working areas in and around the wetlands. All waste (construction and domestic) must be removed from site the same day that is was brought to site. The working areas must maintain a “zero waste” policy on site.	ECO Contractor	Construction
	Train and inform all onsite personnel regarding general waste minimisation, management and disposal.	ECO Contractor	Construction
	Prohibit littering and burning of waste onsite.	ECO Contractor	Construction
	Provide general waste bins around the sites during construction activities in order to prevent littering. The bins must be emptied/ removed from the site on a daily basis for disposal/ storage in the laydown yard before disposal at a registered or licensed disposal facility.	ECO Contractor	Construction
	Retain records of appropriate safety disposal associated with waste removal, transportation and disposal.	Contractor	Construction
	Prohibit the mixing of general waste with hazardous waste. Should general waste be mixed with hazardous waste, it will be considered hazardous waste.	ECO Contractor	Construction
Hazardous Waste Management	Train all contracted staff on best practice protocol for fuel spill management and concrete management.	Contractor	Construction
	Train and inform all onsite personnel regarding hazardous waste minimisation, management and disposal as per the Waste Management Procedure.	ECO Contractor	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
Fuel and dry concrete are the only sources of potential hazardous waste.	Clean areas where hazardous waste spills have occurred and dispose of the hazardous material appropriately. Key personnel must be trained on handling spillages.	ECO Contractor	Construction
	Ensure that waste manifest documentation (as per the Waste Classification and Management Regulations – GNR 634) is prepared and maintained for the generation, transportation and disposal of waste.	Contractor Operator	Construction Operation
SOIL AND LAND MANAGEMENT			
Objectives: — To prevent any disturbance, erosion or contamination of soil and water resources. Indicator and Compliance Mechanisms: — Induction training and records. — Waste Management Procedure.			
Soil and Land Management	Ensure that soil disturbance / handling takes place during the dry season		
	Install erosion prevention measures where required, prior to the onset of construction activities, to prevent flow concentration.	ECO Contractor	Construction
	Any excavated soils should be offloaded at designated stockpile areas situated at least 100 m away from the watercourse.	ECO Contractor	Construction
	Stormwater control systems must be implemented within the site and should be managed and maintained to ensure no contamination of soil reserves.	ECO Contractor	Construction
	Sediment barriers such as silt fences or the placement of hay bales around the lower edge of bare soil areas may be required for larger areas, and active re-vegetation of disturbed areas as soon as possible is required.	ECO Contractor	Construction
	Environmentally friendly barrier systems, such as silt nets or, in severe cases, use trenches downstream from construction sites to limit erosion and possibly trap contaminated runoff from construction.	ECO Contractor	Construction
	Ensure that soils (not designated for development infrastructure) are not compacted during the construction. If compaction occurs, ensure areas are loosened to allow for soil water to access subsoil layers.	ECO Contractor	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
	Machinery must be regularly checked to ensure hydrocarbon leaks (including fuel and hydraulic fluids) are not occurring. Drip trays must be used where necessary. Fuels and oils must be stored on drip trays to prevent accidental spills and soil contamination.	ECO Contractor	Construction
	Construction contractors must be provided portable toilets for the construction phase. The number of toilets to workers should be limited to 1:15.	ECO Contractor	Construction Decommissioning
Topsoil	Topsoil removal, if required, must be limited to the development footprint. Topsoil must be stored separately from subsoil and must be stored in a manner that it can be reused after construction.	ECO Contractor	Construction
WATER MANAGEMENT			
Objectives: — To implement measures to prevent the contamination on surface and groundwater resources. — To prevent erosion. Indicator and Compliance Mechanisms: — Environmental awareness programme/toolbox talks.			
Surface water flow	The upgraded crossings must ensure that surface water flow is not blocked or obstructed.	ECO Contractor	Construction
Surface Water Management	To prevent contamination, no storage and handling of hazardous materials (i.e. diesel or concrete) within any wetland area	ECO Contractor	Construction
	Water used at construction sites should be utilised in such a manner that it is kept on-site and not allowed to run freely into nearby watercourses		
Water Quality	Machinery and vehicles must be regularly checked to ensure hydrocarbon leaks (including fuel and hydraulic fluids) are not occurring. Drip trays must be used where necessary. Fuels and oils must be stored within bunded areas or impermeable surfaces in the laydown yards.	ECO Contractor	Construction
Fire	No fires are permitted in or near the wetland areas. No smoking is permitted within the wetland areas to prevent an accidental wildfire from starting. Fires for warmth must be controlled in a contained facility with the relevant landowners consent, in the laydown areas only.	ECO Contractor	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
NOISE MANAGEMENT			
Objectives: — To ensure that noise impacts to the surrounding environment are minimal or mitigated. Indicator and Compliance Mechanisms: — Induction training and records. — Incident Classification and Reporting Management Procedure.			
Noise	Excessive noise at night time is not permitted. There must be no noise pollution from any contracted staff on site.	ECO Contractor	Construction
	Provide a complaints register to report any excessive noise incidents.	ECO Contractor	Construction
SITES OF CULTURAL OR HERITAGE SIGNIFICANCE			
Objectives: — To ensure that sites/artefacts of heritage value are identified and protected. Indicator and Compliance Mechanisms: — Incident Classification and Reporting Management Procedure. — Monitoring and audit reports.			
Cultural and/or Heritage Sites	In the event that an artefact or heritage site be uncovered, work in the vicinity must cease, representatives of the Mpumalanga Provincial Heritage Resources Authority (MPHRA) must be contacted and an archaeological consultant must be appointed to assess the site. Work may only resume, once clearance is given in writing by the archaeological consultant.	ECO Contractor	Construction
	If any evidence of archaeological sites or remains (e.g., remnants of stone-made structures, indigenous ceramics, bones and stone artefacts) found during construction activities, the finds must be reported to MPHRA and the Chance Find Protocol must be implemented	ECO EO	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
PALAEONTOLOGY Objectives: — To ensure that palaeontological material is identified and protected. Indicator and Compliance Mechanisms: — Toolbox talks — Incident register			
Chance Finds	Should any palaeontological material be found or be exposed during clearing, ground-breaking, digging, excavating, or drilling SAHRA must be notified. All construction activities must be stopped, a 30 m no-go barrier constructed and a palaeontologist should be called in to determine proper mitigation measures.	ECO Contractor	Construction
HEALTH AND SAFETY			
Objectives: — To prevent public access to construction sites and storage areas. — To ensure safety for all onsite personnel. Indicator and Compliance Mechanisms: — Induction training and records. — Health, safety, environmental and community incident and complaints management system register. — Incident Classification and Reporting Management Procedure. — PPE Occupational health and safety plan. — Health and safety protocol.			
Health and Safety	All onsite personnel are required to undergo induction training and regular toolbox talks in order to raise awareness of the conditions contained herein. Snake bite and sunburn awareness must be covered in toolbox discussions.	Contractor	Construction
	The appointed contractor will be responsible for the development of a comprehensive health and safety protocol which must be adhered to.	Contractor	Construction
	Provide and wear appropriate PPE onsite.	Contractor	Construction
	Provide onsite personnel with sufficient potable water for drinking.	Contractor	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
SOCIO-ECONOMIC ENVIRONMENT Objectives: — To ensure that the negative socio-economic impacts are mitigated and managed. — To ensure that the positive socio-economic impacts are enhanced. Indicator and Compliance Mechanisms: — Monitoring and audit reports.			
Local Awareness Training	Prioritisation of local labour through implementing contractor policies.	Contractor	Construction
TRAFFIC			
Objectives: — To ensure that the traffic impacts to the natural environment are mitigated and managed. Indicator and Compliance Mechanisms: — Induction training and records.			
Access routes	Existing access routes to the construction sites must be utilised at all times. Access routes must be approved by the local landowner or farm manager. No heavy vehicles may enter the wetland systems unless on a formal road or farm track that is already disturbed.	Contractor	Construction
	No ad-hoc routes may be utilised on-site.	Contractor	Construction
Vehicle Management	Ensure all vehicles are roadworthy, visible, adequately marked, and operated by an appropriately licenced operator.	Contractor	Construction
Speed limit	A low-speed limit (recommended 20-40 km/h) should be enforced to reduce wildlife collisions	Contractor	Construction
No-Go Areas and areas to be avoided			
Sensitive areas	Grassland, rock outcrops and wetland habitat where no rehabilitation work is planned must be avoided.	Contractor	Construction
Tracks	Existing access tracks should be utilised by workers and machinery	Contractor	Construction
Laydown areas	Laydown areas must only be situated in currently hardstanding or cultivated areas	Contractor	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
Fauna Habitats	All rehabilitation intervention activities (e.g., earth moving and excavations), must be confined to the minimum footprint area required to implement the intervention successfully. No disturbances may be permitted outside of these footprints	Contractor ECO	Construction
The Construction Sites- Working areas			
Construction footprints	The development footprints must be clearly marked out with flagging tape/posts in the field.	Contractor	Construction
	Vegetation clearing must be restricted to the proposed project footprints only, with no clearing permitted outside of these areas.	Contractor ECO	Construction
	Locate all laydown areas and temporary construction infrastructure at least 100m from the edge of the delineated wetland.	Contractor	Construction
	The extent of disturbance should be limited by restricting all construction activities to the project footprint as far as practically possible.	Contractor	Construction
Vegetation Management			
Objectives: — To ensure that as little vegetation is disturbed as possible. — To ensure the sites that are cleared, are rehabilitated as soon and as effectively as possible. Indicator and Compliance Mechanisms: Induction training and records. ECO monitoring and reporting PES Monitoring			
Wetland Vegetation Management	Sods of natural vegetation that exist in areas where works will take place, should be carefully removed and stored on plastic sheeting and watered frequently, so that they can be used for rehabilitation of bare soil areas once construction is completed.	Contractor ECO	Construction
Rehabilitation of Construction activities	Soils should be replaced in the appropriate manner, i.e. subsoils first, followed by topsoils, then followed by replacement of the carefully stored sods on top.	Contractor ECO	Construction
Re-vegetation	Additional rehabilitation efforts should be implemented at any intervention sites that fails to revegetate successfully and where erosion is likely.	Contractor ECO	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
Alien Vegetation Management			
Objectives: - Prevent further spread of alien vegetation in cleared areas -Encourage indigenous species regrowth			
Alien vegetation clearing	The use of harmful herbicides that can infiltrate surface water runoff and enter the wetland systems is prohibited. The alien vegetation clearing techniques must be guided/ informed by best practice principles from the GLPA Management Authorities.	Contractor ECO	Construction
Rehabilitating cleared areas	The cleared areas must be re-seeded with indigenous vegetation common to this area and ecosystem type.	Contractor ECO	Construction
Alien invasive species monitoring	Active AIS control must be conducted at intervention sites where AIS have established during the construction phase.	Contractor ECO	Construction
	A pre-construction walkdown of the proposed intervention sites must be conducted by an ECO or specialist during the wet/growing season to identify any potentially impacted flora SCC and advise on appropriate avoidance and mitigation measures during construction.	Contractor ECO	Construction
Fauna Management			
Objectives - minimise impact to fauna encountered on site			
Supervision	An Environmental Control Officer (ECO) should be on-site during the implementation of rehabilitation interventions to monitor and manage any wildlife-human interactions.	Contractor ECO	Construction
Handling animals found on-site	Any fauna species trapped at intervention sites, should be safely and correctly relocated to an adjacent area of natural habitat.	Contractor	Construction
	The handling, poisoning and killing of on-site fauna by contractors employed on-site must be strictly prohibited. This must be verbally communicated to all contractors.	Contractor ECO	Construction
	No animal found on-site may be removed from the site. Animals may be carefully removed from the construction areas and released into the adjacent areas.	Contractor ECO	Construction

