

DRAFT BASIC ASSESSMENT REPORT

Casteel Dam Safety Rehabilitation Project (DSRP),
Remaining Extent of the Farm Kasteel 231-JU,
Bushbuckridge Local Municipality, Ehlanzeni District,
Mpumalanga Province, South Africa

REPORT DATE: 20 June 2023

DFFE Ref. no: To be issued.

Prepared by:



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DRAFT AVAILABLE FOR 30 DAYS PUBLIC REVIEW & COMMENT

DRAFT BASIC ASSESSMENT REPORT FOR THE PROPOSED CASTEEL DAM SAFETY REHABILITATION PROJECT (DSRP) ON THE REMAINING EXTENT OF THE FARM KASTEEL 231-JU, BUSHBUCKRIDGE LOCAL MUNICIPALITY, EHLANZENI DISTRICT MUNICIPALITY, MPUMALANGA PROVINCE, SOUTH AFRICA (DFFE Ref no. Pending)

Prepared for:



water & sanitation

Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

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Chief Directorate: Strategic Infrastructure Asset Management (SIAM)
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SACNASP and EAPASA Registered

.....
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A. FOREWORD

Applicant

The National Department of Water and Sanitation (DWS), Chief Directorate: Strategic Infrastructure Asset Management (SIAM) is the custodian of all department dams and assures safety at all state dams. The directorate is based in Pretoria in the Gauteng Province.

The DWS conducts Dam Safety Evaluations (DSE) every five (5) years in terms of the Dam Safety Regulations (GNR 132, 24 February 2012) at all state dams. Any safety risks identified at these dams are placed on the Dam Safety Rehabilitation Programme (DSRP) for repair. By repairing the dams, the DWS ensures that the lifespan of dam structures is prolonged, and the safety of the structures are improved to comply with the Dam Safety Regulations.

DWS has identified several shortcomings at Casteel Dam and the dam has been placed on the DSRP for scheduled rehabilitation works. To commission the rehabilitation works the department requires an issued environmental authorisation from the National Department of Forestry, Fisheries and Environment (DFFE).

The application for environmental authorisation has been lodged with the DFFE and is currently subject to a Basic Assessment (BA) and public participation process (PPP) by an independent Environmental Assessment Practitioner (EAP).

Independent Environmental Assessment Practitioner (EAP)

Naledzi Environmental Consultants (Pty) Ltd have been appointed as the independent EAP to undertake and manage the BA and public participation process for project in line with the requirements of the NEMA EIA Regulations of 2014 (GNR 326 as amended in 2017). Naledzi is based in Polokwane in the Limpopo Province, approximately 250km northwest from Casteel Dam.

Naledzi has no vested interest (either business, financial, personal, or other) in the proposed activity proceeding other than remuneration for work performed. Our fees are based on the South African Council for Natural Scientific Professionals (SACNASP) Recommended Consultation Fees (Notice 98 of 2021). We do not echo the views of the applicant however provide an independent view formed by tasks conducted under the NEMA and the EIA Regulations. The payment of our professional fees is therefore not subject to the outcome of the BA process.

Competent Authority

The National DFFE will be responsible to evaluate the BA process reports and to issue the environmental authorisation to DWS: SIAM.



**forestry, fisheries
& the environment**

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REPUBLIC OF SOUTH AFRICA

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473 Steve Biko Road
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0083

B. PURPOSE OF THE REPORT

The Basic Assessment (BA) process is conducted in line with Regulation 19, 39-44 of the NEMA EIA Regulations of 2014 (GNR 326 as amended in 2017). The regulations require the EAP to submit a Basic Assessment Report (BAR) and Environmental Management Programme (EMPR) to the DFFE for decision-making, which have been subjected to a 30-day consultative process.

The purpose of the BAR is to inform the DFFE and the public of the environmental consequences of the project and to recommend mitigation measures to be observed to minimise these to acceptable levels.

The EMPR prescribes the environmental specifications to be adhered to during the execution of the rehabilitation works. The EMPR will become legally binding on the DWS once the environmental authorisation is issued by DFFE.

This BAR and the attached EMPR is herewith made available for a 30-day public review and comment period from **30 June to 31 July 2023** to provide Interested and Affected Parties (I&APs) the opportunity to review and comment on its content.

The BAR and EMPR is available for download from the Naledzi website at <http://www.naledzi.co.za/public-documents-naledzi.php> under project heading 'Casteel DSRP'. Hard copies of the BAR are also on display at the following public venues in the project area:

Table 1: Details of public venues

Location	Contact details	Address
Moreipuso Tribal Office	Norman Mahlala 082- 675-1938	Wales Road, Casteel
Setlhare Tribal Office	Myrah Machate 072-404-0524	Greenvalley, Acornhoek
Casteel Thusong Service Centre	Absalom Malope 072-144-7952	Casteel, R40 Main Road
Faith Mission Church	Lodrick Selowe 072-843-2572	Chochocho (next to old Co-op)

If you wish to comment on the draft reports, you can write a letter, or any additional written submission by email, or contact Naledzi at the below given details. Please submit your comments together with your name and contact details to Naledzi **on or before 31 July 2023.**

All the comments received will be incorporated into the Final BAR and EMPR submitted to the DFFE for decision making.

COMMENTS AND QUERIES CAN BE SUBMITTED TO:

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1. INTRODUCTION

1.1 OVERVIEW

The Department of Water and Sanitation (DWS) Chief Directorate of Strategic Infrastructure Asset Management (SIAM) is responsible for the operation and maintenance of state dams. DWS have applied for environmental authorisation to the National Department of Forestry, Fisheries and Environment (DFFE) to initiate scheduled rehabilitation works at Casteel Dam.

Casteel Dam is a Category II (i.e., significant hazard potential) medium-sized earth-filled embankment dam built in 1965 by the Department of Water Affairs and Forestry. The dam is located next to the R40 Bushbuckridge/Acornhoek Main Road, 17km South of Acornhoek in the Lowveld area of the Mpumalanga Province of South Africa. The dam supplies water to the Dingley Dale Irrigation Scheme (i.e., government water scheme) and for domestic use to downstream communities.

DWS: SIAM conducted routine Dam Safety Evaluations (DSE) at Casteel Dam in 2001 and 2015 which identified numerous safety risks at the dam in need of repair. The main issues being:

- The downstream slope of the dam embankment is steep and may cause rotational slope failure.
- The dam wall is infested with termites.
- The outlet works is defective.
- The spillway is freely draining forming a large gully downstream in the spillway channel progressing towards the spillway.

In January 2001 DWS installed an emergency siphon pipe to provide downstream communities with drinking water (Nepid, 2022). Casteel Dam is now going to be repaired as part of the DWS's Dam Safety Rehabilitation Programme to improve the safety of the dam and prolong its lifespan and to ensure compliance with the Dam Safety Regulations. The works include the dam embankment, spillway, outlet works, intake tower and a large donga. The gravel access intersection with the R40 Main Road to the dam will also be realigned to allow for better maneuverability to and from the site.

The proposed works trigger several listed activities scheduled under the Listing Notices 1 (GNR 327) and Notice 3 (GNR 324) as published under the National Environmental Management Act, 1998 (Act 107 of 1998) EIA Regulations of 2014 (GNR 326) therefore require environmental authorisation subject to a Basic Assessment (BA) process and public participation process before it can be commissioned.

Naledzi Environmental Consultants (Pty) Ltd have been appointed by the DWS: SIAM as the independent environmental assessment practitioner (EAP) to conduct the statutory BA process and public participation process for the project.

No water use license is required for Section 21 water uses in terms of the National Water Act, 1998 (Act 36 of 1998). The DWS: SIAM is exempted since the works involves the refurbishment of an existing government waterworks, approved by the Minister in accordance with section 110 of the NWA. The Department of Water and Sanitation Deputy Director General, Margaret-Ann Diedricks, issued the relevant directive on 21 December 2015 (refer to **Appendix A**).

1.2 DETAILS OF THE PROJECT TEAM

1.2.1 Details of the Applicant

Table 2: Details of Applicant

Description	Details
Organ of State:	Department of Water and Sanitation (DWS) Chief Directorate: Strategic Infrastructure Asset Management (SIAM)
Contact Person:	Mr John Kgopiso (Director)
Address:	Sedibeng Building, 185 Francis Baard Street Pretoria, 0001
Contact number:	+2712-336-8726
Email:	KgopisoJ@dws.gov.za

1.2.2 Details of EAP who prepared report

Table 3 provides the details of the EAP and senior environmental scientist involved in the compilation of the report. The signed declaration of independence by EAP is attached under **Appendix B1**.

Table 3 Details of EAP

Registered EAP Details	Senior Environmental Scientist Details
Naledzi Environmental Consultants (Pty) Ltd	
Prof. Desmond Musetsho	Marissa Botha
Contact number: +2783-410-1477	+2784-226-5584 / 087-550-1529
Fax: 087-550-1537	
Email: dmusetsho@naledzi.co.za	botham@naledzi.co.za

1.2.3 Expertise of EAP

The qualifications of the project team managing the BA process are provided in **Table 4** and copies of qualifications are provided in **Appendix B2**.

Table 4: Qualifications and professional registration of EAP

Name	Qualifications	Years' experience	Professional Registration
Prof. Desmond Musetsho	(PhD) Pri.Sci.Nat M.Inst.D	19	EAPASA, SACNASP, SAIIES
Marissa Botha	18 years working experience. Wetland Assessment, DWS Wetland Impact Assessment, Rhodes University.	18	SACNASP

The expertise and experience of the project team including a past projects list is detailed in the attached curriculum vitae provided in **Appendix B3**.

Prof. Desmond Musetsho is a registered Environmental Assessment Practitioner with the Certification Board for Environmental Assessment Practitioners South Africa (EAPASA), Environmental Scientist accredited by South African Institute of Ecologists and Environmental Scientists (SAIEES) and a registered Environmental Scientist with the South African Council for Natural Scientific Professions (SACNASP) with 19 years working experience in the environmental management industry.

Marissa Botha is a registered professional Environmental Scientist with the SACNASP and has 18 years working experience in the environmental management industry.

1.2.4 Independent Specialist Team

Regulation 12 (2) of the EIA Regulations state that in addition to the appointment of an EAP, a specialist may be appointed if the level of assessment is of a nature requiring the appointment of a specialist.

The independent specialists who were involved in the preparation of the BAR, including the environmental sensitivity themes investigated, are detailed in **Table 5**. Refer to **Appendix E1** for declaration of independence by specialists. These specialists are from the Lowveld area contributing local knowledge to the assessment.

Table 5: Details of Independent Specialists

Theme	Company	Specialist
Terrestrial Biodiversity (Plant, Animal Species)	Digital Earth (Pty) Ltd MBOMBELA	Duncan McKenzie (SACNASP Reg. no 122647)
Aquatic Biodiversity	Nepid Consultants CC WHITE RIVER	Rob Palmer (SACNASP Reg. no 400108/95)
Heritage, Cultural	Agri Civils Geo-Tech & Heritage LYDENBURG	Tobias Coetzee (ASAPA. No 289)
Traffic	Hamantino Consulting Engineers WHITE RIVER	Hendrikus Swart PR. 200270005

2. PROJECT LOCATION

2.1 AFFECTED PROPERTY DESCRIPTION

Casteel Dam is located on the Remaining Extent of the farm Kasteel 231-JU, 15km North of Bushbuckridge Town, along the R40 Bushbuckridge-Acornhoek Road between Arthur’s Seat and Casteel (**Figure 2-1, Figure 2-3, and Appendix C1**). The dam is located on a tributary of the Tlulandziteka River in the Sand River Catchment (**Figure 2-2**). The detailed site description is provided in **Table 6**.

Table 6: Detail site description

Province/s	Mpumalanga Province
District Municipality/ies	Ehlanzeni District Municipality
Local Municipality/ies	Bushbuckridge Local Municipality
Ward number/s	Wards 16, 14 and 32 (situated at a convergence of wards)
Nearest town/s	15km North of Bushbuckridge and 17km South of Acornhoek
Farm name, number, portion	Kasteel 231-JU; Portion 0 (Remaining Extent)
Surveyor General 21 digit code:	T0KU00000000023100000
Coordinate of site	S 24°41 '33.52” E 31°1 '35.17”

2.2 LANDOWNERSHIP

2.2.1 Landowner

Casteel Dam is situated on State Land under the jurisdiction of the Department of Agriculture, Land Reform and Rural Development (DALRRD) (Title Deed number T9370/2012). However, all dams fall under the custodianship of the DWS.

The DALRRD have granted consent to Naledzi for the continuation of the BA process in respect of the Farm Kasteel 231-JU (see **Appendix C2**).

2.2.2 Person in Control of Land

The land is under the control of the Moreipuso and Setlhare Traditional Authorities and falls within Wards 16, 14, 22 and 32 of the Bushbuckridge Local Municipality (Refer to **Figure 2-4**). The tribal authorities have been informed and consulted as detailed under section 8 of this report.



Figure 2-1:Regional Locality Plan showing the location of Casteel Dam, north of Bushbuckridge Town, next to the R40 Bushbuckridge-Acornhoek Road, between Arthur's Seat and Casteel. Image courtesy of Google Earth™



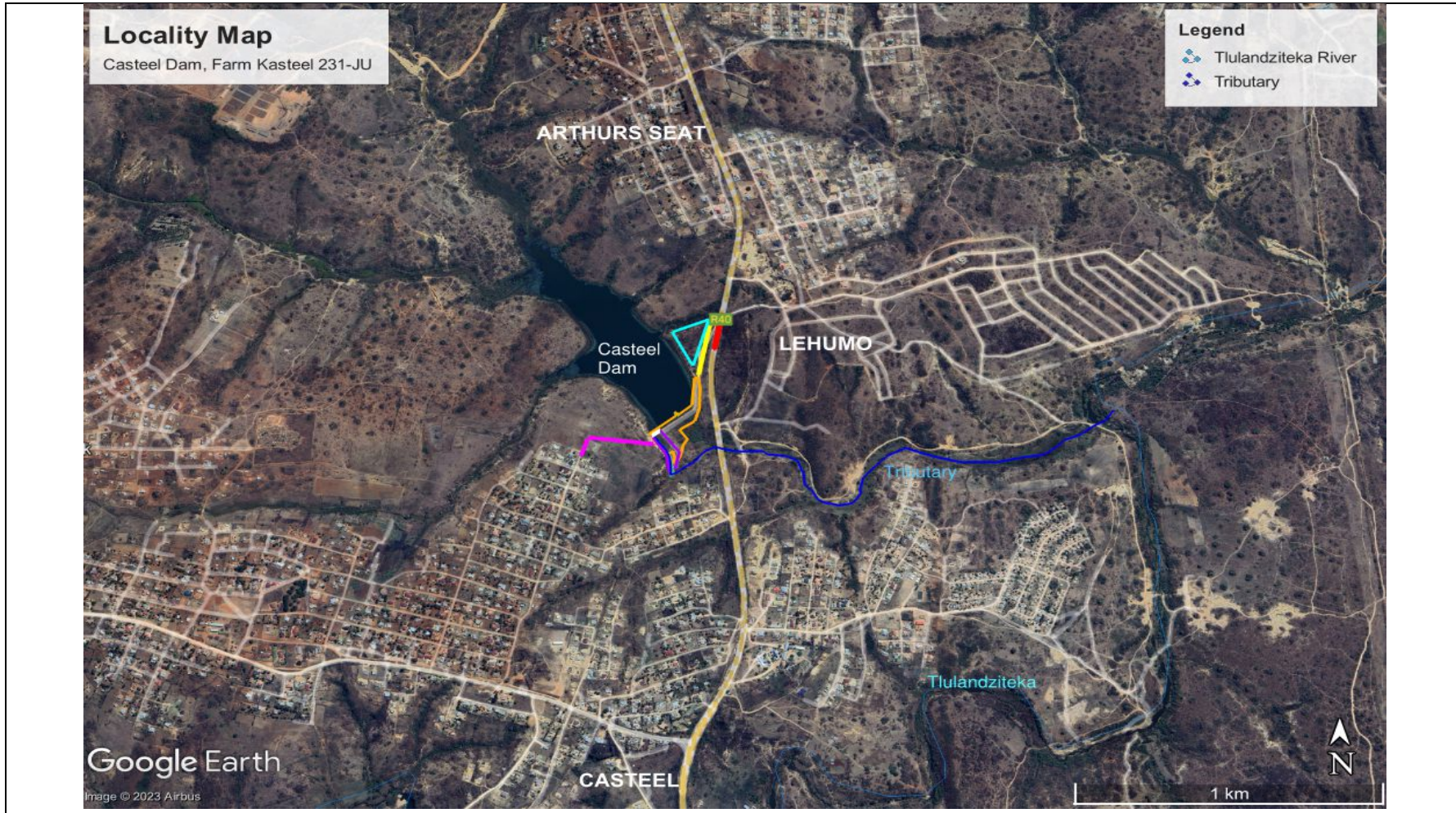


Figure 2-2: Google Earth Satellite image showing the location of Casteel Dam on a tributary of the Tlulandziteka River, along the R40 Bushbuckridge-Acornhoek Road.