ACTIVITY/ASPECT	ENVIRONMENTAL MANAGEMENT AND MITIGATION MEASURE	RESPONSIBLE PERSON	PRIORITY TIMEFRAME
Fauna of conservation concern	In-wetland rehabilitation interventions **must only be implemented during the dry season** when Sensitive species 23 is absent.	Contractor ECO	Construction
	The Best Practice Guidelines for High-Elevation Wetland and Peatland Management in Southern Africa (in press) should be followed to minimise disturbance to on-site wetland habitat and fauna SCC occurring in the study area.	Contractor ECO	Construction
	Bird experts at Birdlife South Africa and the Endangered Wildlife Trust (EWT), should also be consulted to provide on-going guidance on the implementation rehabilitation interventions including inter alia: Optimal season/period to implement interventions; Identification of particularly sensitive sites requiring avoidance; and General land management practices, such as annual burning programmes and livestock grazing management.	Contractor ECO	Construction
House-keeping			
Objective – to prevent environmental degradation/ contamination on site. Indicator and Compliance Mechanisms: Induction training and records. ECO monitoring and reporting			
Storage	Construction chemicals, such as cement and hydrocarbons should be used in an environmentally safe manner with correct storage as per each chemical's specific storage descriptions.	Contractor ECO	Construction
Plant and vehicle management	No leaking vehicles or plant may be allowed on site. All vehicles must be frequently inspected for leaks.	Contractor ECO	Construction
Waste	All waste must be removed and transported to appropriate waste facilities	Contractor ECO	Construction
	Provision must be made for both general and hazardous waste in the laydown yard. These bins must be covered and labelled accordingly.	Contractor ECO	Construction

Mitigation Goal	Mitigation Measure
Monitoring requirements	
The monitoring schedule and methods for these phase 2 activities must be included in the existing wetland monitoring program.	
Wetlands	
Vegetation regrowth	The re-growth of vegetation in rehabilitated areas must be monitored during and post-construction.
Alien and Invasive Species Management	An alien and invasive species management plan should be developed for the Project, which includes details of strategies and procedures that must be implemented on-site to control the spread of alien and invasive species. An initial implementation phase prior to construction consisting of a combined approach using both chemical and mechanical control methods, with periodic follow-up treatments informed by regular monitoring, is required.
	Annual on-site alien invasive species monitoring should be conducted at all rehabilitation intervention sites.
	Monitoring should assess species type and density, and these data should inform the scope of ongoing alien invasive species control.
	At sites where AIS are cleared as part of the proposed rehabilitation interventions, regular follow-up control should be implemented to eradicate any emergent or coppice growth.
Additions to the existing monitoring program (WETRehab Evaluate guideline document (Cowden and Kotze, 2008)	The existing monitoring programme must be updated and extended to cover the proposed rehabilitated wetlands in Cluster 2-7.
	Flow and water quality and water quality must be monitored at the outlet of the Cluster 4 at the R540 road at the outlet of the project, as a minimum, at coordinates: Latitude: 25°35'47.03"S; and Longitude: 30° 04'13.28"N
	Conduct bi-annual aquatic bio-monitoring surveys in the dry and wet seasons to determine PES status for the wetland clusters.

7 MANAGEMENT PLANS

A generic heritage and palaeontological management plan have been included in the EMPr. It must be noted that many of these plans can be updated at any stage depending on any changes that may occur on the site.

7.1 Heritage and Palaeontological Management Plan

The purpose of this document is to provide a response guideline should archaeological sites, palaeontological sites or graves become exposed during ground altering activities within the construction areas. Heritage resources are protected in terms of the National Heritage Resources Act, Act 25 of 1999 (NHRA).

7.1.1 Chance Find Procedure

The following procedural guidelines must be considered in the event that previously unknown heritage resources are exposed or found during the construction phase at Lakenvlei. This chance find procedure (CFP) must be read in conjunction with the Environmental Authorisation, the Environmental Management Programme and Final BAR.

The Contractor or other person discovering a potentially significant site or artefact will initiate the following actions:

- Once alerted to fossil occurrence(s): alert site foreman, stop work in area immediately, safeguard site with security tape / fence / sand bags if necessary.
- Record key data while fossil remains are still in situ:
  - Accurate geographic location – describe and mark on site map / 1: 50 000 map / satellite image / aerial photo;
  - Context – describe position of fossils within stratigraphy (rock layering), depth below surface;
  - Photograph fossil(s) in situ with scale, from different angles, including images showing context (e.g. rock layering);
- If feasible to leave fossils in situ:
  - Alert the Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation;
  - Ensure fossil site remains safeguarded until clearance is given by the Heritage Resources Agency for work to resume;
- If not feasible to leave fossils in situ (emergency procedure only):
  - Carefully remove fossils, as far as possible still enclosed within the original sedimentary matrix (e.g. entire block of fossiliferous rock);
  - Photograph fossils against a plain, level background, with scale;
  - Carefully wrap fossils in several layers of newspaper / tissue paper / plastic bags;
  - Safeguard fossils together with locality and collection data (including collector and date) in a box in a safe place for examination by a palaeontologist;
  - Alert Heritage Resources Agency and project palaeontologist (if any) who will advise on any necessary mitigation;

- If required by Heritage Resources Agency, ensure that a suitably qualified specialist palaeontologist is appointed as soon as possible by the developer.
- Implement any further mitigation measures proposed by the palaeontologist and Heritage Resources Agency;
- The Specialist Palaeontologist must undertake the following:
    - Apply for Fossil Collection Permit Record / submit Work Plan to relevant Heritage Resources Agency;
    - Describe and judiciously sample fossil remains together with relevant contextual data (stratigraphy / sedimentology / taphonomy);
    - Ensure that fossils are curated in an approved repository (e.g. museum / university / Council for Geoscience collection) together with full collection data;
    - Submit Palaeontological Mitigation report to Heritage Resources Agency;
    - Adhere to best international practice for palaeontological fieldwork and Heritage Resources Agency minimum standards;

7.1.2 Training, Inspection and Monitoring

Since it is not practical to have a regular monitoring presence over the construction period by either an archaeologist or palaeontologist, environmental awareness training must be conducted by the EO for all contractors and subcontractors. The training must include, as a minimum, the following:

- Identifying potential features of heritage significance;
- Procedures for dealing with heritage resources discovered on site;
- Applicable Legislation pertaining to the protection of heritage resources; and
- The importance of protecting heritage resources.
- The contents of the Heritage Management Plan must be communicated to the staff through the induction training. On the job training can also be undertaken through the use of Environmental Toolbox Talks.

8 CONCLUSION

In terms of the NEMA, everyone (i.e. all persons engaging in any component of this project) is required to take reasonable measures to ensure that they do not pollute the environment. 'Reasonable measures' includes informing and educating employees about the environmental risks associated with their work and training them to operate in an environmentally responsible manner.

GGV also recognises that, in terms of NEMA, the cost to repair any environmental damage will be borne by the person responsible for the damage. Should the above-mentioned environmental guidelines and mitigation measures be adopted, it is anticipated that the negative environmental impacts of the proposed GGV Wetland Rehabilitation Project will be mitigated adequately. The Holder of the EA and the selected Contractor shall appoint relevant personnel, as well as an independent ECO, to monitor the site periodically throughout construction to ensure that the required environmental controls are in place and working effectively. During operation and maintenance, the area specific Environmental Manager and EO, with the support of the maintenance supervisor, will monitor environmental controls.

If you have any further enquiries, please feel free to contact:

WSP Group Africa (Pty) Ltd

Attention: Rob Rowles

(T) +27 31 240 8832

(E) Rob.Rowles@wsp.com

Appendix A

EAP CV

Rob Rowles

Principal Consultant, Earth & Environment

CAREER SUMMARY

Rob has been in the Environmental Consulting space for thirteen years and has been exposed to a wide range of roles and responsibilities within the ESIA field. He is currently a Principal Consultant within WSP's Earth & Environment team.

Rob has a Masters degree in Environmental Management and is a registered environmental assessment practitioner with EAPASA. Rob has 13 years of on-the-job management experience having completed numerous ESIA, EIA, EMP, WULA, Mine Closure, Public Participation Processes and ECO Due Diligence projects within South Africa. Rob has project experience with projects ranging from mining (ESIA and Operational Compliance), port developments, asphalt plants, pipelines, water supply schemes, roads (national and provincial), industrial developments, and public and private infrastructure projects.