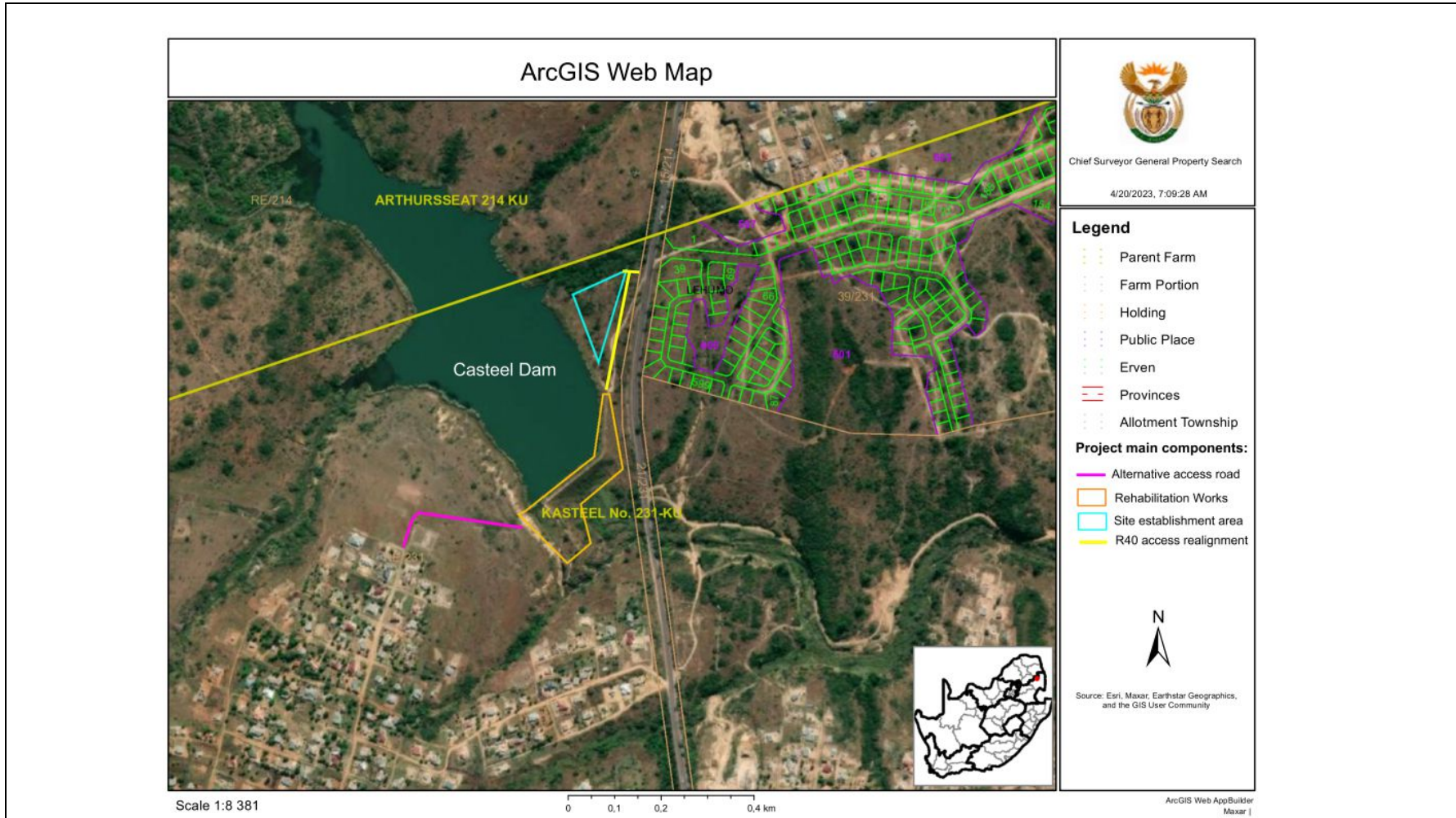


Figure 2-3: Map illustrating the affected property (i.e., Farm Kasteel 231-JU)

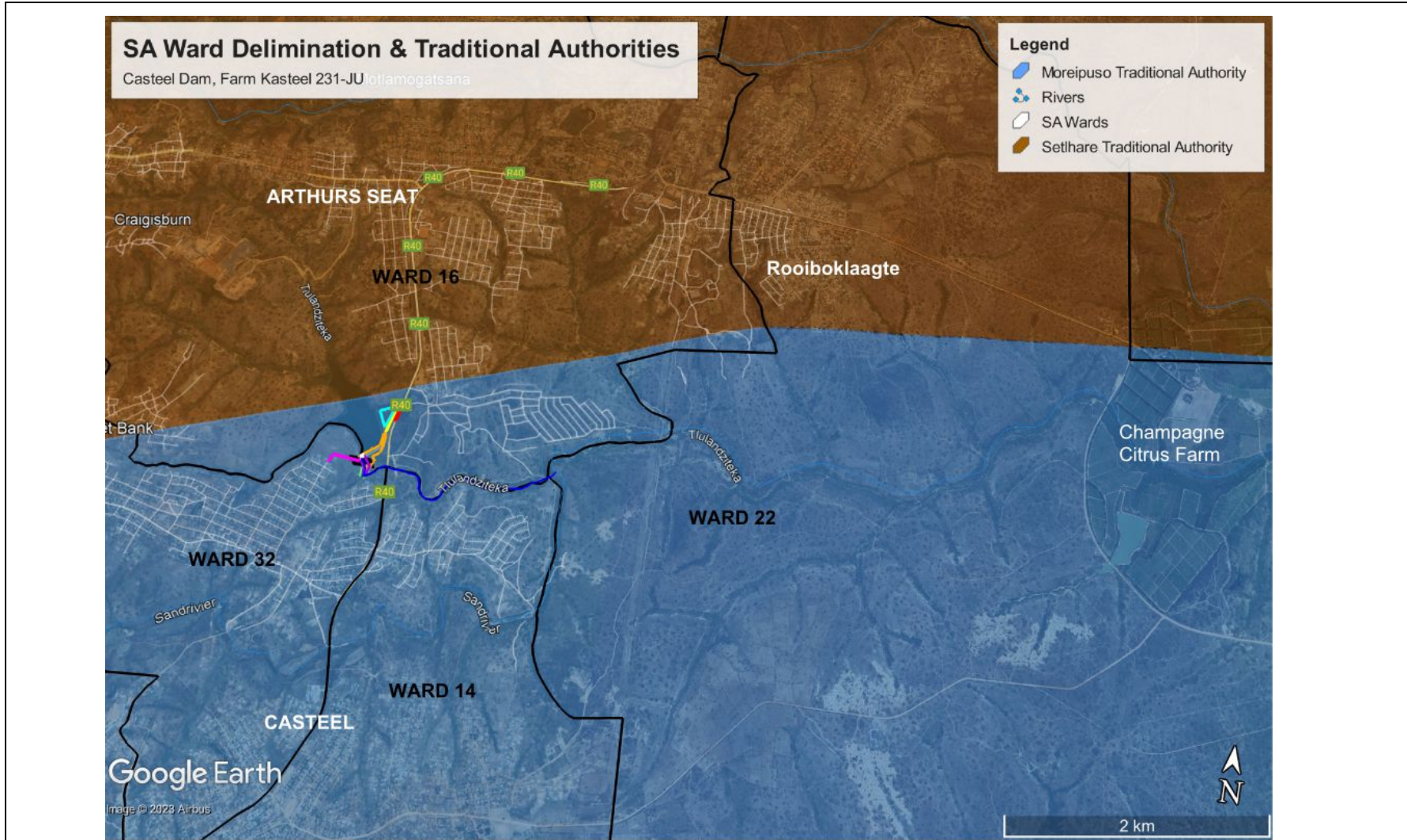


Figure 2-4: Bushbuckridge Local Municipality ward delimitation and traditional authorities applicable to the project area



3. BACKGROUND AND SAFETY EVALUATION FOR CASTEEL DAM

3.1 FEATURES OF CASTEEL DAM

As mentioned in section 1, Casteel Dam is a Class II medium-sized earth-filled embankment dam (L-shaped) with a surface area of approximately 16-hectares and capacity of 1.18 million m³. The dam has a sharp crested weir spillway on its western bank (right flank) (**Plate 1, Table 7**). (*DWS, Proposed Rehabilitation Works of Casteel Dam Design Report, 2014*).



A

Plate 1: Casteel Dam with a spillway on the western bank (right flank). Image courtesy of Nepid, 2022

Table 7: Casteel/Ga-Josefa Dam Specifications	
SPECIFICATION	DESCRIPTION
Classification:	Category II medium-sized dam Significant hazard potential
Fully Supply Level (FSL) Capacity:	1.18 million m ³
Crest Length and Width:	Length: 255m Width: 3.5-4m
Dam Wall Height:	16.6m
Slope:	Downstream = 1:1.75
Regional Maximum Flood:	430m ³ /s
Spillway Type:	Sharp-crested weir spillway
Spillway Capacity:	125m ³ /s (right flank and outlet works)
Dam FSL Surface Area:	Approximately 16 hectares
Catchment	Sand River Catchment (Region X32A)

3.2 DSE SAFETY RISKS IDENTIFIED

The DWS: SIAM is the custodian of all state dams and conducts 5 yearly dam safety evaluations in terms of the Dam Safety Regulations (GNR 132, 24 February 2012) on these dams owned by the department. Based on the recommendations of the DSE Report, a list of shortcomings was identified at Casteel Dam i.e.

- The slope on the downstream dam embankment is steep therefore unstable with a for potential slip failure.
- The downstream toe of the dam is saturated from seepage through the dam wall embankment.
- The outlet work (emergency siphon) is defective. A temporary pipeline has been installed to release water to downstream water users.
- The dam is freely discharging from the spillway to the river which resulted in a deep erosion gully downstream in the spillway channel on the right (western) flank of the dam.
- The spillway capacity is inadequate and has eroded to rock level. It cannot handle the 430m³ Regional Maximum Flood to and requires the dam embankment to be raised. If not rehabilitated it may overtop the embankment during RMF flood events.
- Termite infestation is present on the dam embankment/wall. The termite burrows could result in tunnels through the dam wall and may cause piping through the structure.

Refer to **Plate 2 - 3** below.

The above list of shortcomings has informed a recommended scope of works for the rehabilitation of the Casteel Dam. No expansion of the dam or construction of a new facility is proposed.

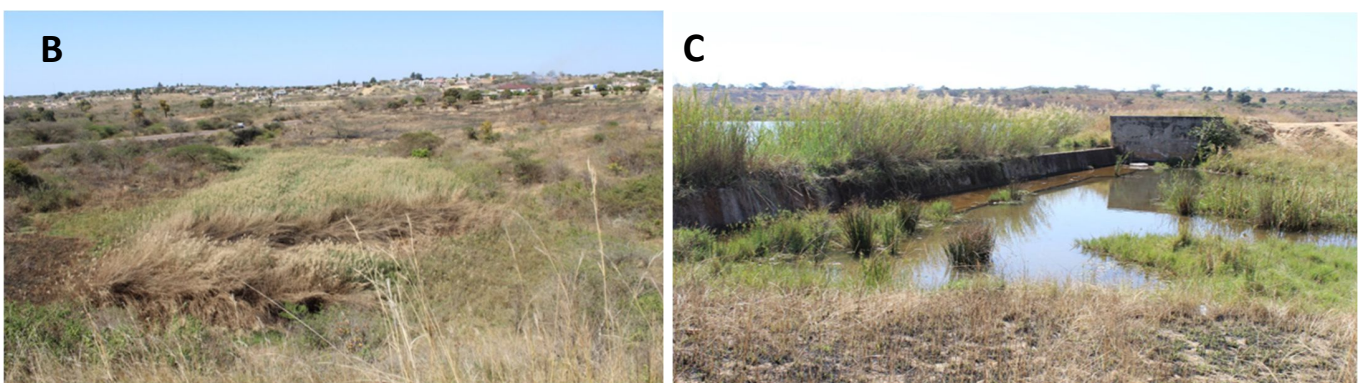


Plate 2: (B) Seepage below dam embankment (C) Spillway apron

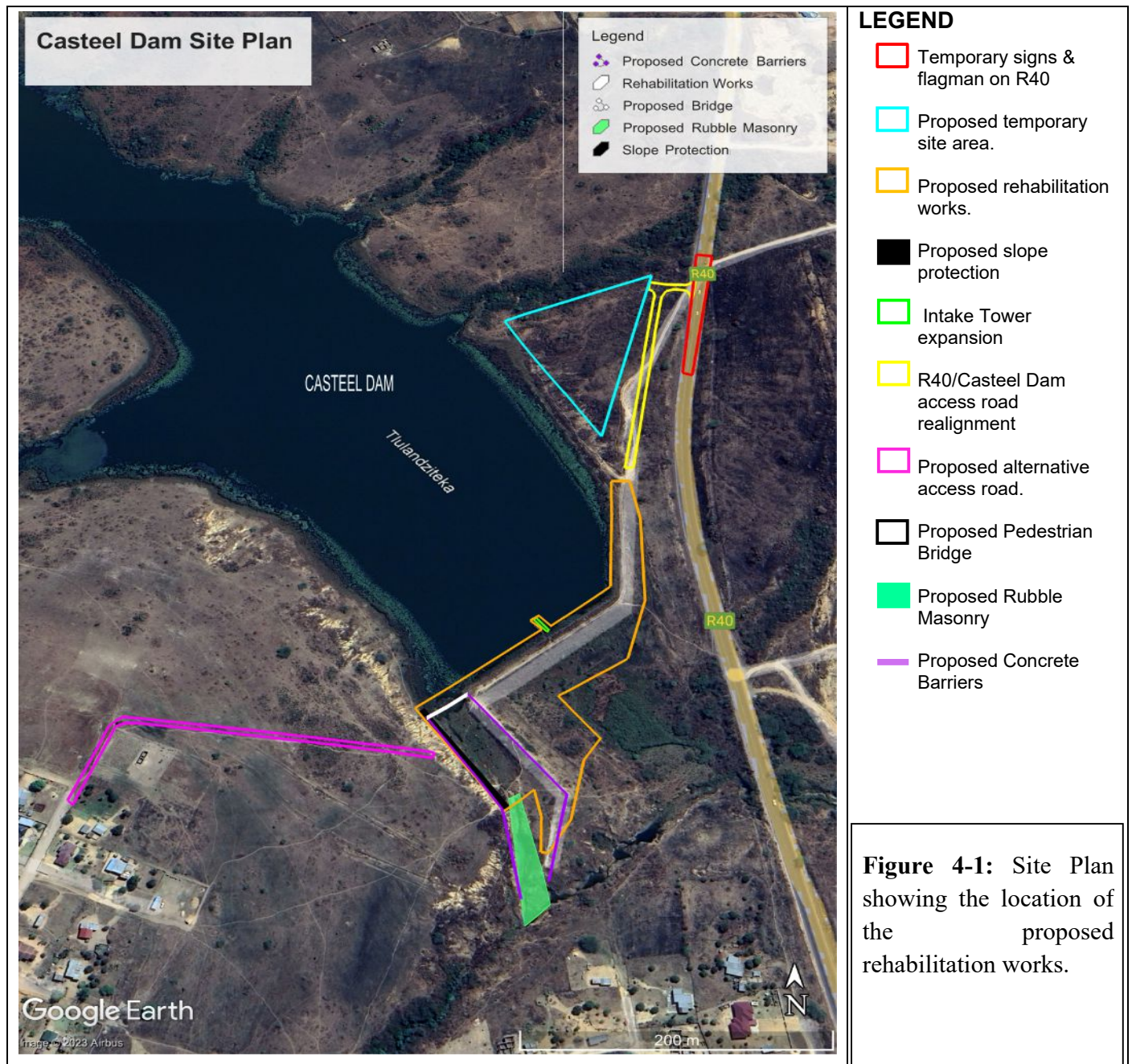


Plate 3: (D) Erosion along the right flank of Casteel Dam; **(E)** Termites colonising the dam wall/crest, **(F)** Large donga in the spillway channel; **(G)** Intake tower (metal/iron parts removed overtime making it unsafe **(H)** & **(I)** Temporary pipeline over the dam embankment releasing water to downstream water users.

4. PROPOSED SCOPE OF WORKS AT CASTEEL DAM

4.1 SITE PLAN

Figure 4-1 provides the Site Layout Plan illustrating the location and components of the repair works to be implemented at Casteel Dam. The Design Reports and drawings are attached under **Appendix D1**.



4.2 DESCRIPTION OF PROPOSED ACTIVITIES

With reference to the Site Plan (**Figure 4-1**), the scope of works will include six main components as detailed in **Table 8**. The rehabilitation components are described in more detail in sections 4.2.1 (**Table 9**).

Table 8: Main components of Casteel DSRP

No.	Activity	Extent	Description
1	Rehabilitation works at the embankment, spillway, outlet works and intake tower.	<u>28,500m²</u> <u>(2.85-hectares)</u>	<ul style="list-style-type: none"> ▪ 10 000m² works on a spillway section and embankment. ▪ 10 000m² works on main embankment. ▪ 500m² works on pipe trenches. ▪ 8000m² access to wall
2	Donga erosion rehabilitation.	<u>2,200 m²</u> <u>(0.22-hectares)</u>	<ul style="list-style-type: none"> ▪ 1400m²/0.14ha Rubble masonry. ▪ 800m² / 0.08ha, 1.2m high concrete barrier
3	Proposed Pedestrian Bridge	<u>Approx. 70m²</u> 37 meters in length	Construction of 37 meters in length pedestrian bridge over the spillway. The current walk path will be closed by the newly constructed concrete barrier.
4	R40/Casteel access road realignment	6-meters wide 250-meters in length	<p>Realignment and upgrading of the existing from the R40 to the toe of the dam with imported material.</p> <p>This is to accommodate construction vehicles including operation and maintenance traffic to the dam.</p> <p>During construction, temporary signs and flagmen will be placed along the R40 in proximity of the dam access intersection to reduce traffic speeds from 100km/hr to 60km/hr (with the approval of SANRAL).</p>
5	Temporary site establishment area	0.9-hectares	Construction site laydown area
6	Create alternative gravel access road	4-5 meters wide 300-350-meters in length	Construction access from Casteel village to the spillway section of the dam.

A large extended pipe is currently releasing water downstream to the irrigation scheme users and communities. During the outlet works repair, one out the three existing outlet pipes will always be available to release water to downstream water users. Once the rehabilitation works are done, DWS will stop the temporary measure and the outlet works would continue to release water as usual.

All reeds and vegetation on the spillway approach channel and upstream slope along the dam embankment will be removed as part of the rehabilitation works. It will promote the free flow of water, prevent spillway blockages, and allow for the placement of slope protection material. The areas for components 3 – 5 (Table 8) comprise degraded indigenous vegetation that will also need to be cleared.

4.2.1 Rehabilitation Works Components

The components forming part of the rehabilitation works at the dam embankment, spillway section, outlet works, and Intake Tower are detailed in **Table 9**.

Table 9: Description of components of rehabilitation works at the dam embankment and donga.

No.	Rehabilitation Works Component	Proposed Works
1	Raise the non-overspill crest (NoC)	<ul style="list-style-type: none"> - Raising of the embankment crest by 2-meters (from 604 to 606 mabsl) by constructing a 2.15-meter-high concrete parapet wall with a 1.2-meter-wide base on NoC; - Raise the existing concrete wall on the right flank (next to the spillway) to the new NoC level.
2	Stabilization of downstream slope of dam embankment	<ul style="list-style-type: none"> - Flatten the slope to 1:2.5 by adding earth fill. - Widen embankment crest from 4-5-meter by adding layers of material on the downstream side. - Protect downstream slope by adding a gravel layer.
3	Spillway channel (34m wide and 150m in length)	<ul style="list-style-type: none"> - Slope channel (right and left flank) to 1:0.75 - Line spillway using Amoflex / Geocell (i.e., slope protection) - Construct a new training wall raised to 605.5 mabsl (existing wall foundation to be demolished).
4	Embankment drainage and filter system	<ul style="list-style-type: none"> - Construct an inclined chimney drain and a toe drain to control dam wall seepage. - Two 160mm perforated collector pipes (embedded in 19mm stone) will discharge collected seepage. - A V-notch will be used to monitor seepage. - Existing 3 x 250mm pipes will be replaced with up to 1000mm diameter pipes.
5	Repair/refurbishment of the dam outlet works (i.e., use siphon to drawdown water) and Intake Tower.	<ul style="list-style-type: none"> - A temporary coffer dam will be constructed around the Tower to create a safe working space. - Repair outlet works. - Expand dimensions of concrete intake tower to 5m x 5m, currently the dimensions are 1.5m x 1.5m. - Provide a concrete intake tower bridge.
6	Construction of a paved walkway on the dam crest.	
7	Donga erosion rehabilitation works	<ul style="list-style-type: none"> - Rock stabilization by adding rubble masonry 1400m²/0.14ha to line the river return channel. - 800m² / 0.08ha to construct a 1.2m high concrete barrier along both sides of the Donga, starting from the spillway ending before the river connection point. This will prevent animals and humans from falling into the Donga.

4.2.2 Project Phases

The project will only comprise a Construction phase of twenty-four (24) months. The DWS Chief Directorate: Construction Management will undertake the rehabilitation works.

4.2.3 Construction Workforce and Labour

It is predicted that a minimum of 150 and maximum of 200 workers will be onsite daily, dropped off by public transportation.

Skilled labour will be supplied by the DWS Construction Management team and unskilled labour will be sourced from the local communities. The local labour will be identified/selected by the project steering committee (PSC) in consultation with the political principals, traditional councils, local authority and ‘a stakeholder committee’ in its entirety.

4.2.4 Construction Material

No borrow pit or quarry will be established. All required construction material will be sourced from a licensed commercial quarry/crusher (probably near Agin Court Region). The exact location of the quarry has not been finalised yet.

The volumes of required material include:

- 28 000m³ of gravel
- 5000m³ of concrete
- 2500m³ of Rockfill

The construction material will be transported to site using 6m³ trucks. The importation of filling material will take place within the first 3 months of the construction period.

4.2.5 Material Stockpile Areas

Material stockpiles must be confined to the site establishment area. At the spillway section, the material stockpile (if required) should be placed 100 meters west of the spillway along the alternative access road. The area allocated for this is less than 2000m². Hessian will be placed along the perimeter to prevent stormwater carrying soil into the dam and or other watercourses. See **Figure 4-2** overleaf for the proposed location of stockpiles.

These are all above Casteel Dam and its downstream tributary ‘area of inundation’ (**Appendix D2**) in a flood event.

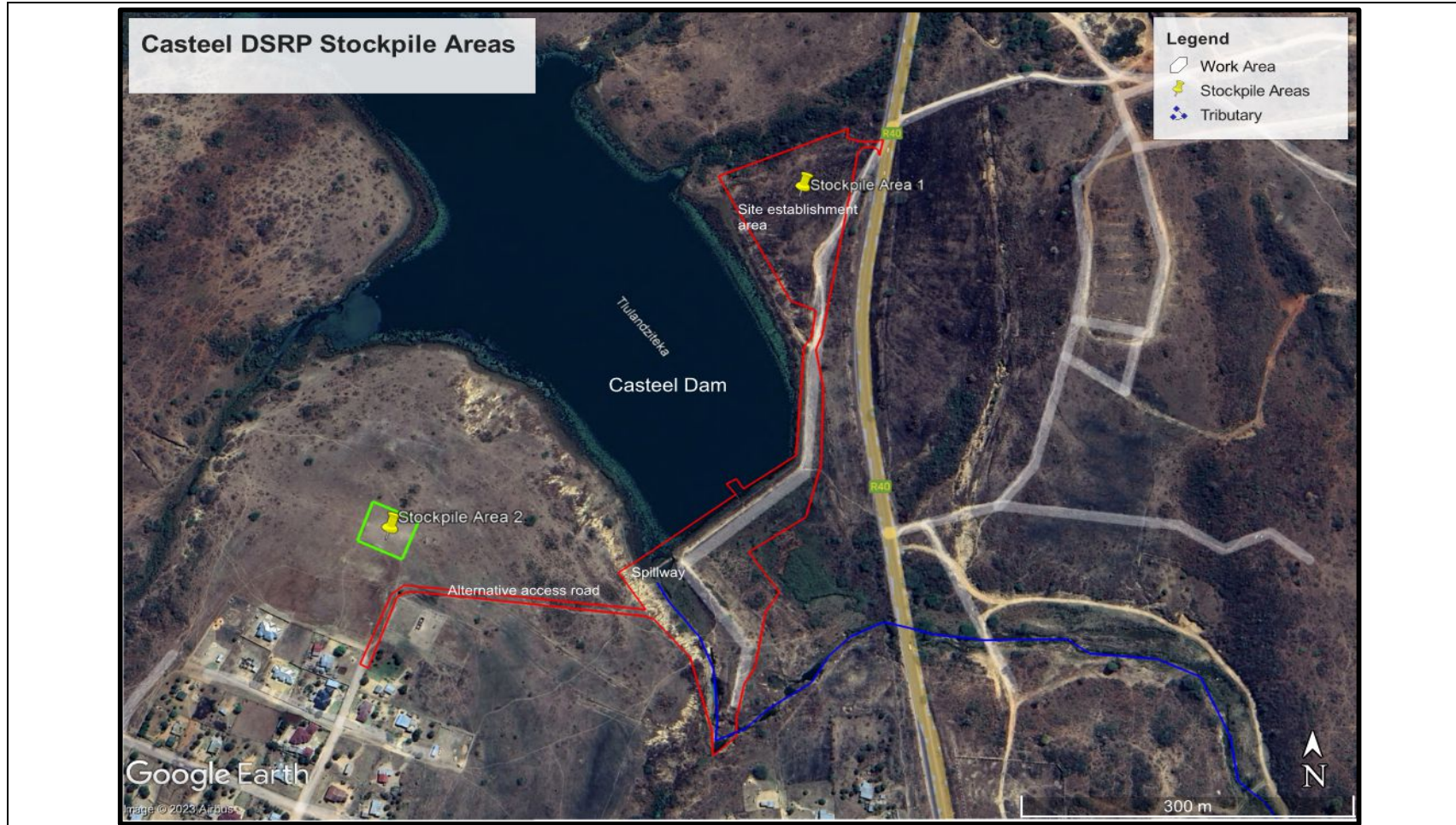


Figure 4-3: Proposed stockpile areas for Casteel DSRP. The red polygon represents the works footprint area. Stockpile area 1 is at the site establishment area. The green polygon presents the stockpile area 2(if required) at the spillway section (imagery courtesy of Google Earth)

4.2.6 Predicted Construction Traffic

The construction vehicle trip generation will likely include tipper trucks, importing material from the quarry to the dam wall and public transportation transporting workers to and from the site.

4.2.7 Access Road to be used

The construction traffic will use two access roads i.e.

- The R40/ existing Casteel Dam access intersection.
- R40 / D3950 intersection (Wales Road) to access the spillway section.

The existing R40/Casteel Dam access road will be slightly realigned to allow for better manoeuvrability to and from the R40. The construction trucks (importing borrow material) could approach the Casteel Dam from either North or South. It is however most likely to approach the Casteel Dam from the South.

The R40/D3950 intersection (Wales Road) will be used to access the spillway section on the right (western) flank of the dam. A short 300-350-meter gravel access road will be created from the village road to the dam.

4.2.8 Solid Waste Management

The construction phase will generate solid waste of which none will be hazardous. The solid waste will be collected by truck of the appointed Contractor and removed to the Casteel Waste Disposal Site. The waste disposal site is ‘*licensed for closure*’, but still in use by Bushbuckridge Local Municipality until the proposed Thulamahashe Regional Landfill Site is complete in 2025.

The volume of waste to be generated is however unknown at this stage.

4.2.9 Effluent Management

The activity will not generate sewage. Mobile chemical toilets for construction staff will be provided at the temporary site establishment area (i.e., construction laydown area). The chemical toilets will be provided and serviced by an external contractor i.e., Talisman, Coastal Hire etc.

4.3 PROJECT SCHEDULE

The anticipated project schedule is provided in **Table 10**.