<1 years with WSP

13 years of experience

Area of expertise

Extensive experience in environmental impact assessment (Basic Assessment & Full Scoping EIA)

Extensive Environmental Construction and Operational Auditing (ECO and EO) experience against the requirements of EMPs and EAs.

Water Use Authorizations (Full WULAs and GA's)

Mining Permits, Mining Rights, and Mine Closure

Extensive experience in the compilation of site specific EMPs, Environmental Due Diligence and Feasibility Assessments and reports

Experience in leading Public Participation processes, presenting and reporting.

Language

English

EDUCATION

Masters in Environmental Management (MSc Environmental Management through The University of Johannesburg	2012
Honours Degree in Geography and Environmental Science, University of KwaZulu-Natal	2008
B Social Science Degree in Geography and Environmental Science, University of KwaZulu-Natal	2007

PROFESSIONAL MEMBERSHIPS

Registered Environmental Assessment Practitioner (2022/5395)	EAPASA
International Association for Impact Assessment (7287)	IAIAsa

PROFESSIONAL HISTORY

WSP Group Africa, Principle Consultant (Earth & Environment)	2023 - present
EnviroPro, Senior Environmental Consultant	2014 – 2023
Golder Associates, Environmental Consultant	2010 - 2013

PROJECT EXPERIENCE

RECENT EIA & WULA PROJECTS

FFS Refiners – Part 1 Amendment for the conversion of used oil to diesel storage, Qhebega.

KZN Department of Transport – HN Engineering, Nkwalinye Bridges. EIA x 4 and WUA. KZN, South Africa. 2022-2023. Lead Consultant. The assessment of 4 independent structures over four rivers and wetland near Melmoth, KZN.

Driftwood Estates – 24G Application. 2022. Lead consultant. A 24G process for an embankment that was constructed without authorisation within 100m of the high water mark of the sea and within an estuarine functional zone.

Shisalanga Construction – Part 2 Amendment for an additional stockpile area and extended footprint. 2022. Lead Consultant. The expanded project footprint (1ha) was within a highly sensitive vegetation type and area with endangered millepedes.

Ezemvelo KZN Wildlife – Mpila Staff Accommodation EIA. 2022-2023. Lead Consultant. An upgrade of staff housing and sewage infrastructure within the Mpila Camp.

KZN Department of Transport- HN Engineering, Mbojane Bridge EIA and WUA, South Africa 2019 – 2022. An assessment for a new bridge within a watercourse, adjacent to a nationally protected area.

The City of Umhlatuze Municipality, Civtech Engineering - Ntambanana Water Supply Scheme EIA and WUA, South Africa. 2019 – 2022. Lead Consultant. This water supply scheme consisted of 8 new reservoirs, over 400km of bulk and reticulation pipeline network, over four different municipal wards.

Melting Ice Investments (Pty) Ltd, Riverview Restaurant EIA and WUA, South Africa. 2019 – 2022 Lead Consultant. This was a private mixed-use development within 100m of the high water mark of the sea in Mdloti Town, KZN.

eThekwini Municpality, Magcakeni Water Supply Scheme, South Africa. 2019 – 2022. Lead Consultant

Shisalanga, SEIA for the Shisalanga Asphalt Plant Ulundi, South Africa. 2019 – 2022. Lead Consultant. The licensing of a permanent asphalt plant on a neighbouring protected reserve.

Shisalanga, SEIA for the Shisalanga Asphalt Plant, Hluhluwe, South Africa. 2019 -2022**.** Lead Consultant The licensing of a permanent asphalt plant within an agricultural and private game reserve area.

Naidu Consulting / Department of Transport, Basic Assessment, WUA and ECO for The Little Mooi River Bridge, South Africa. 2019 – 2022. Lead Consultant and ECO. A new 3-span bridge within the Little Mooi river, at the foothills of the Highmoor National Reserve.

Neeran Mining, Sand Mine Closure. 2022 - 2023. Rob was the lead consultant for the closure submission for a privately owned sand mine in Winterton, KZN.

Naidu Consulting / Department of Transport, Basic Assessment, WUA and ECO for the D883 Road, South Africa. 2019 – 2022**.** Lead Consultant. A 10km provincial road upgrade, involving road realignment within a protected vegetation type.

HJK, Mine Closure. 2022. Rob was the lead consultant for the HJK Sand mine close submission to DMRE.

Harry Gwala District Municipality, District Roads Basic Assessment and WUA, South Africa. 2019-2022. Lead Consultant. Basic Assessment, WUA for 8 new District roads within the Harry Gwala District Municipality

eThekwini Municipality, Maintenance Management Plan for Waste Water Infrastructure in Sensitive Environments, South Africa. 2019 – 2021. Lead Consultant. Helped authorise and develop a MMP template for eThekwini's MMP projects that involve pipelines through sensitive areas.

KZN Department of Transport, Basic Assessment and WUA for the D59 Bridge, South Africa. 2019 – 2022. Lead Consultant. A new culvert along the D59 road within an endangered vegetation type.

eThekwini Municipality, Basic Assessment for the Hammarsdale Low Level Bridge, South Africa
2019 -2020. Lead Consultant**.** A provincial road upgrade that involved offsetting for the clearance of endangered grassland.

eThekwini Municipality, Basic Assessment for the Mafume Low Level Bridge, South Africa
2019 -2020. Lead Consultant. A new bridge in a green fields rural area, involving wetland loss and new road access in and out the valley.

eThekwini Municipality/Bosch Munitech, Basic Assessment for the Dudu Shangase and Nyatela Pedestrian Bridges, South Africa. 2019 -2020. Lead Consultant. Four individually assessed pedestrian bridges within the densely populated uMlalazi area.

DEC, Department of Transport, Basic Assessment for the Mkomazi Bridge, South Africa
2019 – 2020. Lead Consultant. An assessment for a road realignment and new 4-span bridge over the Mkomazi River.

RECENT ECO AUDITING/ DUE DILIGENCE PROJECT EXPERIENCE

PNGCON, Njabulu Eco Estate, South Africa. 2022 – 2023**.** Independent ECO Auditor for the greenfields Njabulo Eco Estate residential development**.**

KZN Transport, D59 Bridge Construction. 2022-2023. Rob was the lead consultant for the EIA, WUA and ECO for the construction phase of the D59 Bridge outside of Richmond KZN. Construction was not complete at the time that Rob joined WSP.

FWJK, TYNE Residential Development. 2022-2023. The independent ECO Auditor for Phase 1 of the Tyne Residential Development in uMhlanga, KZN. This project required EMP and SWMP development and implementation.

Transnet / Channel Construction, PE Port Slipway cradle upgrade, South Africa. 2021 -2022**.** Rob was appointed as the independent ECO for the slipway cradle upgrade. This entailed EMP development and monthly auditing within the Gqeberha Port.

eThekwini, Solomon Mhlangu M7 Upgrade, South Africa. 2022 – 2023**.** Rob was the independent ECO for the construction phase of eThekwini Municipality's M7 road upgrade.

BJFC/eThekwini Municipality, Adams Mission Water Supply Scheme, South Africa. 2019 – 2021. Rob was appointed as the independent ECO for the construction phase of the Adams Mission pipeline network. This pipeline crossed a number of very sensitive, critically endangered ecosystem types.

Bongaumausa Ngubo, Lethi'Ngubo Quarry, South Africa. 2021. Rob conducted Due Dilegence audits for DMRE compliance on the Lethi'Ngubo stone quarry/

FWJK, Bridge City Development, South Africa. 2022. Rob was appointed as the independent ECO for the Bridge City IMPACT recycling industrial warehouse build.

E-Waste, PMB and Boxburg, South Africa. 2020-2023. Rob was appointed as the independent ECO responsible for the due diligence ECO auditing and reporting for E-Waste's electronical recycling plants in KZN and Gauteng.

The Rowles Group, The Woods Private Estate Developments, South Africa. 2021 – 2022**.** Rob was appointed as the independent ECO and ECO manager for the Rowles Group's The Woods residential development. This involved some careful management and rehabilitation of a critically endangered grassland and wetland.

HNE, Greater Kokstad Municipality's "Kokstad Housing"and the Harry Gwala District municipality's "Ixopo Public Housing" Projects. 2020-2023. Rob was the appointed ECO responsible for the environmental compliance for both the Kokstad and Ixopo housing projects.

SH Group, 57 North Beach Roach Private Development, South Africa. 2021 – 2022. Rob was appointed as the independent ECO for the entire 57 North Beach Road construction in uMdloti.

Ilmebe District Municipality, Darnall Sewer Network Upgrade, South Africa. 2019 – 2021. Rob was appointed as the independent ECO for the entire construction phase of this sewer network upgrade. This project entailed wetland management and stringent alien vegetation management.

National Asphalt, National Asphalt's Independent ECO for their Bon Accord, Middelburg, Rustenburg, Laezonia, Vanderbjil Park, Nelspruit, Musina, Roadside, Tzaneen and Pienaar's Rivier asphalt plants, South Africa. 2021 – 2023. Rob was responsible for Nation Asphalts' environmental compliance and reporting. These asphalt plants were audited bi-annually.

Shisalanga Construction, Shisalanga's Independent ECO for their Hluhluwe, Umlaas Rd, Ulundi, Escourt, Dundee, Cliffdale and Shakaskraal Plants, South Africa. 2019 – 2023. Rob undertook compliance audits for Shisalnga's asphalt plant operations in KZN, both in the construction and operational phases.

Naidu Consulting/ eThekwini Municipality, ECO for the Go Durban BRT Transport System, South Africa 2019 – 2022. Consultant and Auditor for the construction of the Go Durban BRT road network upgrade.

BTMN Engineering, Singisi Sub-Station (Greater Kokstad Municipality). 2020-2022. Rob was the independent ECO for the construction phase of the District Municipality's new sub station in Kokstad, KZN.

Naidu Consulting, Basic Assessment, WUA & ECO for Ezimbokodweni Pedestrian Bridge & Sewer Pipeline, South Africa. 2019 – 2022**.** Consultant and ECO Auditor for the construction phase of the pedestrian bridge and pipeline construction.