Table 10: Project Schedule

No.	Project Phase	Time frame	Period
1	BA process	18 months	Done by December 2023
2	Contractor Procurement	6 months	January to June 2024
3	Construction period	24 months	July 2024 to June 2026
Total		48 months	

4.4 NEMA LISTED AND SPECIFIED ACTIVITIES

The confirmed listed activities for which application for environmental authorisation has been lodged to the DFFE are detailed in **Table 11**.

Coordinate points indicating the location of each listed activity is provided under **Appendix D3**.

Table 11: Triggered listed activity applicable to the Casteel DSRP

Listing Notice 1 (GNR 327)		
Activity No(s):	Description	Description of portion of project to which the applicable listed activity relates:
19	Infilling or depositing of any material of more than 10m ³ into or dredging, excavation, removal or moving of soil, sand shells, shell grit, pebbles, or rock of more than 10m ³ from /into a watercourse.	<p>The proposed rehabilitation works will result in the infilling of more than 10m³ into/from a watercourse i.e.,</p> <ul style="list-style-type: none"> ▪ Concrete parapet wall with 1.2m wide base, ▪ Earth fill to flatten downstream slope. ▪ Sloping of spillway channel. ▪ Construction of chimney drain and toe drain, ▪ Temporary coffer dam and expansion of intake tower. ▪ Rock stabilisation and erosion protection by rubble masonry. ▪ Concrete barrier ▪ Pedestrian bridge over spillway <p>The rehabilitation works will take place in and on the embankment of the Casteel Dam (watercourse) and within a Channelled Valley Bottom (CVB) wetland associated with the tributary of the Tlulanziteka River.</p> <p>The material volumes to be used as infill as part of the rehabilitation works include:</p> <ul style="list-style-type: none"> ▪ 28 000m³ of gravel ▪ 5000m³ of concrete ▪ 2500m³ of Rockfill
27	Clearance of 1 ha or more but less than 20 ha of indigenous vegetation, except where such clearance of indigenous vegetation is required for – (i) undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance plan.	<p>Clearance of approx. 4.5-hectares of a combination of terrestrial and wetland vegetation for the dam rehabilitation works and associated access roads i.e.</p> <ul style="list-style-type: none"> ▪ 2.85-hectares Granite Lowveld degraded shrubland and 0.1 ha Phragmites mauritiana wetland for the dam embankment rehabilitation works. ▪ 1.1-hectares of Granite Lowveld degraded shrubland for the realignment of the R40/Casteel Dam access road and site establishment area. ▪ 0.15-hectares of modified old lands (open woodland) to create the 300m -350m alternative access road to spillway section.

		<ul style="list-style-type: none"> ▪ 0.08-hectares degraded shrubland for the concrete barrier on both sides of the donga. ▪ 0.2-hectares for temporary stockpiling of construction material along the alternative access road (max 2000m² area).
Listing Notice 3 (GNR 324)		
4	<p>The development of a road wider than 4 meters with a reserve less than 13.5 meters i.e.</p> <p>(i) Outside urban areas: bb) National Protected Area Expansion Strategy (NPAES) Focus Area ee) Critical biodiversity areas (CBA) as identified in systematic biodiversity plans adopted in bioregional plans.</p>	<p>The R40/Casteel Dam access road will be realigned to be 6 meters wide and 250 meters in length. The road realignment will take place within a NPAES focus area and CBA ‘Optimal’ in terms of the 2020 Ehlanzeni Bioregional Plan.</p>
12	<p>Clearance of an area of 300m³ or more of indigenous vegetation except where such clearance of indigenous vegetation is for maintenance purposes undertaken in accordance with a maintenance management plan.</p> <p>(f) Mpumalanga (ii) within a critical biodiversity area (CBA) identified in bioregional plans</p>	<p>Clearance of approximately 1.4-hectares of terrestrial Granite Lowveld degraded shrubland vegetation for a section of the dam rehabilitation works (0.3ha), the site establishment area (0.9ha) and realignment of the R40/Casteel Dam access road (0.2ha) which falls within a terrestrial CBA ‘Optimal’ in terms of the 2020 Ehlanzeni Bioregional Plan/ Mpumalanga Biodiversity Sector Plan.</p> <p>Clearance of 0.1-hectares (1000m²) of Phragmites mauritiana wetland vegetation within an aquatic CBA (aquatic river) in terms of the 2020 Ehlanzeni Bioregional Plan for the dam rehabilitation works at the dam embankment, downstream slope of the dam embankment.</p>
14	<p>The development of –</p> <p>(i) Dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10m²; or</p> <p>(ii) <u>infrastructure or structures with a physical footprint of 10m² or more – where such development occurs –</u></p> <p>(a) Within a watercourse</p> <p>(b) In front of a development setback; or</p> <p>(c) If no development setback has been adopted within 32-meters of a watercourse measured from the edge of a watercourse.</p> <p>(f) in Mpumalanga</p> <p>(i) Outside urban areas (bb) National Protected Area Expansion Strategy (NPAES) Focus Area</p>	<p>The dam rehabilitation works will result in the development of infrastructure/structures of 30 795m² (3.08 ha) in extent within a water course i.e.</p> <ul style="list-style-type: none"> ▪ 10 000m² works on a spillway section and embankment. ▪ Slope protection ▪ 10 000m² works on main embankment. ▪ 500m² works on pipe trenches. ▪ 8000m² access to wall ▪ Expansion of concrete intake tower to a 5-meters x 5 meters structure and provide concrete intake tower bridge. ▪ Building of temporary coffer dam around intake tower to create safe working space. ▪ 0.14ha of rubble masonry to line the river turn channel to rehabilitate the donga erosion. ▪ 0.08ha to construct a 1.2m high concrete barrier along both sides of the donga, starting from the spillway, ending before the river connection point.

	<p>(ff) Critical biodiversity areas (CBA) as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans.</p>	<ul style="list-style-type: none"> ▪ 70m² Pedestrian Bridge <p>The rehabilitation works will be conducted within the following watercourses: Casteel Dam, tributary of Thulanziteka River, artificial seep wetland and natural Channelled Valley Bottom wetland; an area identified as an Aquatic Critical Biodiversity Area by the 2020 Ehlanzeni Bioregional Plan. The site establishment area is also located 25-meters from a drainage line. The overall site falls within the Protected Area Expansion Strategy ‘Priority Focus Area’.</p>
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4.5 ENVIRONMENTAL AUTHORISATION VALIDITY PERIOD

The environmental authorisation is requested for a period of 5 years.

It is envisaged that the DWS will need to secure approval from SANRAL for the road signage and traffic calming along the R40, the procurement process will take 6 months and the rehabilitation works for Casteel Dam another 24 months (2-years). Thereafter the areas disturbed by construction need to be rehabilitated/re-vegetated which may take another 3-6 months.

5. POLICY AND LEGISLATIVE REQUIREMENTS

The below section provides a brief description of the policy and legislative requirements applicable to the proposed Casteel DSRP including an indication as to how the activity complies with it.

South Africa has sound environmental legislation aimed at achieving sustainable development, including laws that support public participation, impact assessment and environmental management. These include amongst others i.e., National and Provincial legislation, Bioregional Plans, Municipal Planning Frameworks, guideline documents, spatial datasets, and protocols.

5.1 NATIONAL LEGISLATION

5.1.1 The Constitution of the Republic of South Africa, 1998 (Act 108 of 1996)

The Constitution of South Africa under section 24 states that everyone has a right to an environment that is not harmful to their health or well-being and to have the environment protected through reasonable legislative measures.

Environmental protection is a practice of protecting the natural environment on individual, organizational or governmental levels, for the benefit of both the natural environment and humans. Due to the pressures of population and technology, the biophysical environment is being degraded, sometimes permanently. This has been recognized, and governments have begun placing restraints on activities that cause environmental degradation. NEMA is the statutory framework to enforce Section 24 of the Constitution and is discussed in the section below.

5.1.2 National Environmental Management Act, 1998 (Act 107 of 1998) (NEMA)

NEMA's section 24 (5) makes provision for the identification and assessment of activities that are potentially detrimental to the environment which require authorisation from a competent authority. These specified listed activities requiring environmental authorisation have been scheduled under GN 327, 325 and 324 of the NEMA EIA Regulations of 2014 (as amended by GNR 326).

The proposed Casteel DSRP triggers several activities under Listing Notice 1 (GNR 327) and Notice 3 (GNR 324) therefore require application subject to a Basic Assessment process in line with regulations 19-20, 39-44 of the EIA Regulations of 2014 (GNR326) published under NEMA.

An application for environmental authorisation was submitted to the competent authority, DFFE, for the section 24 (5) listed activities (detailed in Table 11 in section 4.4 above). Naledzi is the appointed independent EAP undertaking the assessment and public participation process for the Casteel DSRP. We have prepared this BAR to provide an assessment of the environmental, social, and economic consequences of the proposed project and prescribe mitigation measures to reduce negative and enhance positive impacts.

The BAR has informed the attached EMPR which provides the environmental specifications to be observed during the construction period of the project to give effect to section 28 of NEMA. Section 28 places 'Duty of care and remediation of environmental damage' on the developer/applicant.

5.1.3 NEMA EIA Regulations of 2014 (as amended)

With reference to section 5.1.2 above, the BA process and PPP is conducted in line with section 19 – 20 and 39 – 44 of the NEMA EIA Regulations of 2014 (GNR 326). The BAR and EMPR have been prepared in compliance with Appendix 1 and 4 and are currently subject to a 30-day consultative process in line with Regulation 19(1)(a).

5.1.4 National Water Act, 1998 (Act 36 of 1998) (NWA)

The principles and objectives of the NWA are to guide the protection, use, development, conservation, management, and control of water resources in a sustainable and equitable manner for the benefits of all persons. To give effect to the said Section 21 of the NWA calls for licensing of defined water uses.

The DWS: SIAM is exempted from applying for a water use authorisation since the project involves the refurbishment of an existing government waterworks, approved by the Minister in accordance with section 110 of the NWA.

The rehabilitation works will however take place within a natural wetland (Channelled Valley Bottom), tributary of the Tlundziteka River and within 500m of artificial aquatic ecosystems (i.e., Casteel Dam, Seepage Wetland, spillway apron). The NWA requires the legal protection of wetlands including the full range of goods and services that the ecosystems provide.

Mr Rob Palmer of Nepid Consultants classified (as per *Ollis et al, 2013*) and delineated (DWAF Guideline, 2008) the aquatic ecosystems. The Aquatic Biodiversity Assessment Report is attached under **Appendix E4** and its results provided in section 9.7 of the report.

5.1.5 National Heritage Resources Act, 1999 (Act 25 of 1999) (NHRA)

NHRA protects all structures and features older than 60 years (Section 24), archaeological sites and material (Section 35) and graves and burial sites (Section 36). Section 38 indicates that any person intending on undertaking any form of development of which the surface area exceeds 0.5-hectares, triggers a heritage assessment (section 38(1)), and requires approval from the South African Heritage Resources Agency (SAHRA).

A Phase 1 Heritage Impact Assessment (HIA) Study was undertaken for Casteel DSRP attached under **Appendix E6** and results provided in section 9.12 of this report. No heritage features were identified onsite and is therefore not considered to be sensitive from a heritage perspective. SAHRA was notified of the project on 17 October 2022 (Case ID 19843) and the HIA Study results have been uploaded to the SAHRIS online application system for approval.

5.1.6 National Environmental Management: Biodiversity Act, 10 of 2004 (NEMBA)

The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection.

Mr Duncan McKenzie from Digital Earth (Pty) Ltd conducted a Terrestrial Biodiversity Impact Assessment for the project and is discussed in detail in section 9.6 of this report and attached under **Appendix E3**. According to the revised 2022 Red List of Ecosystems published under Section 52 (1) of NEMBA the site overlaps with a 'Least Concern Ecosystem'.

The study also considered the Threatened or Protected Species Regulations contained in the Threatened and Protected Species Lists (GG Notice 256, 2016) aka. NEMBA Tops published under Section 56 (1) of NEMBA and the internationally endorsed Conservation of Nature (IUCN) IUCN Red List Categories and Criteria in the Red List of South African plants.

Two plant species protected under the Mpumalanga Nature Conservation Act (MNCA) have been recorded onsite i.e., *Aloe barbertoniae* (succulent occurring in large numbers) and *Gladiolus cf. crassifolius* (geophyte rarely encountered). Another 144 Species of Conservation Concern (SCC) were recorded onsite but none of which are listed as 'Threatened/Near Threatened'. No bird or mammal species of SCC were recorded during fieldwork. (Perhaps only as foraging species).

All specimens of *Aloe barbertoniae* within the rehabilitation works footprint areas will be carefully dug-up with their roots intact and transplanted into either adjacent habitat or used in landscaping/re-vegetation around the construction site. No destruction permits are therefore required from MDARDLEA.

Eight species declared invasive under the NEMBA 2016 Alien and Invasive Species List were also recorded within the study area indicative of moderate infestation. The EMPR recommends for these declared aliens within a 100m buffer around the project to be eliminated as per the DEA published guidelines (DEA, 2015).

5.1.7 National Forest Act, 1998 (Act 84 of 1998) (NFA)

The purpose of the Forest Act is to protect natural forests and woodlands as it forms an important part of that environment and need to be conserved and developed according to the principles of sustainable management. Plantation forests play an important role in the economy and have an impact on the environment and need to be managed appropriately.

The Terrestrial Ecologist identified one nationally protected tree in the study area i.e., **Marula** (*Sclerocarya birrea*). It occurs in moderately high density. A number of these individual trees will need to be removed for the site establishment area and works on the dam embankment.

Destruction permits will be obtained in terms of section 15 (1) of the act from the DFFE: Forestry Regulation about the removal of the tree Marula.

5.1.8 National Road Traffic Act, 1998 (Act 93 of 1996)

The National Road Traffic Act 93 of 1996 provide for road traffic matters. The South African National Roads Agency (SANRAL) is responsible for the management and control of the national road system i.e., develop, maintain, rehabilitation of national roads.

SANRAL is the custodian of the R40 and proposing an upgrade on the section from Hazyview to Maviljan, and to Arthur Seat which passes Casteel Dam. The roll-out date is unknown.

Mr Hendrikus Swart from Hamantino Consulting Engineers conducted a Traffic Study to determine the impact of the additional construction traffic on the local road network (i.e., R40 and D3950/Wales Road intersection). The study found that all the analysed intersections are expected to operate at acceptable levels of service (LoS) with the addition of construction traffic, whether coming from the North or South on the R40. The traffic assessment is discussed in detail in section 9.8 of the report and attached under **Appendix E5**.

Two proposed project aspects will however require SANRAL's approval/permission:

- Realignment of the R40/Casteel Dam access road and its intersection with the R40 inclusive of a gravel shoulder to the R40.

- Recommended temporary construction signage to be provided on the R40/Casteel Dam access intersection in accordance with the SA Road Traffic Signs Manual to the north of the dam and ‘Reduce Speed’ signage to calm traffic in this specific section from 100km/hr to 60km/hr.

This will have to be accommodated/considered in the planned upgrades along the R40. SANRAL and its consulting engineers (BVi) are being engaged as a key stakeholder as part of the project PPP.

5.1.9 National Environmental Management Waste Act, 2008 (Act 59 of 2008) (NEMWA)

NEMWA Chapter 4 states the developer has a general duty to avoid generating waste and if not, avoidable it must be minimised and managed accordingly, Section 16 states it’s the responsibility of the person generating waste to ensure that the waste is treated and disposed in an environmental sound manner. Section 27 calls for the provision of containers for waste management.