Naidu Consulting, Basic Assessment, WUA & ECO for uMshwathi Bridges, South Africa. 2019 – 2022**.** Consultant and ECO Auditor for the construction phases of the uMshwathi Bridges construction phases.

DEC, Basic Assessment, WUA & ECO for L207 Bridge, South Africa. 2019 – 2020. Consultant and ECO lead for the construction phase of the L207 Bridge.

Naidu Consulting, Basic Assessment, WUA & ECO for Msunduzi River Road Bridge, South Africa. 2019 – 2020**.** Consultant & independent ECO for the construction phase of the Msunduzi River Road Bridge.

Emzansi Engineers, Basic Assessment, WUA & ECO for uMzimkhulu Pedestrian Bridge, South Africa. 2019 – 2020**.** Consultant and ECO lead for the construction phase of the uMzimkhulu Pedestrian Bridge.

DEC, Basic Assessment, WUA & ECO for uMkomaas Steel Bridge Rehabilitation, South Africa. 2019 – 2020**.** Consultant and ECO for the construction phase of the uMkomaas Steel Bridge Rehabilitation phase.

Naidu Consulting, Basic Assessment Upgrade and construction of 8 roads in DC22, WULAs ECO, South Africa. 2019 – 2020. Consultant and Auditor for 8 x district roads in DC22 within the PMB, KZN.

BVI, Basic Assessment for Douglas Water Supply Scheme, South Africa. 2019 – 2022**.** Consultant and Auditor responsible for environmental compliance and monthly auditing for the construction phase of the Douglas Water Supply scheme.

Environmental Assessment Practitioners Association of South Africa

Registration No. 2022/5395

Herewith certifies that

ROBERT ARTHUR ROWLES

is registered as an

Environmental Assessment Practitioner

Registered in accordance with the prescribed criteria of Regulation 15. (1) of the Section 24H Registration Authority Regulations (Regulation No. 849, Gazette No. 40154 of 22 July 2016, of the National Environmental Management Act (NEMA), Act No. 107 of 1998, as amended).

Effective: 01 March 2025

Expires: 31 March 2026

Chairperson

Registrar

SAQA
SOUTH AFRICAN QUALIFICATIONS AUTHORITY

Appendix B

EAP Declaration of Interest and Oath Undertaking

10.2 The Environmental Assessment Practitioner (EAP)

I Rob Rowles....., as the appointed environmental assessment practitioner ("EAP") hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent (tick which is applicable):

✓	other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or

	am not independent, but another EAP that is independent and meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review EAP must be submitted);

- have expertise in conducting environmental impact assessments, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- will ensure compliance with the EIA Regulations 2014;
- will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application;
- will take into account, to the extent possible, the matters listed in regulation **18** of the regulations when preparing the application and any report, plan or document relating to the application;
- will disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority or the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority (unless access to that information is protected by law, in which case I will indicate that such protected information exists and is only provided to the competent authority);
- will ensure that information containing all relevant facts in respect of the application is distributed or made available to interested and affected parties and the public and that participation by interested and affected parties is facilitated in such a manner that all interested and affected parties will be provided with a reasonable opportunity to participate and to provide comments on documents that are produced to support the application;
- declare that all the particulars furnished by me in this form are true and correct;
- am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Signature of the environmental assessment practitioner

WSP

Name of company

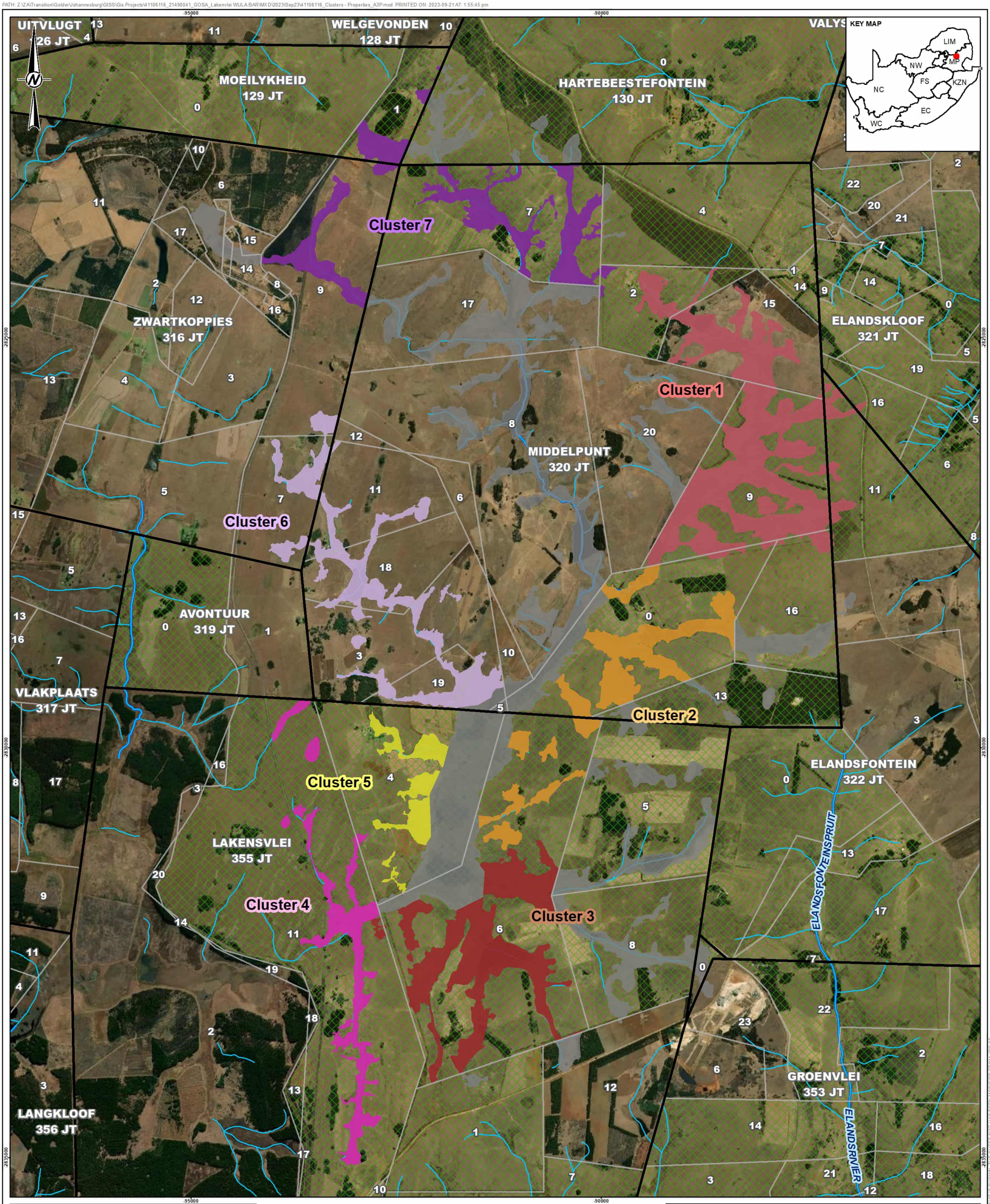
15 May 2025

Date

Appendix C

MAPS

PATH: Z:\ZA\Transition\Golder\Johannesburg\GISS\Gis Projects\41106116_21490041_GOSA_Lakenvlei WULA BAR\MXD\2023\Sep23\41106116_Clusters - Properties_A3P.mxd PRINTED ON: 2023-09-21 AT: 1:55:45 pm



LEGEND

- Parent Farms
- Farm Portions
- Cluster 1
- Cluster 2
- Cluster 3
- Cluster 4
- Cluster 5
- Cluster 6
- Cluster 7
- Cluster 8
- Rivers - Perennial
- Rivers - Non perennial
- Wetland data - September 2015
- Greater Lakenvlei Protected Environment

0 800 1 600
1:43 000 METRES

NOTE(S)
1. LINE NOTES
2. LINE NOTES
3. LINE NOTES

REFERENCE(S)
1. COORDINATE SYSTEM: WGS LO31
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
GLENCORE

PROJECT
LAKENVLEI

TITLE
CLUSTER PROPERTIES

CONSULTANT
wsp

YYYY-MM-DD	2023/09/21
DESIGNED	KM
PREPARED	KM
REVIEWED	RR
APPROVED	RR

PROJECT NO. 41106116 | CONTROL | REV. | FIGURE

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3

25mm

0

PATH: Z:\ZA\Transition\Golder\Johannesburg\GIS\Gis Projects\41106116_21490041_GOSA_Lakenvlei WULA BAR\MXD\2023\Sep23\41106116_Clusters1 - Properties_A3P.mxd PRINTED ON: 2023-09-21 AT: 4:20:08 pm

KEY MAP

Remove alien vegetation
Remove dam wall
Plug small trenches
Remove small dam
Plug small trenches
Level and shape
Remove dam wall
Level and shape
MIDDELPUNT 320 JT
Level and shape
Remove dam wall
Level and shape
Remove dam wall



LEGEND

- Level and shape
- Plug small trenches
- Remove alien vegetation
- Remove dam wall
- Cluster 1 Installed Dongalock Structures
- Cluster 1
- Parent Farms
- Farm Portions

0 300 600
1:18 000 METRES

NOTE(S)

REFERENCE(S)
1.COORDINATE SYSTEM: GCS WGS 1984
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
GLENCORE

PROJECT
LAKENVLEI WETLAND REHABILITATION

TITLE
CLUSTER 1 PROPERTIES

CONSULTANT
wsp

YYYY-MM-DD	2023/09/21
DESIGNED	
PREPARED	TS
REVIEWED	IF
APPROVED	IF

PROJECT NO. 41106116 | CONTROL | REV. | FIGURE

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ISO A3

PATH: Z:\ZA\Transition\Golder\Johannesburg\GISS\Gis Projects\41106116_21490041_GOSA_Lakenvlei WULA BAR\MXD\2023\Sep23\41106116_Clusters2 - Properties_A3P.mxd PRINTED ON: 2023-09-21 AT: 4:06:23 pm