The proposed Casteel DSRP will generate solid waste and will be managed efficiently by the DWS Construction team by provision of bins onsite, collection and disposal of solid waste to Casteel Disposal Site on a regular basis (i.e., weekly/twice a month).

5.1.10 National Environmental Management Air Quality Act, 2004 (Act 39 of 2004) (NEM: AQA)

NEM: AQA is the law regulating air quality to protect the environment by providing reasonable measures for prevention of air pollution. Section 32 of the act calls for dust control regulated in terms of the 2013 National Dust Control Regulations. The regulations set a standard for acceptable dust fall rate for residential and non-residential areas (Table 12).

During the construction phase, dust fall from rehabilitation works and vehicle entrained dust along access roads will be released because of the use of heavy construction machinery and 6m³ trucks transporting construction material to site. The impact will be short term on the immediate area since majority of the construction material will be delivered in the first four months of construction. The dust emissions are easily managed by dust suppression methods i.e., water spraying.

Table 12: Acceptable standard for dust fall out rate.

Restriction Areas	Dustfall rate (D) (mg/m ² /day, 30-days average)	Permitted frequency of exceeding dust fall rate
Residential area	D < 600	Two within a year, not sequential months.
Non-residential area	600 < D < 1200	Two within a year, not sequential months.

5.2 PROVINCIAL LEGISLATION

5.2.1 Mpumalanga Nature Conservation Act, 1998 (Act 10 of 1998) (MNCA)

MNCA consolidates and amends the laws relating to nature conservation within the Mpumalanga Province and the MDARDLEA is the implementing authority in this regard.

As mentioned, the Terrestrial Ecologist recorded two provincially protected plant species (i.e., *Aloe barbertoniae*, *Gladiolus cf. crassifolius*) onsite that will be transplanted on adjacent habitat or used in landscaping the construction site post rehabilitation works. No permits are therefore required from MDARDLEA. No bird and mammal species of SCC were recorded.

5.2.2 2015 Mpumalanga Biodiversity Sector Plan (MBSP)

The Mpumalanga Tourism and Parks Agency (MTPA) compiled the MBSP which comprises two spatial components: maps of terrestrial and freshwater critical biodiversity areas (CBAs); and a set of land-use guidelines that are important for maintaining and supporting the inherent biodiversity values of these critical biodiversity areas.

The site overlaps with both terrestrial (i.e., Optimal CBA, Moderately Modified Areas, ONA) and freshwater features (i.e. CBA Rivers, ESA, Dam) as set out in the MBSP.

Based on the findings of the Terrestrial Biodiversity Study (Digital Earth, 2022) most of the CBA portions of the study area are ecologically compromised and mostly likely needs to be re-classified as Moderately Modified/ONA. The ONA in the south-eastern corner the objective should be to minimise habitat and species loss. The 'Heavily / Moderately Modified' classified areas in the south-western portion of the site are flexible in terms of land uses.

According to the findings of the Aquatic Biodiversity Study (Nepid, 2022) the Casteel Dam has already incurred direct impacts on the aquatic habitats. The rehabilitation works will not have a significant further impact on aquatic habitats.

5.2.3 2019 Ehlanzeni Bioregional Plan (EBP)

The Ehlanzeni Bioregional Plan is based on the systematic MBSP developed by the MTPA. The plan was created to show the Critical Biodiversity Areas (CBA), Ecological Support Areas (ESA), Heavily or Moderately modified (dams), Other Natural Areas (ONA) and Protected Areas (PA) of the Ehlanzeni District Municipality.

The specific EBC CBA areas which overlap with the project site is a duplication of the MBSP but at district level and is addressed under section 5.2.2.

It is understood that the Ehlanzeni Environmental Management Framework (EMF) is in the making but not released yet for consideration in this report.

5.2.4 2017 Bushbuckridge Spatial Development Framework (SDF)

The Spatial Planning and Land Use Management Act, 16 of 2013 (SPLUMA). SPLUMA requires each municipality to develop an SDF. Section (12) (a) of the SPLUMA requires that SDFs be compiled by all spheres of government for their areas of jurisdiction. The 2017 Bushbuckridge Local Municipality SDF has integrated in its Local Spatial Development Frameworks (LSDF) to guide land use within the different regions of the municipality.

The Casteel Dam falls within ‘Casteel – Region 7’ and ‘Thulamahashe Region 4’ LSDF’s. The dam is located amid densely populated settlements. It is an important resource supplying irrigation and domestic water to downstream farmers and communities in region 4. The rehabilitation of the dam will not impact the land uses set out under the LSDF for the area however traditional authorities will need to observe a 70-meter distance from 1:100 year or 1: 200-year flood line of the dam when allocating stands to community members. A map set indicating the flood line, inundation maps and buffer to the upheld to Casteel Dam produced by DWS: SIAM is included under **Appendix D3** after the Layout Plan.

5.2.5 2021/2022 Bushbuckridge Integrated Development Plan

The IDP is a process through which the municipalities prepare strategic development plans for a five-year period. An IDP is one of the key instruments for local government to cope with its new developmental role and seeks to arrive at decisions on issues such as municipal budgets, land management, promotion of local economic development etc. in a strategic manner.

The dam is an important resource which provides irrigation water to Dingley Dale, New Forest, Champagne Citrus farmers and domestic water to downstream communities. The rehabilitation works are essential to ensure the safety and continued function of the dam.

Job creation is a requirement of all municipal LED programmes therefore DWS intends to source unskilled labour from the local communities which will be identified and selected in consultation with the local authority, traditional authorities.

5.3 GUIDELINE DOCUMENTS, SPATIAL TOOLS, PROTOCOLS

The DEA, other provincial government departments, including DWS have formulated guideline documents to assist applicants, authorities, and environmental assessment practitioners on the requirements of considering various aspects in the EIA/BA process. Guidelines consulted during the preparation of the BAR include:

5.3.1 Guideline Documents

Guideline documents consulted in the preparation of this BAR are detailed in **Table 13**.

Table 13: Guideline documents and where it has been applied.

Guideline	Section of BAR
DEA IEM Guideline Series 11: Criteria for determining alternatives	Section 7
DEA; Integrated Environmental Guideline 7: Public Participation in the EIA Process 2012 (read in due regard of Regulation 41-44 of the NEMA EIA Regulations of 2014 (as amended by GNR 326).	Section 8. Used to guide the public participation process.
South African Traffic Impact and Site Traffic Impact Assessment Requirements Manual.	Used as a guide for the Traffic Impact Assessment Study attached under Appendix E.
‘Manual for the Identification and Delineation of Wetlands and Riparian Areas’ (DWS,2008) and ‘Classification System for Wetland and other Aquatic Ecosystems’ (Ollis et al.,2013) were used for the Aquatic Biodiversity Impact Assessment Study.	Section 9.7. Used to delineate and classify aquatic ecosystems attached under Appendix E as the Aquatic Biodiversity Study.

5.3.2 Spatial Datasets

Considered Spatial Datasets	Applicability	Discussed
DFFE Screening Tool	Yes	Section 5.3.2.1
SAPAD, 2022	N/A	Section 5.3.2.2
SACAD, 2022	Yes	Section 5.3.2.2 Kruger-Canyon BP Reserve
2018 NPAES	Yes	Section 5.3.2.3 ‘Priority Focus Area’
2017 SWRA	N/A	Section 5.3.2.4 Outside of the Mpumalanga-Drakensberg SWRA
2018 SAIIE National Wetland Map 5	Yes	Section 5.3.2.5 Wetlands, River
2011 NFEPA	Yes	Section 5.3.2.6 Sand River Catchment, quaternary drainage X32A Wetland and Tlulandziteka River (FEPA River)

5.3.2.1 DFFE National web based Environmental Screening Tool

Regulations 16 (1)(b)(v) of the EIA Regulations of 2014 requires the submission of a national web-based environmental screening tool report (STR) (GNR. 960 / 05 July 2019), when applying for an environmental authorisation. The STR is generated from the DFFE national online GIS-based ‘National web-based Environmental Screening Tool’ and provides detail on the environmental sensitivity, and specific requirements, including specialist studies that apply to a proposed development site, based on the national sector classification and the environmental sensitivity of the site.

The STR is attached under Appendix E2, and its findings and recommendations are summarised in **Table 14** below. The verification findings are recorded in a Site Sensitivity Verification Report (SVR) in line with the ‘Protocols for Assessment and Minimum Report Content Requirements for Environmental Themes for Activities requiring Environmental Authorisation published in Government Notice Regulation 320 of 20 March 2020 under Section 24 (5)(a), (h) and 4 of the NEMA also attached under **Appendix E2**.

The confirmed and commissioned specialist studies were further discussed and agreed to with the DFFE during a pre-application meeting that took place on 25 August 2022 (refer to **Appendix F1** for minutes).

Table 14: STR sensitivity theme results and recommendations

Environmental Theme	Alleged sensitivity	Geographic Areas	Recommended Specialist Study	Confirm/Refute
Terrestrial Biodiversity	Very High	CBA, Protected Area Expansion Strategy	Terrestrial Biodiversity Assessment	Specialist Study commissioned. But site found to be of ‘Low’ sensitivity
Aquatic Biodiversity		CBA, Wetland, Strategic Water Resource Area, FEPA Sub-Catchment, and quaternary catchment	Aquatic Biodiversity, Hydrology Assessments	Study commissioned, except for Hydrology. DWS conducted as part of DSE. Site is a ‘Very High sensitivity.’
Agriculture		Very High Land capability	Agricultural Assessment	Refuted. Not required. Project aims to repair safety risks at dam. Areas to be crossed by alternative access lie fallow.

Civil Aviation	High	Dangerous and restricted airspace as demarcated' and '8km to 15km of other civil aviation aerodrome'	CA approval Restricted airspace i.e., AFB Hoedspruit, National Park.	Confirmed. CAA input will be solicited; however, rehabilitation works will not impact the airspace/aircraft.
Plant, Animal	Medium	Possible presence of sensitivity species.	Animal and Plant Species Assessment	Commissioned Site of 'Low' sensitivity.
Palaeontology		Moderate sensitivity features	Palaeontological Impact Assessment	Refuted. Zero Palaeontology Sensitivity.
Archaeological and Cultural Heritage	Low	Low sensitivity	Archaeological Impact Assessment	Commissioned Confirmed to be of 'Low' significance.
Defence		None recorded. No further action required		No action required.
<p><u>Additional commissioned study requested by DFFE due to project locality next to R40:</u></p> <ul style="list-style-type: none"> - Traffic Impact Study <p>The following studies were confirmed to be superfluous with DFFE i.e.</p> <ul style="list-style-type: none"> - Visual Impact Assessment (It's a rehabilitation project not a new development) - Socio Economic Impact Assessment (DWS Construction Management to execute works with unskilled labour sourced from community). 				

5.3.2.2 Protected Areas Register (SAPAD) and Conservation Areas (SACAD)

Based on the 2022 SAPAD the site is not located in or within 10km of a proclaimed protected area. According to the SACAD database the project site only falls within the transitional area of the Kruger to Canyon Biosphere Reserve ratified by UNESCO (**Figure 5-1**). The World Heritage Convention Act, 1999 and UNESCO Man & Biosphere Programme is therefore not applicable.

The 'Transitional Areas' within the BR contain a variety of agricultural activities, settlements, and other land uses. According to the land-cover status quo map of the Biosphere Reserve (BR), the project area at Casteel Dam will take place on land cover classified as woodland/open bush and wetland situated amid 'densely populated rural settlements. Therefore, the project will not compromise the BR land use management.

5.3.2.3 2018 National Protected Areas Expansion Strategy (PAES) Dataset

According to the 2018 National Protected Areas Expansion Strategy ‘Focus Areas’ spatial dataset, the study area forms part of the PAES and falls within a ‘Priority Focus Area’ (**Figure 5-2**). However, the closest protected area is situated more than 10km away, and the surrounding area is densely populated.

This dataset has been considered in the Terrestrial Biodiversity Assessment attached under Appendix E and addressed under section 9.6 of this report.

5.3.2.4 2017 Strategic Water Resource Area (SWRA) Dataset

According to the 2017 SWRA spatial dataset, the project site does not fall within any SWRA. It is located outside of the Mpumalanga-Drakensberg SWRA (see **Figure 5-3**). It is assumed that the STR may still refer to the 2014 MBSP dataset where the site coincides with the Top 50% of strategic water resource area’.

Casteel Dam is situated in the Tlulanziteka (Sand) River in the upper reaches of quaternary catchment X32A in the Nkomati Water Management Area. Quaternary catchments X32A and X32D together generate 50% of the runoff (Smits, 2004 Modelling Scenarios for Water Resource Management in the Sand River Catchment) for the overall Sand River Catchment.

5.3.2.5 2018 South African Inventory of Inland Aquatic Ecosystems

According to the dataset the project site coincides with a Channelled Valley Bottom (CVB) Wetland below the dam embankment. The rehabilitation works and site establishment area also fall within 500 meters of several other CVB wetlands (**Figure 5-4**). The presence of aquatic features and the delineation including assessment thereof is addressed under section 5.1.2 and section 9.7 of this report. The specialist assessment also considered the SAIIE dataset.

5.3.2.6 2011 National Freshwater Ecosystem Priority Areas

The NFEPA database confirms that the site falls within the Sand River Catchment (FEPA) within quaternary drainage region X32A (FEPA). There is a Channelled Valley Bottom (CVB) wetland at the rehabilitation works area and the FEPA river namely Tlulanziteka River (**Figure 5-4 and 9-12**).

This is addressed in the Aquatic Biodiversity Assessment included under Appendix E and discussed in section 9.7 of this report.

5.3.2.7 Environmental Theme Specific Protocols for Specialist Studies

The Environmental Theme Specific Protocols provided overleaf have been used to guide the content requirements for specialist site verifications and investigations i.e., Terrestrial, Aquatic and Heritage Studies.

- GNR. 320 of 20 March 2020, Procedures for the Assessment of Minimum Criteria for Reporting on Identified Environmental Themes
- GNR 1150 of 30 October 2020 - Protocol for the Specialist assessment and minimum report content requirements for environmental impacts on terrestrial and animal plant species
- SAHRA 2007 and 2012 Minimum Standards: Archaeological and Palaeontological Components of Impact Assessment Reports
- GNR. 320 of 20 March 2022, Protocols for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity.