-91000 -90000 -89000

2829000 2830000 2831000

KEY MAP

8

0

19

3

10

MIDDELPUNT 320 JT

5

13

4

Remove alien vegetation

Stop headcut

6

LAKENSVLEI 355 JT

5

-91000 -90000 -89000

LEGEND

- Remove alien vegetation
- Stop headcut
- Rivers
- Cluster 2 Proposed Dongalocks
- Cluster 2
- Parent Farms
- Farm Portions

0 200 400

1:10 000 METRES

NOTE(S)

REFERENCE(S)
1.COORDINATE SYSTEM: WGS LO31
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
GLENCORE

PROJECT
LAKENVLEI WETLAND REHABILITATION

TITLE
CLUSTER 2 PROPERTIES

CONSULTANT
wsp

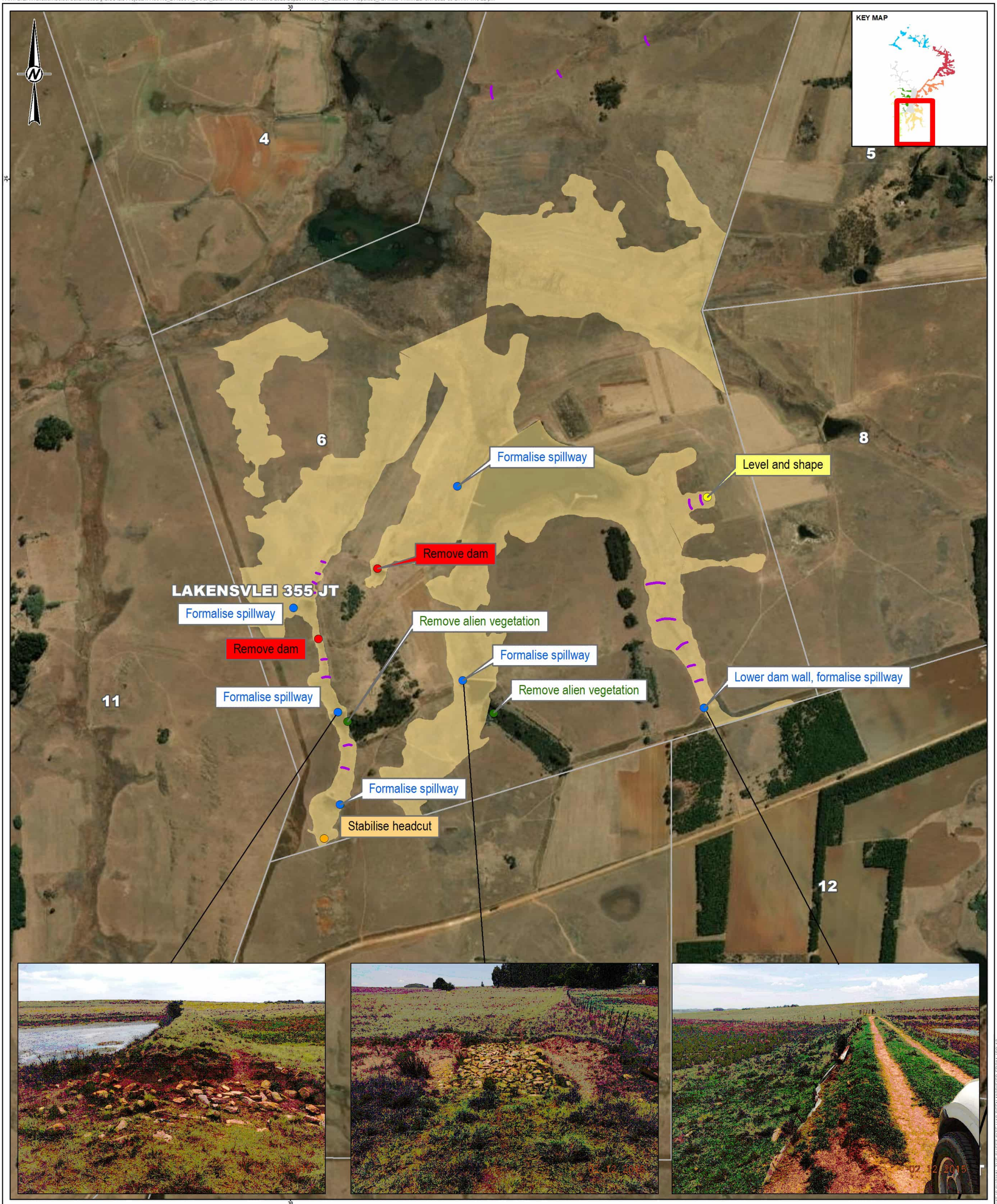
YYYY-MM-DD	2023/09/21
DESIGNED	
PREPARED	TS
REVIEWED	IF
APPROVED	IF

PROJECT NO. 41106116 CONTROL REV. FIGURE

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3

25mm

0



LEGEND

- Add structure
- Formalise spillway
- Level and shape
- Remove alien vegetation
- Remove dam
- Stabilise headcut
- Cluster 3 proposed dongalocks
- Cluster 3
- Parent Farms
- Farm Portions

0 300 600
1:15 160 METRES

NOTE(S)

REFERENCE(S)
1.COORDINATE SYSTEM: GCS WGS 1984
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
GLENCORE

PROJECT
LAKENVLEI WETLAND REHABILITATION

TITLE
CLUSTER 3 PROPERTIES

CONSULTANT
wsp

YYYY-MM-DD	2023/09/21
DESIGNED	
PREPARED	TS
REVIEWED	IF
APPROVED	IF

PROJECT NO. 41106116 | CONTROL | REV. | FIGURE

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3
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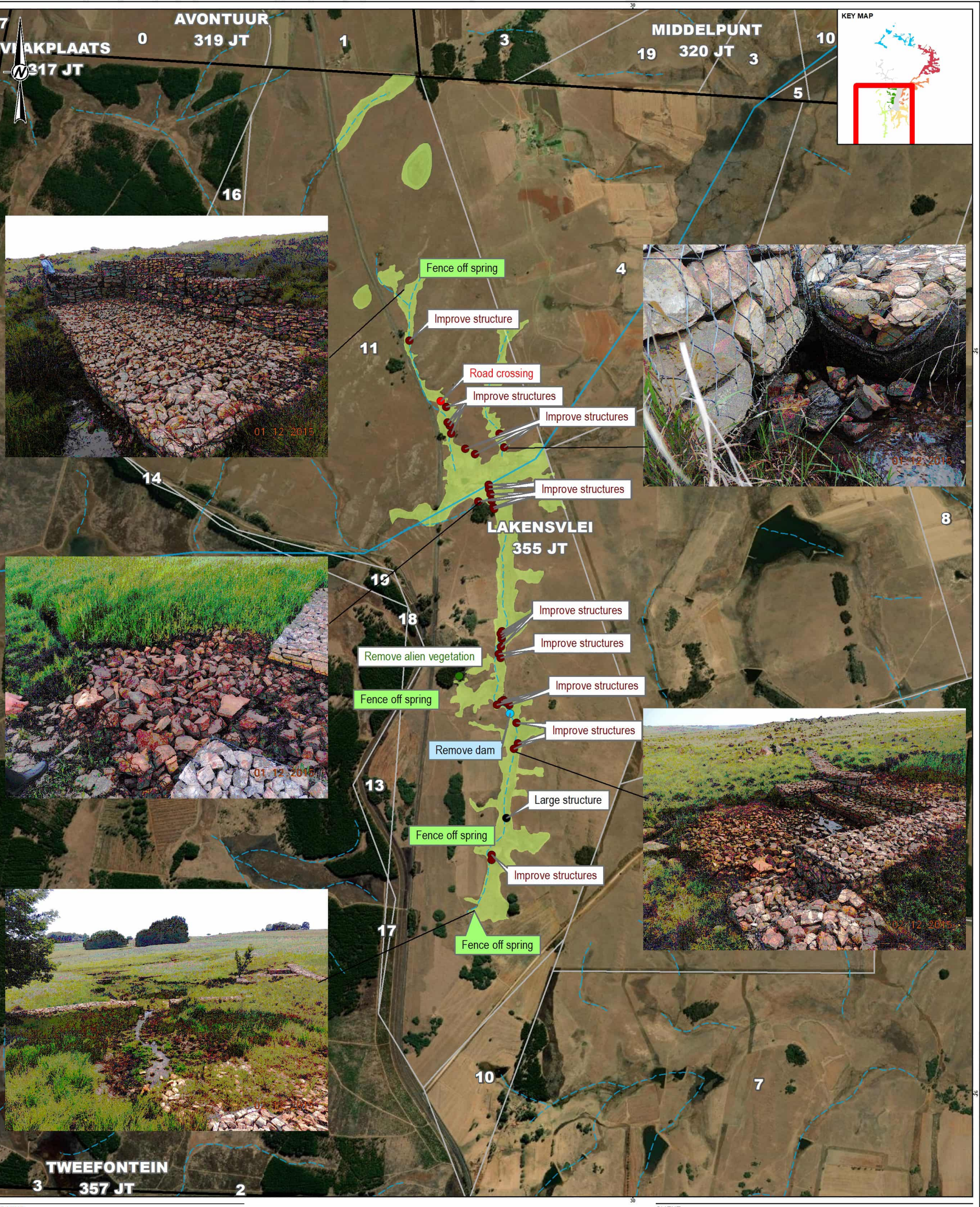


LEGEND

- Improve structures
- Large structure
- Remove alien vegetation
- Remove dam
- Road crossing
- Rivers
- Rivers - Non perennial
- Cluster 4
- Parent Farms
- Farm Portions

0 500 1 000
1:23 900 METRES

NOTE(S)

REFERENCE(S)
1.COORDINATE SYSTEM: GCS WGS 1984
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
GLENCORE

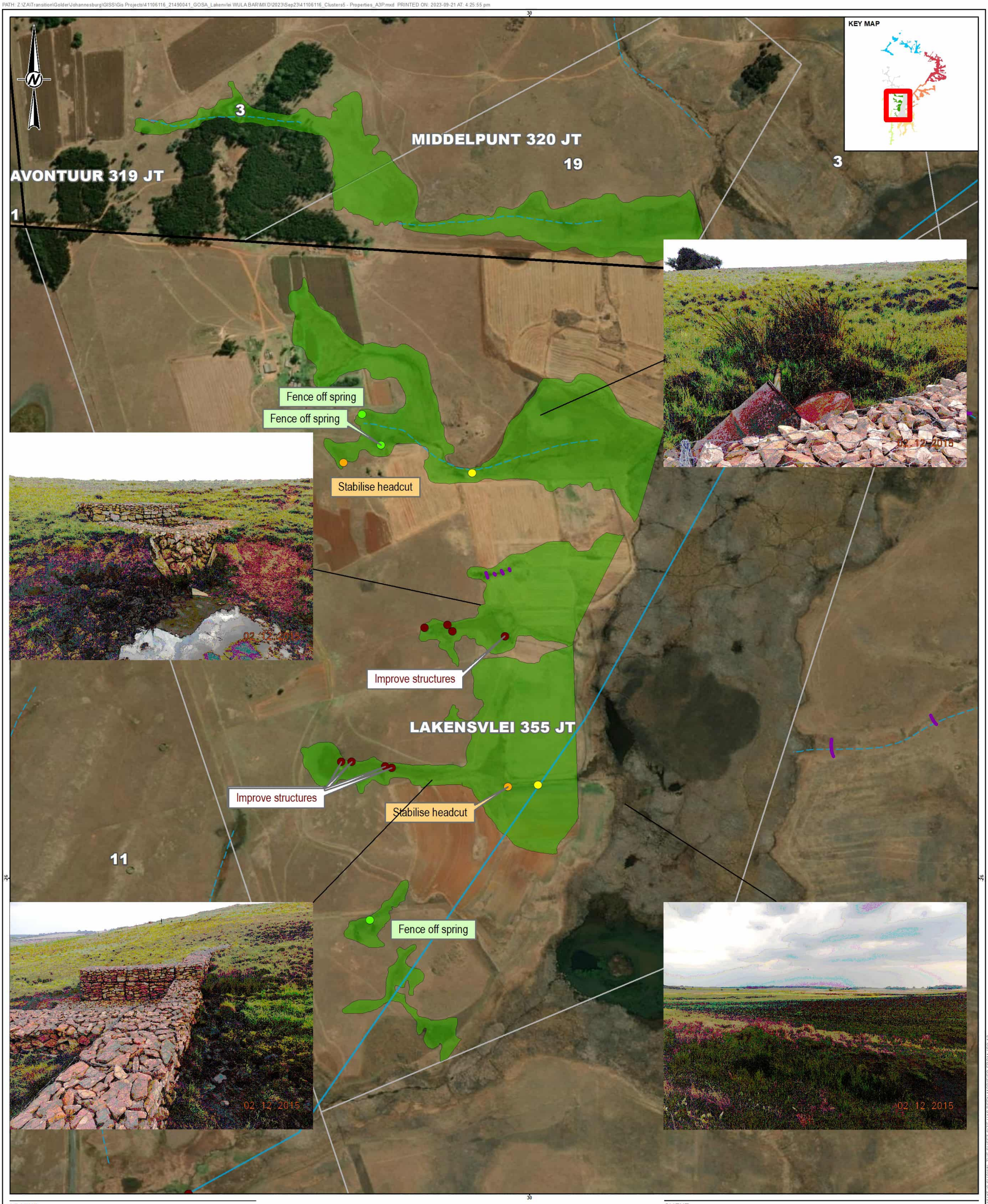
PROJECT
LAKENVLEI WETLAND REHABILITATION

TITLE
CLUSTER 4 PROPERTIES

CONSULTANT
wsp

YYYY-MM-DD	2023/09/21
DESIGNED	TG
PREPARED	MM
REVIEWED	JW
APPROVED	JW

PROJECT NO. 41106116 CONTROL REV. FIGURE



LEGEND

- Fence off spring
- Improve structures
- Incised channel
- Stabilise headcut
- Rivers
- Rivers - Non perennial
- Installed Dongalock Structures
- Cluster 5
- Parent Farms
- Farm Portions

0 150 300

1:10 000 METRES

NOTE(S)

REFERENCE(S)
1.COORDINATE SYSTEM: GCS WGS 1984
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

CLIENT
GLENCORE

PROJECT
LAKENVLEI WETLAND REHABILITATION

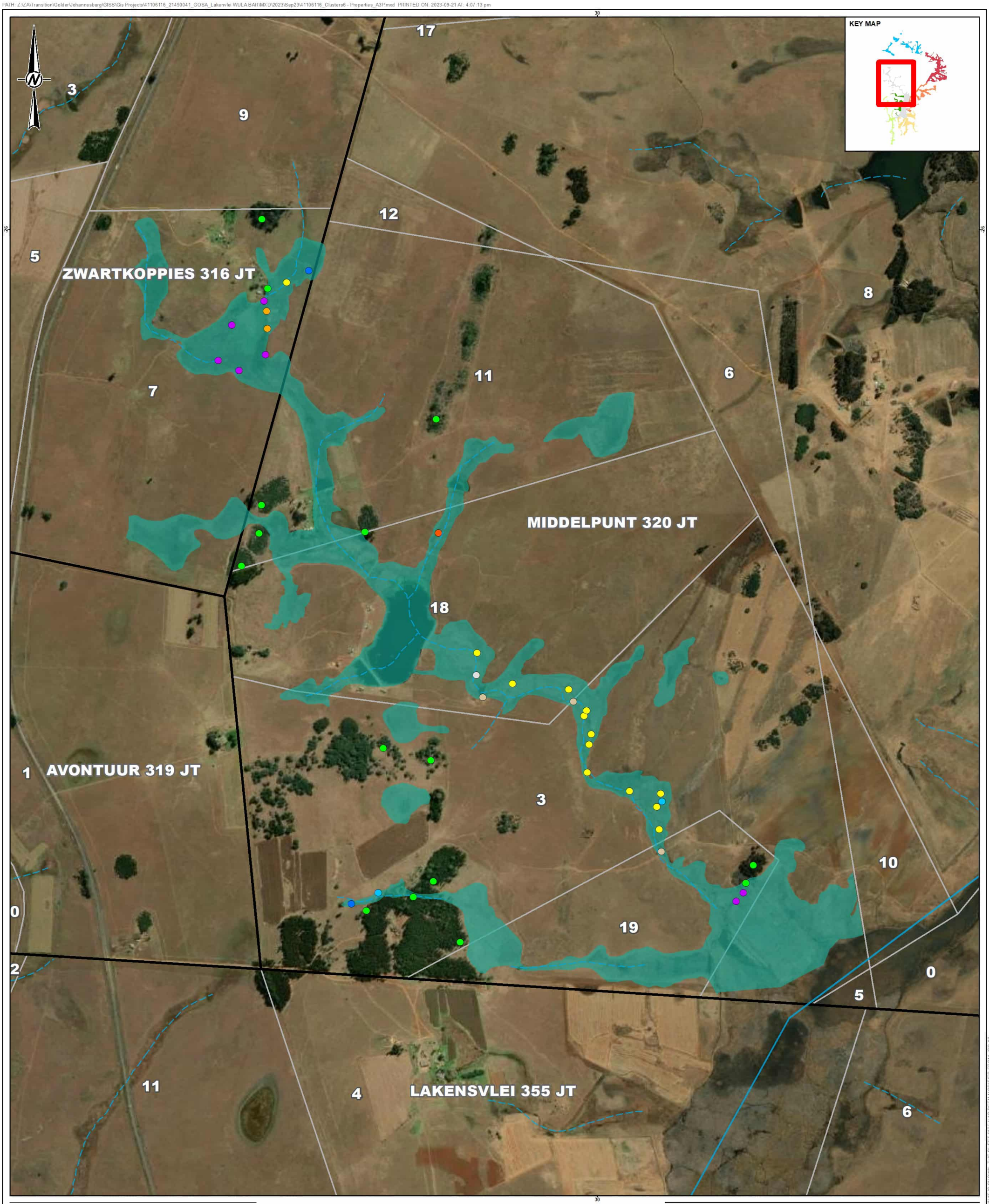
TITLE
CLUSTER 5 PROPERTIES

CONSULTANT
wsp

YYYY-MM-DD	2023/09/21
DESIGNED	
PREPARED	TS
REVIEWED	IF
APPROVED	IF

PROJECT NO. 41106116 CONTROL REV. FIGURE

PATH: Z:\ZA\Transition\Golder\Johannesburg\GISS\Gis Projects\41106116_21490041_GOSA_Lakenvlei WULA BAR\MXD\2023\Sep23\41106116_Clusters6 - Properties_A3P.mxd PRINTED ON: 2023-09-21 AT: 4:07:13 pm



LEGEND

- Alien trees
- Berm & Drain
- Breached dam
- Channel; Incised channel
- Drain
- Erosion
- Farm track
- Headcut
- Spring
- Cluster 6
- Parent Farms
- Farm Portions

0 200 400 600
1:15 000 METRES

NOTE(S)

REFERENCE(S)
1.COORDINATE SYSTEM: GCS WGS 1984
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