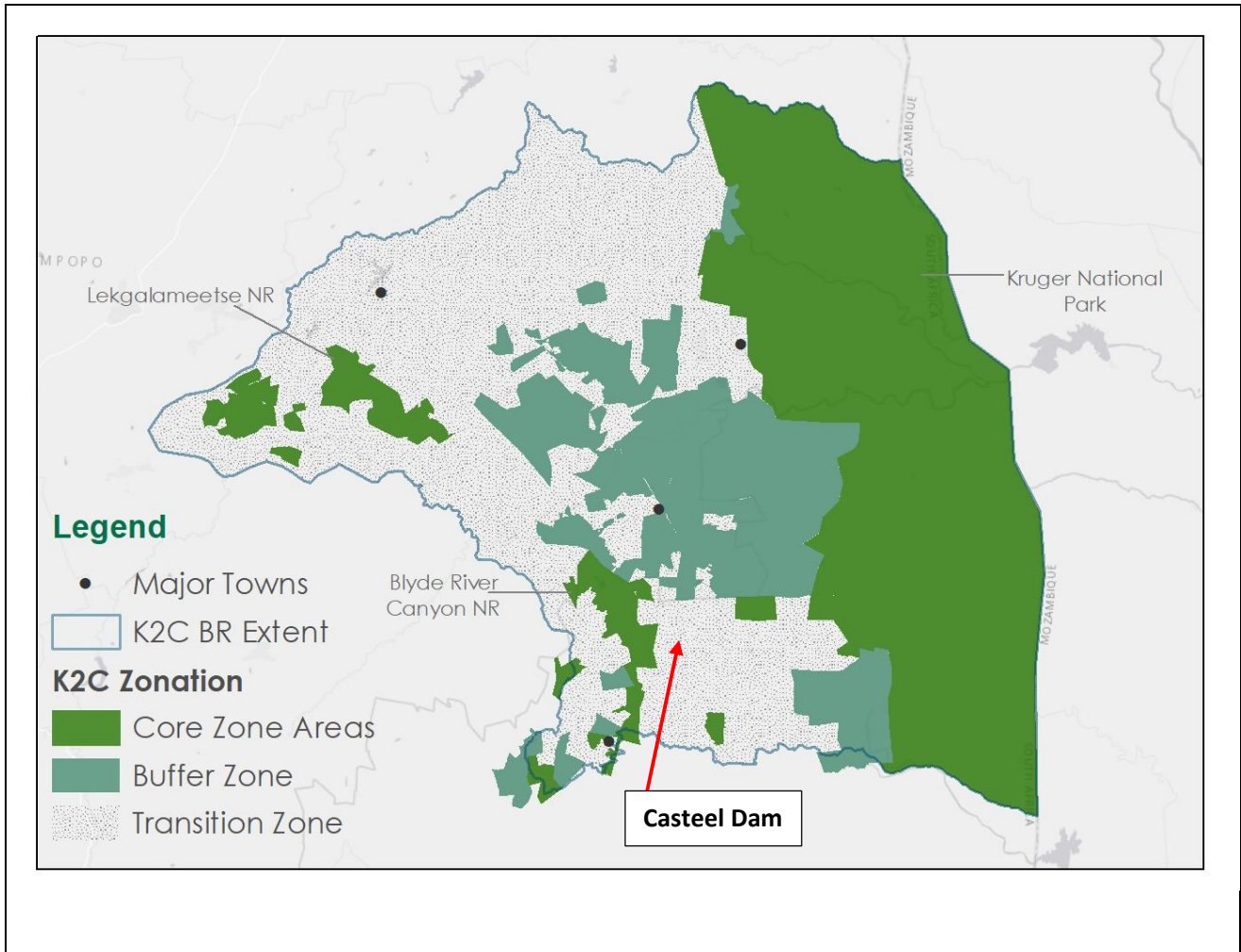


Figure 5-1: Kruger to Canyon Biosphere Reserve Zonation Plan showing Casteel Dam coincides with the Kruger to Canyon Biosphere Reserve ‘Transitional Zone’. Image courtesy of <https://kruger2canyons.org/zonations/> (Related to SAPAD and SACAD 2022 Database)

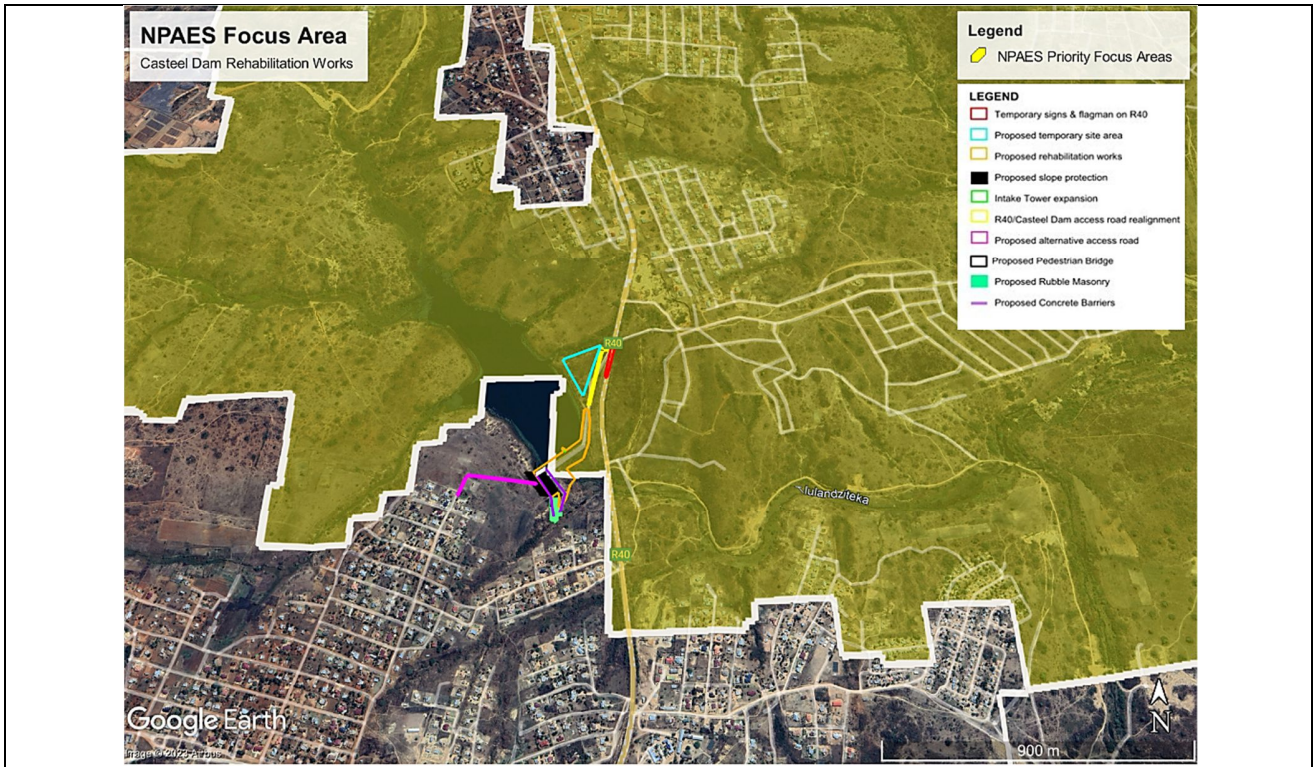


Figure 5-2: Casteel Dam superimposed on the NPAES Datasets showing the project site coincides with a 'Priority Focus Area'.

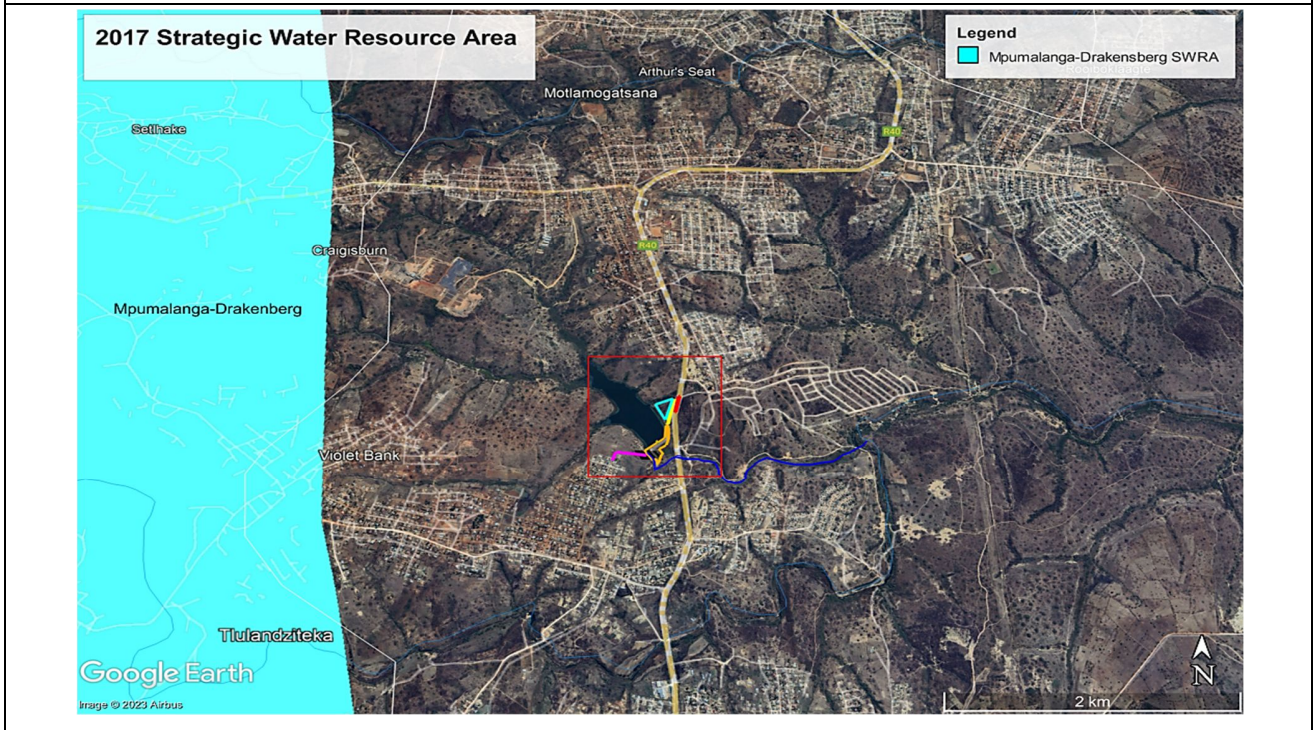
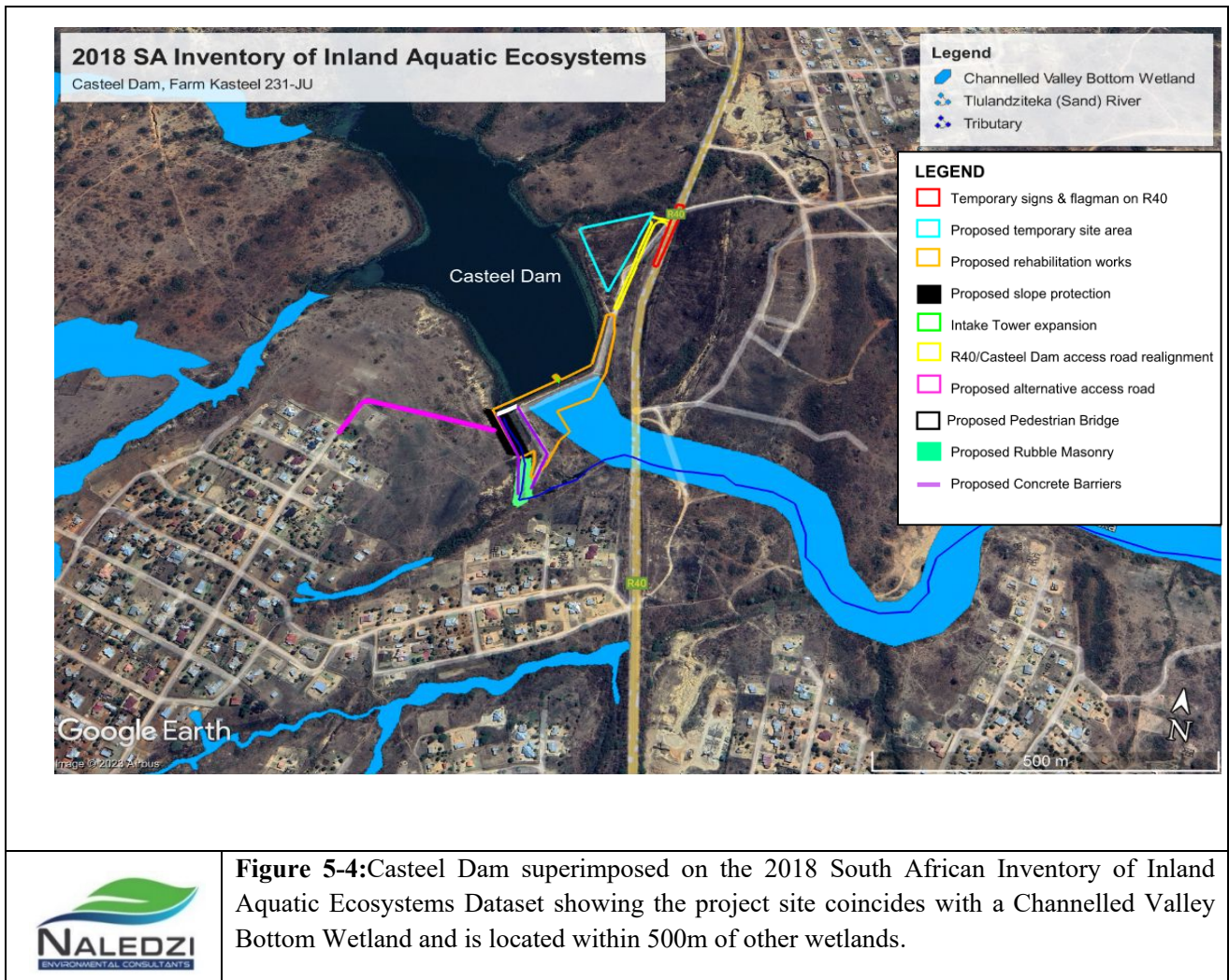


Figure 5-3: Project site (red polygon) superimposed on the 2017 Strategic Water Resource Areas Dataset showing the project site east outside of the Mpumalanga Drakensberg SWRA.



6. MOTIVATION ON NEED AND DESIRABILITY

The concept of ‘need and desirability’ relates to the nature, scale and location of a development being proposed including the wise use of land. The need primarily refers to time and ‘desirability’ to place (i.e., the right time and is it the right place for locating the type of activity).

It is based on the principle of sustainable development. Defining it in a way ensures that the triple bottom line is achieved i.e., ecologically, socially, and economically sustainable development. The DFFE, when considering applications, as a minimum must have regard to the need for the and desirability for the activity.

In lieu of the lengthy 2017 DEA Need and Desirability Table, Naledzi has opted to engage the 2014 DFFE BAR Template ‘Project Motivation’ table to motivate the project need and desirability. Reason being the project is small, is essential to improve the safety and operational status of the existing government waterwork and allow the continued supply of water to downstream farmers and communities.