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PROJECT
LAKENVLEI WETLAND REHABILITATION

TITLE
CLUSTER 6 PROPERTIES

CONSULTANT
wsp

YYYY-MM-DD	2023/09/21
DESIGNED	TG
PREPARED	MM
REVIEWED	JW
APPROVED	JW

PROJECT NO. 41106116 | CONTROL | REV. | FIGURE

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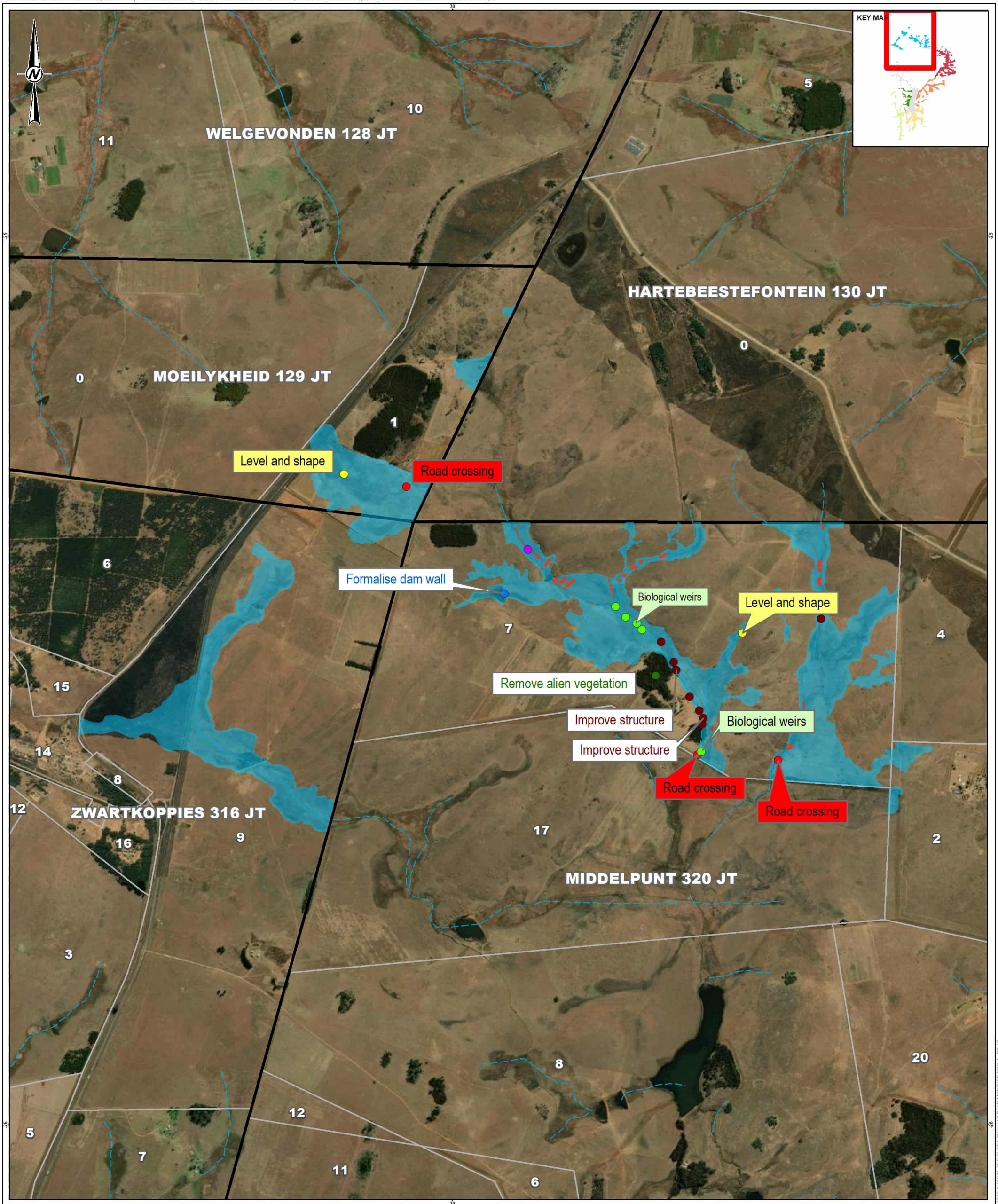
PATH: Z:\ZA\Transition\Golder\Johannesburg\GIS\Gis Projects\41106116_21490041_GOSA_Lakenvlei WULA BAR\MXD\2023\Sep23\41106116_Clusters7 - Properties_A3P.mxd PRINTED ON: 2023-09-21 AT: 4:21:40 pm



LEGEND

- Biological weirs
- Formalise dam wall
- Level and shape
- Remove alien vegetation
- Road crossing
- Rivers - Non perennial
- Installed Dongalock Structures
- Cluster 7
- Parent Farms
- Farm Portions

0 400 800

1:20 000 METRES

NOTE(S)

REFERENCE(S)
1.COORDINATE SYSTEM: GCS WGS 1984
2. SERVICE LAYER CREDITS: SOURCE: ESRI, MAXAR, EARTHSTAR GEOGRAPHICS, AND THE GIS USER COMMUNITY

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PROJECT
LAKENVLEI WETLAND REHABILITATION

TITLE
CLUSTER 7 PROPERTIES

CONSULTANT

YYYY-MM-DD	2023/09/21
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PROJECT NO. 41106116 CONTROL REV. FIGURE

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM ISO A3

Appendix D

Intervention Coordinates

Coordinates of proposed structures

No.	Cluster No.	Coordinate	Engineering description of the intervention
CLUSTER 1			
1	1	25°31'40.91"S - 30° 6'52.18"E	Alien Vegetation Clearing
2	1	25°31'38.54"S - 30° 6'56.38"E	Alien Vegetation Clearing
CLUSTER 2			
3	2	25°34'25.72"S - 30° 5'36.35"E	Double sheet dongalock
4	2	25°34'41.61"S - 30° 5'56.52"E	Double sheet dongalock
CLUSTER 3			
5	3	25°36'18.35"S - 30° 5'20.31"E	Spillway to be formalized
6	3	25°36'21.31"S - 30° 5'54.09"E	New spillway
7	3	25°36'2.36"S - 30° 5'8.43"E	Alien Vegetation Clearing
9	3	25°36'34.94"S - 30° 5'3.14"E	Spillway to be formalized
10	3	25°36'39.65"S - 30° 5'0.94"E	Double sheet dongalock
11	3	25°36'23.48"S - 30° 5'4.28"E	Alien Vegetation Clearing
12	3	25°36'22.23"S 30° 5'2.88"E	Spillway to be formalized
13	3	25°36'12.03"S - 30° 5'0.15"E	Embankmentl repair
14	3	25°36'6.77"S - 30° 4'59.15"E	Embankmentl repair
15	3	25°36'22.64"S - 30° 5'24.63"E	Alien Vegetation Clearing
16	3	25°35'52.51"S - 30° 5'54.01"E	Drop Structure

No.	Cluster No.	Coordinate	Engineering description of the intervention
17	3	25°36'6.05"S - 30° 5'5.18"E	Alien Vegetation Clearing
CLUSTER 4			
18	4	25°37'10.81S", 30°4'20.65E"	Repair existing Gabion Structure
19	4	25°37'10.41"S - 30° 4'21.68"E	Construct bird friendly fence
20	4	25°37'10.08"S - 30° 4'22.39"E	Repair existing Gabion Structure
21	4	25°37'11.18S", 30°4'23.44E"	Repair existing Gabion Structure
22	4	25°37'10.50"S - 30° 4'23.38"E	Repair existing Gabion Structure
23	4	S 25°37'9.10", E 30°4'23.29"	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
24	4	25°37'3.71"S, 30° 4'24.85"E	Double sheet dongalock
25	4	25°37'2.14S", 30°4'25.45E"	Double sheet dongalock
26	4	25°36'59.39"S, 30° 4'25.55"E	Repair existing Gabion Structure
27	4	25°36'58.19"S, 30° 4'25.55"E	Repair existing Gabion Structure
28	4	25°36'57.88"S, 30° 4'22.65"E	Construct bird friendly fence
29	4	25°36'57.94"S, 30° 4'22.53"E	Repair existing Gabion Structure
30	4	25°36'57.53"S, 30° 4'22.86"E	Repair existing Gabion Structure
31	4	25°36'55.05S", 30°4'26.99E"	Double sheet dongalock
32	4	25°36'52.83" S, 30°4'28.48" E	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
33	4	25°36'50.25"S, 30° 4'28.69"E	Repair existing Gabion Structure
34	4	25°36'49.41"S, 30°4'29.06"E	Double sheet dongalock
35	4	25°36'48.68" S, 30°4'28.97" E	Double sheet dongalock
36	4	25°36'47.29"S, 30° 4'28.90"E	Double sheet dongalock
37	4	25°36'36.97"S, 30°4'30.76"E	Double sheet dongalock
38	4	25°36'35.10"S, 30° 4'30.45"E	Repair existing Gabion Structure
39	4	25°36'34.84"S, 30°4'30.48"E	Double sheet dongalock
40	4	25°36'34.08"S, 30° 4'31.25"E	Repair existing Gabion Structure
41	4	25°36'33.92"S, 30°4'31.48"E	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
42	4	25°36'33.80"S, 30°4'31.93"E	Double sheet dongalock
43	4	25°36'29.53"S, 30°4'30.63"E	Double sheet dongalock
44	4	25°36'29.51"S, 30° 4'31.00"E	Repair existing Gabion Structure
45	4	S 25°36'28.36", E 30°4'30.28"	Spillway repair
46	4	25°36'25.72"S, 30° 4'29.37"E	Repair existing Gabion Structure
47	4	25°36'25.08"S, 30° 4'28.74"E	Repair existing Gabion Structure
48	4	25°36'24.59"S, 30° 4'28.14"E	Repair existing Gabion Structure
49	4	25°36'24.90"S, 30° 4'27.67"E	Repair existing Gabion Structure
50	4	25°36'25.59"S - 30° 4'26.73"E	Repair existing Gabion Structure

No.	Cluster No.	Coordinate	Engineering description of the intervention
51	4	25°36'27.64"S - 30° 4'17.86"E	Construct bird friendly fence
52	4	25°36'21.28"S - 30° 4'27.44"E	Double sheet dongalock
53	4	25°36'17.85"S - 30° 4'27.03"E	Double sheet dongalock
54	4	25°36'16.33"S - 30° 4'28.06"E	Double sheet dongalock
55	4	25°36'21.28"S - 30° 4'27.44"E	Double sheet dongalock
56	4	25°36'15.36"S - 30° 4'27.46"E	Repair existing Gabion Structure
57	4	S 25°36'14.33" - E 30°4'27.04"	Spillway repair
58	4	25°36'12.95"S - 30° 4'27.57"E	Repair existing Gabion Structure