1. Is the activity permitted in terms of the property’s existing land use rights?	YES	
Casteel Dam was built in 1965 and the rehabilitation works will take place at the existing dam embankment, spillway and outlet works to prolong its lifespan and ensure the safety of the structure. The temporary site establishment area will be located northeast of the dam on natural, yet disturbed vegetation.		
2. Will the activity be in line with the following?		
(a) Provincial Spatial Development Framework (PSDF)	YES	
(b) Urban edge/Edge of Built environment for the area	YES	
(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of Local Municipality (e.g., would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?)	YES	
Casteel Dam is in a rural delivery focus /tourism belt area along the existing R40 corridor according to the 2019 Mpumalanga PSDF.		
According to the Bushbuckridge Local Municipality SDF and IDP the Casteel Dam is in the LSDF’s for Casteel (Region 7) and Thulamahashe (Region 4) which is in central Bushbuckridge. Casteel Dam is located amid densely populated settlement. The Dam provides irrigation water to two large downstream irrigation schemes (i.e., Dingley Dale and New Forest) including domestic water to downstream communities located in the Thulamahashe Region 4. The irrigation schemes service in order of 1000 farmers. The rehabilitation works will improve the function and operation status of the dam and ensure continued supply.		
(d) Approved Structure Plan of the Municipality	YES	
The traditional authorities and Bushbuckridge Local Municipality has requested the DWS to provide a plan showing the buffer area to be kept clear of housing as not to encroach on the dam flood line. See Appendix D3.		
(e) An Environmental Management Framework (EMF) adopted by the Department (e.g., Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)	YES	
(f) Any other Plans (e.g., Guide Plan)	YES	
3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing	YES	

<p>approved SDF agreed to by the relevant environmental authority (i.e., is the proposed development in line with the projects and programmes identified as priorities within the credible IDP?)</p>		
<p>The project relates to the rehabilitation of an existing government waterwork, Casteel Dam, to improve its functioning and operation status.</p>		
<p>4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)? (This refers to the strategic as well as local level i.e., is the development a national priority, but with specific local context it could be inappropriate).</p>	<p>YES</p>	
<p>Casteel Dam supplies water to downstream farmers (i.e., approx. 1000 farmers) and domestic water to downstream communities. It is also used by the local communities for subsistence fishing and grazing. The continued water supply is essential for the commercial (i.e., Champagne Citrus Farm) and subsistence farmers downstream.</p>		
<p>5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development? (Confirmation by the relevant authority in this regard must be attached to the report)</p>	<p>YES</p>	
<p>No services are required or services infrastructure since this project relates to rehabilitation of an existing government waterworks.</p> <p>It is worth stating that the Department of Agriculture (DoA) must repair the canal from Casteel Dam to Dingley Dale and New Forest which transports the water from Casteel Dam to the irrigation schemes downstream. The canal is neglected and in need of repair. This issue was raised by the local authority and downstream water users. DWS is the custodian of Casteel Dam, but the DoA is responsible for the canal.</p>		
<p>6. Is the development provided for in the infrastructure planning of the municipality, and if not, what will be the implication on infrastructure planning of the municipality (priority and placement of services and operation costs? (Comment by relevant municipality)</p>	<p>YES</p>	
<p>7. Is this project part of the national programme to address an issue of national concern or importance?</p>	<p>YES</p>	
<p>The project forms part of the National DWS: Dam Safety Rehabilitation Programme. The objective of the project is to improve the safety of Casteel Dam to ensure compliance with the Dam Safety Regulations (GNR 132, 24 February 2012) as published under Chapter 12 (Safety of Dams) under the NWA and will ensure the continued supply of water to downstream farmers and communities.</p>		
<p>8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context)</p>	<p>YES</p>	
<p>The land use will not change. Casteel Dam was already built in 1965. The repair works will be conducted on the existing Casteel Dam embankment, spillway and outlet works. The alternative access road to the spillway and site establishment area is temporary and will be rehabilitated post the construction phase.</p>		
<p>9. Is the development the best practicable environmental option for this land/site?</p>	<p>YES</p>	
<p>If not repaired there is a risk of dam failure because the dam wall is unstable, infested with termites and a large gully is working its way towards the spillway. The ecological implications of dam failure would be catastrophic and irreversible, and its intensity Critical (Nepid, 2022). The spatial extent of dam failure will extend at least to the confluence with the Tlulandziteka (Sand) River. By implementing the repair works the probability of dam failure is drastically reduced and will prolong the lifespan of the dam i.e., the best environmental option.</p>		

10. Will the benefit of the proposed land use/development outweigh the negative impacts of it?	YES	
<p>Restoring the dam will ensure:</p> <ul style="list-style-type: none"> • The lifespan of the dam is prolonged. • Improve the safety of the dam. • Continued water supply to downstream farmers and communities including informal fishing by the surrounding communities. <p>The project will also create employment opportunities for the local community.</p> <p>Based on the findings of the Terrestrial Biodiversity Study (Digital Earth, 2022) most of the CBA portions of the study area are ecologically compromised and mostly likely needs to be re-classified as Moderately Modified/ONA. The ONA in the south-eastern corner the objective should be to minimise habitat and species loss. The ‘Heavily / Moderately Modified’ classified areas in the south-western portion of the site are flexible in terms of land uses.</p> <p>According to the findings of the Aquatic Biodiversity Study (Nepid, 2022) the Casteel Dam has already incurred direct impacts on the aquatic habitats. The rehabilitation works will not have a significant further impact on aquatic habitats.</p>		
11. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?		NO
<p>The proposal is to initiate rehabilitation works at the existing Casteel Dam to restore dam safety.</p>		
12. Will any person’s rights be negatively affected by the activity/ies?		NO
<p>The restoration of the dam will benefit the downstream farmers of Dingley Dale and New Forest, downstream communities including the surrounding communities conducting informal fishing at the dam.</p> <p>Any community customs and rituals performed at the Casteel Dam will be respected by the DWS / appointed Contractor. The Heritage Impact Assessment considered the potential impact and engaged the traditional authorities in this regard. No such customs/rituals were declared. Any such standing rituals and customs will be confirmed again with the local communities during Draft BAR and EMPr public review period engagement meetings to ensure that these are captured and provided for the EMPr.</p>		
13. Will the proposed activity compromise the ‘urban edge’ as defined by the local municipality?		NO
<p>The rehabilitation works are proposed at the existing Casteel Dam amid the densely populated Casteel settlement. There is no defined urban edge for Casteel / Arthurs Seat.</p>		
14. Will the proposed activity contribute to any of the 36 Strategic Infrastructure Projects (SIPS)?		NO
15. What will be the benefits to society in general and to the local communities?	Explain	
<p>The lifespan of a primary water source will be prolonged, and the safety of the dam will be improved to ensure continued supply of water to downstream farmers and communities.</p>		
16. Any other need and desirability considerations related to the proposed activity?		NO
17. How does the project fit into the National Development Plan for 2030?		
<p>The NDP aim is to achieve prosperity and equity. According to Chapter 12 of the NDP personal safety is considered a human right and integrally linked to other developmental activities. DWS will rehabilitate Casteel Dam to ensure the dam complies with the Dam Safety Regulations to eliminate the risk to human-life (due to risk of dam failure). Casteel Dam is a government waterwork (primary resource) that supply water to downstream farmers (approx. 1000) and communities. The rehabilitation works will prolong the lifespan of the structure and improve the safety of the structure.</p>		

18. Please describe how the general objectives of Integrated Environmental Management as set out in section 23 of NEMA have been considered.

Section 23 requires application of environmental management tools to ensure integrated environmental management activities. Section 24 gives effect to the objectives contained in section 23 of NEMA by identifying activities which require environmental authorisation to be subjected to either a Basic Assessment or full EIA process (EM tool) and subsequent implementation of conditions set out under the authorisation.

The proposed Casteel DSRP has been undertaken according to section 24 of NEMA i.e.

- DWS has applied for environmental authorisation to DFFE in May 2023 for several scheduled activities published under section 24 of NEMA.
- The application is currently subject to a Basic Assessment process as prescribed under Regulation 19 of the NEMA EIA Regulations of 2014 (GNR 326, as amended) and is being undertaken by Naledzi EC as the independent EAP.
- The potential identified environmental impacts and risks associated with the construction phase of the project have been identified and assessed based on their significance. Mitigation measures are recommended to manage/avoid/stop or reduce the magnitude of such impacts.
- The Public Participation Process is being conducted in line with Regulation 39 -44 of the NEMA EIA Regulations of 2014 (GNR 326 as amended). The local authority, tribal authorities, landowner, local communities, downstream water users (irrigation schemes and communities) have been engaged and will be continued to be engaged throughout the BA process to solicit their views and inputs on the application.
- This BAR (this report) has informed the attached EMPR which provides the environmental specifications to be observed during the construction period of the project to give effect to section 28 of NEMA. Section 28 places 'Duty of care and remediation of environmental damage' on the developer/applicant.
- The BAR and EMPR which was subjected to a 30-day consultative process will be submitted to the DFFE for decision-making.
- The EMPR which prescribes the environmental specifications to be adhered to during the construction of the rehabilitation works will become legally binding on the environmental authorisation title holder (DWS) once the environmental authorisation is issued by DFFE.

19. Please describe how the principles of environmental management as set out in section 2 of NEMA have been considered.

The general principles are that environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, development, cultural and social interests equitably. Development must be socially, environmentally, economically sustainable.

The Basic Assessment process includes specialist investigations for terrestrial and aquatic biodiversity including heritage to identify potential features which may be impacted by the rehabilitation works i.e.

- Disturbance and loss of ecosystems and biological diversity
- Pollution and degradation of the environment (terrestrial, aquatic)
- Disturbance to landscapes and sites of national cultural heritage

The public consultation process has recorded the issues and or concerns from the community and downstream water users (i.e., environmental rights to be considered and protected). The potential environmental impacts on the site features, heritage and or cultural features have been identified, and significance rated with the inputs from specialists and recommended as environmental specifications to be observed. The DWS will implement the recommendations contained in the EMPR and environmental authorisation, if granted by the DFFE.

7. ALTERNATIVES CONSIDERED

The only alternatives considered for the proposed Casteel DSRP are design and no-go alternatives since the location of the works are dictated by the dam infrastructure in need of repair.

7.1 DESIGN ALTERNATIVES

(a) Stabilization of the downstream slope: There were two options considered to improve flood handling capacity of the dam and to stabilize the downstream slope. The two options included:

- Option 1 – Raising using Parapet Wall (Estimated cost – R 6 670 500.00) (Figure 7-1)
- Option 2 – Raise using a 4m berm (Estimated cost – R 12 350 000) (Figure 7-2)

Option 1 is the most preferred as it is a more cost-effective design method to rehabilitate the dam. Therefore, the dam will be raised using a parapet wall.

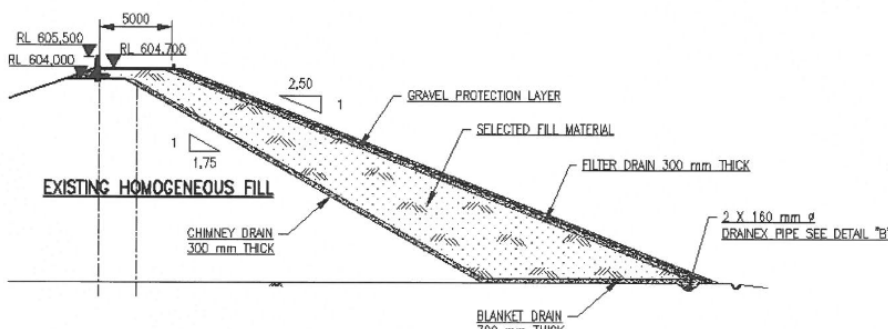


Figure 7-1: Raising using a Parapet Wall

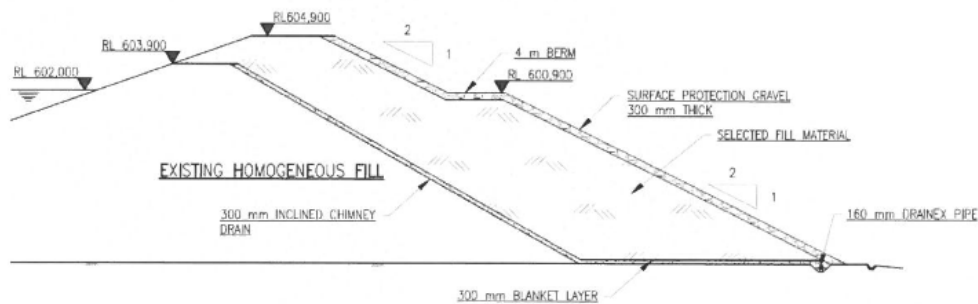


Figure 7-2: Raise using a 4m berm.

(b) Repairing the Outlet Works: The priority is to repair the existing outlet works. The use of a siphon is the last resort. Two options were considered i.e.

- Trash Screen – not easy to clean from blockages (least preferred)
- Box cage type – allows for diver safety consideration (preferred).

The use of a box cage design type is recommended for diver safety considerations.

7.2 NO-GO OPTION

I.e., this is the option of not executing the activity/project.

If the rehabilitation works are not executed at the dam wall there is a risk of dam failure because the dam wall is unstable, infested with termites and a large gully is working its way towards the spillway. The ecological implications of dam failure would be catastrophic and irreversible, and its intensity Critical (Nepid, 2022). The spatial extent of dam failure will extend at least to the confluence with the Tlulandziteka (Sand) River. By implementing the repair works the probability of dam failure is drastically reduced and will prolong the lifespan of the dam i.e., the best environmental option. Thus, the no-go alternative is not preferred.

8. PUBLIC PARTICIPATION PROCESS FOLLOWED

The public participation process (PPP) is a key requirement of the BA process and needs to satisfy the requirements of Regulation 39-44 of the NEMA EIA Regulations as set out in **Table 15**.

The PPP identifies potential I&APs on the project and provide an opportunity for the expression of public, and state department views on the environmental and social impacts of the application. All public and state department views on impacts are documented, addressed, and responded to in the BA process and incorporated into the BAR and EMPR for consideration by the DFFE.

Table 15: Brief NEMA EIA Regulation 39-44 PPP Requirements incl. section where addressed.

Reg.	Requirements	Section
39	Obtain written consent of the landowner/ person in control of the land	8.2.3
40(1)	Give all potential registered I&APs, including the competent authority, a period of 30-days to submit comments on the BAR and EMPR.	8.3.1
41 (2)	Give notice to all potential I&APs of an application / proposed application which is subjected to public participation by -	
	a) Fixing a notice board at a place conspicuous to and accessible by the public and at the boundary of the site.	8.2.6
	b) Give written notice to occupiers, owner/person in control of the land, to same parties adjacent to the land, municipal ward councillor of affected area, affected municipality, any organ of state having jurisdiction in respect to the activity and any other party.	
	c) Place advertisement in one local newspaper/ any official Gazette.	8.2.5
	d) Place advertisement in at least one provincial newspaper/national newspaper if the activity extends beyond the border of the district/metropolitan municipality.	N/A
	e) Using reasonable alternative methods	
42	Open and maintain a register of I&APs and submit such register to the competent authority (i.e., names, contact details and addresses).	8.2.4
43	I&APs, and state departments administering a law related to the application, are entitled to comment, in writing, on all reports/plans lodged to such party during the PPP.	8.3.1

44	Record I&AP comments in reports and plans and attached responses to such comments and records of meetings, to the reports and plans submitted to the competent authority.	8.2.8 8.2.9 Appendix F9, F10.
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8.1 PPP APPROACH

The proposed Casteel DSRP makes provision for two rounds of public consultation to meet the PPP legal requirements and are illustrated in **Figure 8-1** and detailed in the sections below.