No.	Cluster No.	Coordinate	Engineering description of the intervention
59	4	25°36'11.22"S - 30° 4'27.75"E	Repair existing Gabion Structure
60	4	25°36'10.61"S - 30° 4'27.81"E	Repair existing Gabion Structure
61	4	S 25°36'9.99", - E 30°4'27.76"	Repair existing Gabion Structure
62	4	S 25°36'9.48", - E 30°4'27.39"	Triple sheet dongalock
63	4	25°36'9.60"S - 30° 4'27.82"E	Repair existing Gabion Structure
64	4	25°36'19.22"S - 30° 4'18.43"E	Alien Vegetation Clearing
65	4	S 25°35'42.56"- E 30°4'20.36"	Alien Vegetation Clearing
66	4	25°35'37.65"S - 30° 4'24.96"E	Repair existing Gabion Structure
67	4	25°35'38.53"S - 30° 4'25.13"E	Repair existing Gabion Structure

No.	Cluster No.	Coordinate	Engineering description of the intervention
68	4	S 25°35'39.40" - E 30°4'25.06"	Double sheet dongalock
69	4	25°35'38.53"S - 30° 4'25.13"E	Repair existing Gabion Structure
70	4	25°35'38.53"S - 30° 4'25.13"E	Repair existing Gabion Structure
71	4	25°35'42.51"S - 30° 4'25.98"E	Repair existing Gabion Structure
72	4	S 25°35'39.40" - E 30°4'25.06"	Double sheet dongalock
73	4	25°35'42.88"S - 30° 4'26.15"E	Repair existing Gabion Structure
74	4	25°34'54.17"S - 30° 4'6.92"E	Construct bird friendly fence
75	4	S 25°35'3.30" - E 30°4'7.99"	Double sheet dongalock
76	4	S 25°35'6.18"- E 30°4'7.25"	Upgrade road crossing

No.	Cluster No.	Coordinate	Engineering description of the intervention
77	4	25°35'19.30"S - 30° 4'14.39"E	Upgrade road crossing
78	4	25°35'20.57"S - 30° 4'15.56"E	Repair existing Gabion Structure
79	4	25°35'23.99"S - 30° 4'15.75"E	Repair existing Gabion Structure
80	4	25°35'24.80"S - 30° 4'16.22"E	Upgrade road crossing
81	4	25°35'26.35"S - 30° 4'16.66"E	Repair existing Gabion Structure
82	4	25°35'29.76"S - 30° 4'19.80"E	Double sheet dongalock
83	4	25°35'29.38"S - 30° 4'18.75"E	Repair existing Gabion Structure
84	4	25°35'30.05"S - 30° 4'20.63"E	Repair existing Gabion Structure

No.	Cluster No.	Coordinate	Engineering description of the intervention
85	4	25°35'30.98"S - 30° 4'21.84"E	Repair existing Gabion Structure
86	4	25°35'23.19"S - 30° 4'25.87"E	Double sheet dongalock
87	4	25°35'24.80"S- 30° 4'26.83"E	Repair existing Gabion Structure
88	4	25°35'26.35"S - 30° 4'27.26"E	Repair existing Gabion Structure
89	4	25°35'26.64"S - 30° 4'26.87"E	Double sheet dongalock
90	4	25°35'27.11"S - 30° 4'27.16"E	Repair existing Gabion Structure
91	4	25°35'27.91"S - 30° 4'27.63"E	Double sheet dongalock
92	4	25°35'28.40"S - 30° 4'27.96"E	Road crossing upgrade
93	4	25°35'29.47"S - 30° 4'28.20"E	Repair existing Gabion Structure
Cluster 5			
94	5	25°35'12.35"S - 30° 4'41.60"E	Construct bird friendly fence
95	5	25°34'58.14"S - 30° 4'38.66"E	Double sheet dongalock
96	5	25°34'57.79"S - 30° 4'38.99"E	Repair existing Gabion Structure
97	5	25°34'58.31"S - 30° 4'39.58"E	Repair spillway
98	5	S 25°34'58.00"- E 30°4'40.68"	Double sheet dongalock
99	5	S 25°34'58.03", E 30°4'41.61"	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
100	5	S 25°34'58.56", E 30°4'42.80"	Repair existing Gabion Structure
101	5	S 25°34'58.35", E 30°4'43.79"	Repair existing Gabion Structure
102	5	S 25°34'58.69", E 30°4'46.29"	Double sheet dongalock
103	5	S 25°34'59.74", E 30°4'54.27	Double sheet dongalock
104	5	25°35'0.12"S - 30° 4'54.38"E	Double sheet dongalock
105	5	S 25°35'0.01", E 30°4'55.01"	Double sheet dongalock
106	5	25°34'59.95"S - 30° 4'57.16"E	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
107	5	25°34'59.97"S - 30° 4'58.97"E	Double sheet dongalock
108	5	S 25°34'59.32", E 30°5'0.17"	Road crossing upgrade
109	5	25°34'45.82"S - 30° 4'46.33"E	Repair existing Gabion Structure
110	5	25°34'45.66"S - 30° 4'46.86"E	Repair existing Gabion Structure
111	5	S 25°34'46.19", E 30°4'46.98"	Triple sheet dongalock
112	5	S 25°34'45.69", E 30°4'48.35"	Double sheet dongalock
113	5	25°34'45.80"S - 30° 4'48.08"E	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
114	5	S 25°34'45.03" - E 30°4'47.85"	Double sheet dongalock
115	5	25°34'45.18"S - 30° 4'47.44"E	Double sheet dongalock
116	5	25°34'45.24"S - 30° 4'48.85"E	Double sheet dongalock
117	5	S 25°34'45.81" - E 30°4'49.15"	Repair existing Gabion Structure
118	5	25°34'44.82"S - 30° 4'50.85"E	Double sheet dongalock
119	5	S 25°34'44.31", E 30°4'54.06"	Double sheet dongalock
120	5	S 25°34'44.27", E 30°4'54.50"	Double sheet dongalock
121	5	S 25°34'44.53", E 30°4'54.55"	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
122	5	S 25°34'44.67", E 30°4'55.00"	Double sheet dongalock
123	5	25°34'45.25"S - 30° 4'55.29"E	Road crossing upgrade
124	5	S 25°34'45.70"- E 30°4'53.79"	Double sheet dongalock
125	5	S 25°34'46.08", E 30°4'54.03"	Repair existing Gabion Structure
126	5	S 25°34'47.61", E 30°4'59.63"	Road crossing upgrade
127	5	S 25°34'46.87", E 30°5'0.47"	Road crossing upgrade
128	5	25°34'30.83"S - 30° 4'51.83"E	Road crossing upgrade

No.	Cluster No.	Coordinate	Engineering description of the intervention
129	5	25°34'31.06"S - 30° 4'51.02"E	Double sheet dongalock
130	5	25°35'12.35"S - 30° 4'41.60"E	Construct bird friendly fence
131	5	25°34'25.95"S - 30° 4'40.75"E	Construct bird friendly fence
132	5	25°34'30.31"S - 30° 4'39.21"E	Double sheet dongalock
Cluster 6			
133	6	S 25°34'7.45", E 30°4'45.51"	Upgrade road crossing
134	6	25°33'52.39"S - 30° 5'5.16"E	Upgrade road crossing
135	6	25°32'32.24"S - 30° 4'16.37"E	Dam wall repair
136	6	25°33'8.60"S - 30° 4'34.32"E	Double sheet dongalock
Cluster 7			
137	7	25°30'28.14"S - 30° 4'36.42"E	Double sheet dongalock
138	7	25°30'30.50"S- 30° 4'47.82"E	Road crossing upgrade
139	7	25°30'49.97"S - 30° 5'5.88"E	Spillway Upgrade
140	7	25°30'47.44"S - 30° 5'14.46"E	Spillway Upgrade
141	7	25°30'52.39"S - 30° 5'26.09"E	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
142	7	25°30'53.76"S - 30° 5'28.40"E	Double sheet dongalock
143	7	25°30'55.25"S - 30° 5'29.98"E	Double sheet dongalock
144	7	25°30'56.12"S - 30° 5'31.18"E	Double sheet dongalock
145	7	25°30'58.77"S - 30° 5'34.40"E	Double sheet dongalock
146	7	25°31'2.44"S -30° 5'36.70"E	Double sheet dongalock
147	7	25°31'3.93"S - 30° 5'37.15"E	Double sheet dongalock
148	7	25°31'8.73"S - 30° 5'39.59"E	Double sheet dongalock
149	7	S 25°31'10.00", E 30°5'40.55"	Double sheet dongalock

No.	Cluster No.	Coordinate	Engineering description of the intervention
150	7	25°31'11.25"S - 30° 5'41.41"E	Double sheet dongalock
151	7	25°31'12.62"S - 30° 5'42.03"E	Double sheet dongalock
152	7	25°31'13.77"S - 30° 5'41.92"E	Double sheet dongalock
153	7	S 25°31'14.08" - E 30°5'42.49"	Double sheet dongalock
154	7	25°31'18.76"S - 30° 5'41.72"E	Double sheet dongalock
155	7	S 25°31'19.16"- E 30°5'41.51"	Double sheet dongalock
156	7	25°31'19.12"S- 30° 5'40.81"E	Road crossing upgrade
157	7	S 25°31'19.87", E 30°5'41.82"	Road crossing upgrade
158	7	25°31'20.11"S - 30° 5'43.31"E	Road crossing upgrade

No.	Cluster No.	Coordinate	Engineering description of the intervention
159	7	S 25°31'20.73", E 30°5'44.80"	Road crossing upgrade
160	7	S 25°31'20.26", E 30°5'55.33"	Road crossing upgrade

No.	Cluster No.	Coordinate	Engineering description of the intervention
161	7	25°30'57.37"S - 30° 5'49.19"E	New Head Cut Drop structure
162	7	S 25°30'57.68", E 30°5'46.93"	New Head Cut Drop structure

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