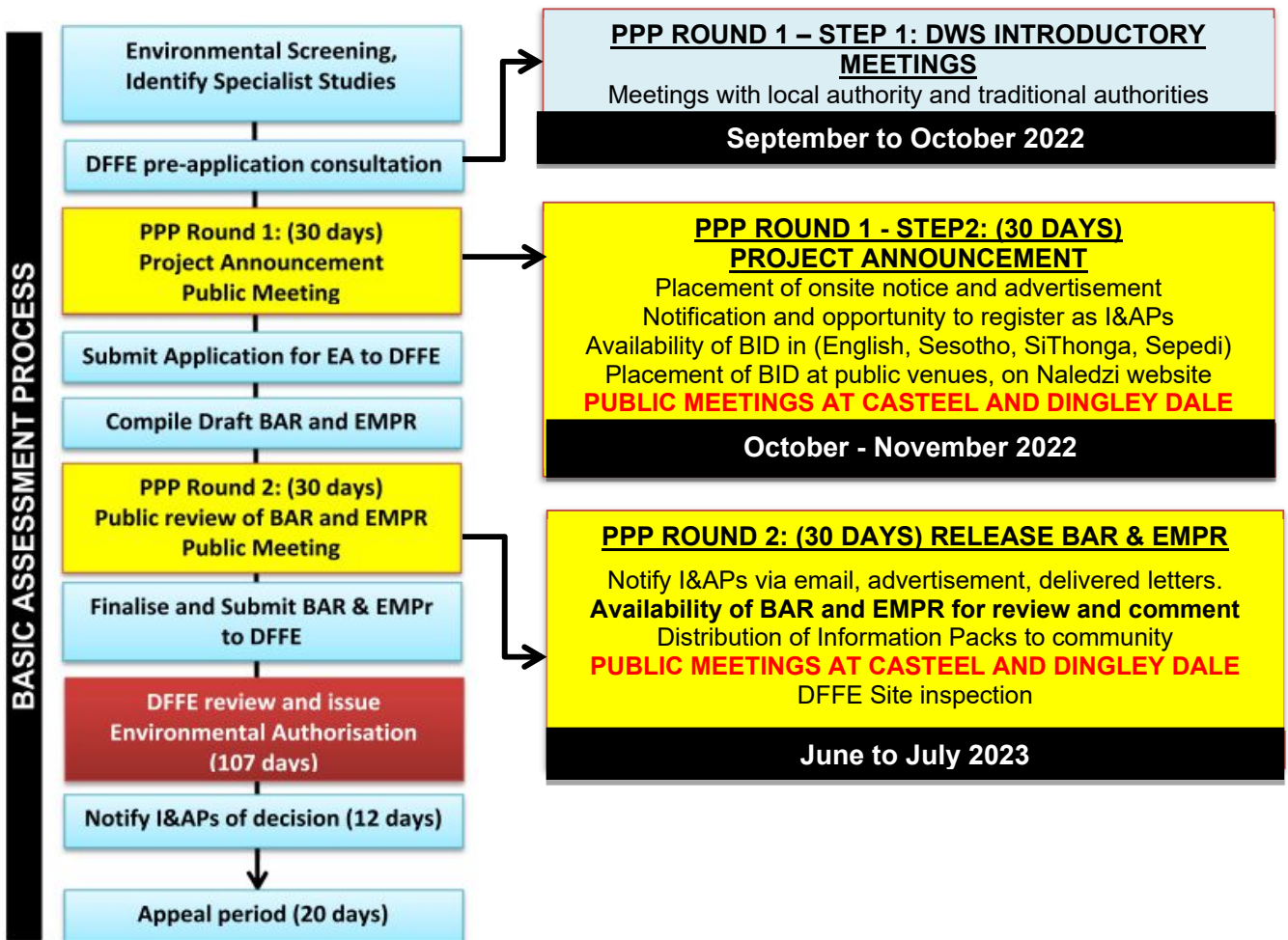


Figure 8-1: Basic Assessment process and associated PPP followed for proposed Casteel DSRP

8.2 PRE-APPLICATION WORK

8.2.1 Authority Engagement

On 25 August 2022 an online pre-application meeting took place with the DFFE responsible case office Mrs Samkelisiwe Dlamini (Reference no. 2022-08-0009). The BA and PPP approach including required specialists' studies were discussed and agreed to. The proceedings were recorded and adopted as attached under **Appendix F1**.

8.2.2 DWS Introductory Meetings

DWS Introductory meetings took place on 15 and 16 September 2022 with the Bushbuckridge Local Municipality, Councillors of Wards 16, 14, 32 and 22 including the Moreipuso – and Setlhare Traditional Authorities. This was an initiative by the DWS: SIAM to:

- Introduce the EAP to the mentioned stakeholders as an appointed DWS contractor.
- Alert the stakeholders of the proposed Casteel DSRP and required application for environmental authorisation to DFFE.
- Announce the commencement of the BA process and required PPP.
- Specific requirements for the PPP (i.e., languages of notices, public engagements etc)

The signed attendance registers of these engagements are included under **Appendix F2**. In absence of recorded meeting proceedings from DWS, Naledzi noted the comments raised and these have been recorded in the project Comments and Response Report discussed in the sections below.

8.2.3 Landowner Consent

As specified under section 2.2.1 of this report the Mpumalanga Department of Agriculture, Land Reform and Rural Development granted consent to Naledzi to lodge the application for environmental authorisation and continue with the BA process in respect of Kasteel 231-KU and is attached under **Appendix C2**.

8.2.4 Registration of I&APs

The EAP is required to provide access to information during the BA process and must consult with the relevant interested and affected parties. Therefore, as per the regulatory requirements an I&AP database has been opened for the project and the relevant landowner, traditional authorities, ward councillors, organs of state, local and district authorities including downstream water users have been pre-identified and registered on the project database and notified of the project.

The broader public (incl. communities) was also given the opportunity to register and participate in the BA process by means of public notices on 14 October 2022 calling for registration of I&APs until 15

November 2022. A further opportunity to register including review and comment on this Basic Assessment Report is provided from 30 June to 31 July 2023. Refer to **Appendix F3** for the I&AP Database.

For the proposed Casteel DSRP the key parties are detailed in **Table 16**.

Table 16: Key Stakeholders for proposed Casteel DSRP

KEY STAKEHOLDERS	
Competent Authority – Environment Authorisation	Catchment Management Agency
National Dept. Forestry, Fisheries and Environment (DFFE)	Inkomati-Usutu Catchment Management Agency (IUCMA)
Permitting Authority – Protected Tree Permits	Downstream Water Users
Dept. of Forestry and Fisheries: Forestry Regulation and Support	Dingley Dale Irrigation Scheme New Forest Irrigation Scheme Champagne Citrus Board
Landowner	
Mpumalanga Dept. Agriculture Land Reform and Rural Development	
Persons in Control of Land	Commenting Authorities
Moreipuso Traditional Authority Setlhare Traditional Authority	Mpumalanga Dept. of Agriculture, Rural Development, Land and Environmental Affairs Mpumalanga Tourism and Parks Agency Department of Agriculture South African Heritage Resources Agency Mpumalanga Province Heritage Resource Agency Mpumalanga Department of Co-operative Governance and Traditional Affairs South African Civil Aviation Authority (CAA) South African National Defence Force (SANDF)
Local and District Authority	
Bushbuckridge Local Municipality Councillors for Ward 16, 14, 32 and 22 Ehlanzeni District Municipality	
Services Infrastructure	
South African National Roads Agency (SANRAL) Bvi Consulting Engineers Eskom (Distribution and Transmission)	
Organisations/Non-profit company	
Kruger to Canyons Biosphere Region Birdlife Africa	

8.2.5 Press Advertisements

A press advertisement announcing the proposed Casteel DSRP BA process and call for registration of I&APs was published in the Bushbuckridge News in the issue of Friday, 14 October 2022 in English and Sepedi.

Refer to **Appendix F4** for the newspaper tear sheet. The announcement of the availability of the Draft BAR and EMPR have been placed in the same newspaper in June 2023.

8.2.6 Site Notices

Site notices were placed onsite and at eleven (11) public places in the project area conspicuous to and accessible by the public on 15 October 2022 as part of the BA process announcement (i.e., first round of public engagements). The site notices were posted in all area’s relevant languages i.e., English, Sesotho, Sepedi, and Xitsonga. Site notices were placed at the following places:

<ul style="list-style-type: none"> • Moreipuso Traditional Council Office (Wales Road) • Moshiko General Dealer, Zoeknog B • Zoeknog Clinic, Zoeknog A • Casteel U-Save • Casteel Thusong Service Centre • Casteel Dam (R40/Casteel Dam access road) 	<ul style="list-style-type: none"> • SASSA Office, Setlhare Tribal Council Grounds • Setlhare Tribal Council Office • Marriam Mogakane Community Centre (Acornhoek) • Shoprite, Acornhoek Plaza and at Acornhoek Mall • Champagne Citrus Farm
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For the second round of public engagements (release of the Draft BAR& EMPR), over and above direct and press advertisement notification, site notices have been placed at the same public venues.

Please refer to **Appendix F5** for Photographic Proof of Site Notice Placement for the first round of public engagements.

8.2.7 Direct Notification of I&APs (PPP 1st Round)

With the release of the public notices, the stakeholders (pre-identified) and I&APS were informed of the proposed Casteel DSRP application for environmental authorisation and BA process by means of a Background Information Document (BID) and Comment and Registration Form, requesting registration on the database and attendance of scheduled public meetings in the project area.

A 30-day comment and registration period on the BID was provided from 17 October to 15 November 2022. The BID was made available in English, Sesotho, Sepedi, and Xitsonga by the following means:

- Sent directly (via email) to the pre-identified list of I&APs and any subsequent I&AP registrations.
- Hand delivered to traditional council offices, the Kgosi’s and downstream water uses (i.e. Irrigation Schemes, Citrus Board).

- An electronic copy of the BID was also placed on the Naledzi website for public download i.e.
 - <http://www.naledzi.co.za/public-documents-naledzi.php>
- A copy of the BID was also uploaded onto SAHRIS online application system on 17 October 2022. The Case ID number allocated is 19843.
- Printed copies of the BID were on display at public venues in the project area i.e.
 - Faith Mission Church, Chochocho (Dingley Dale)
 - Setlhare Tribal Office
 - Moreipuso Tribal Office
 - Casteel Thusong Service Centre

A Suggestion Box was placed at each public venue to allow I&APs and the community to complete their Registration and Comment Forms and drop them into the Suggestion Box for collection by Naledzi later since not all have access to WhatsApp or email.

Refer to **Appendix F6** for copies of the BID and **Appendix F7** for proof of direct notification (i.e., Signed BID Distribution List, email proofs, Naledzi website display and SAHRIS website upload).

No written submissions were made during the initial public registration period however several stakeholder comments were recorded during the DWS introductory meetings and the first round of public engagements. Refer to section 8.2.9 below.

8.2.8 1st Round of Public Meetings

Two public meetings including a site inspection took place from 25 – 26 October 2022 i.e.

- Tuesday, 25 October at 11am at Casteel Thusong Service Centre (Tent) with the community of Casteel, ward councillors including the Setlhare and Moreipuso Tribal Council representatives.
- Tuesday, 25 October at 2pm a site inspection with the Environmental Management Division of the Bushbuckridge Local Municipality at Casteel Dam.
- Wednesday, 26 October 2022 at 9am at the Faith Mission Church in Chochocho (Dingley Dale) with the downstream water users (i.e., irrigation schemes, citrus farm) including ward committee members.

Naledzi facilitated the meeting in English with a Sepedi/Xitsonga Translator present at each meeting. The minutes and signed attendance registers are attached under **Appendix F8**.

The public meetings were announced through the 14 October 2022 Bushbuckridge News press advertisement, site notices including the BID and Stakeholder Notification letter documented in sections 8.2.5 to 8.2.7.

8.2.9 Summary of Issues by I&APs

The comments and responses recorded during the DWS introductory meetings, and first round of public engagements have been summarised in the Comments and Response Report attached under **Appendix F9**. A summary is included in **Table 17** below.

Table 17: Brief Summary of main I&AP issues and Naledzi responses

Stakeholder	Key issue	Response
DFFE	<ul style="list-style-type: none"> ▪ Traffic Impact Study ▪ SAHRA approval (Heritage Impact Study) 	Appendix E.
Bushbuckridge Local Municipality	<ul style="list-style-type: none"> ▪ Employment opportunities ▪ Engage downstream water users. ▪ Site inspection ▪ Map of buffer area to dam to be kept clear of housing. ▪ Construction material source ▪ Consider community customs/rituals 	Section 4.2.3 Section 8.2.6, 8.2.8 Section 8.2.8 Appendix D2. Section 4.2.4 Section 9.12
Moreipuso Traditional Council	<ul style="list-style-type: none"> ▪ Map of buffer area to dam to be kept clear of housing. ▪ Consult Ward Councillors for Wards 14, 22, 32 and 16. ▪ Canal downstream from dam is in poor condition. ▪ Dam must be fenced off and security controlled. ▪ Community must still have access for fishing. 	Appendix D2 Section 8.2.6, 8.2.8 Responsibility of DoA To be confirmed Will have access
Setlhare Traditional Council	<ul style="list-style-type: none"> ▪ Consult Ward Councillors for Wards 14, 22, 32 and 16. ▪ Notifications to community in Sepedi, Sesotho, Xitsonga. ▪ Translator proficient in above languages to be present at meetings. ▪ Consider community beliefs and rituals. ▪ Clay-brick factory upstream is polluting the dam. ▪ Number of skilled and unskilled job opportunities. ▪ Dam to be rehabilitated as soon as possible. 	<ul style="list-style-type: none"> ▪ Section 8.2.6, 8.2.8 ▪ Appendix F6 ▪ Section 8.2.8, Appendix F8. ▪ Section 9.12 ▪ Appendix F9 ▪ Section 4.2.3 ▪ Section 4.3.
Downstream Water Users	<ul style="list-style-type: none"> ▪ Who will be employed for the project? ▪ How will farmers downstream be impacted? ▪ Will the valve releasing water to Chochocho also be repaired? ▪ The direct beneficiaries of the water supply are at the meeting and to benefit from project. 	Section 4.2.3 Section 4.2. (Water will be released during works). Section 4.2.3

8.3 POST APPLICATION SUBMISSION WORK

8.3.1 Release of the Draft BAR and EMPR for public comment

The application for environmental authorisation has been submitted to the DFFE during June 2023 including a copy of the Draft BAR and EMPR for authority inputs.

The Draft BAR and EMPR is simultaneously made available for a 30-day review and comment period to stakeholders and state departments from 30 June to 31 July 2023. An electronic copy of the report is available to all I&APs on the Naledzi website <http://www.naledzi.co.za/public-documents-naledzi.php>. The Notification letter of the availability of the draft report has been made available in English, Sesotho, Sepedi, and Xitsonga.

Printed copies of the report are on display at the same public venues as the BID.

8.3.2 2nd Round of Public Meetings

Two public meetings have been scheduled as part of the second round of public engagements to facilitate comments on the Draft BAR and EMPR from the community, tribal authorities, and downstream water users i.e.

Venue	Date	Time
Casteel Thusong Service Centre (Tent) (Meeting is intended for community members)	12 July 2023	10:00
Faith Mission Church, Dingley Dale (Meeting is intended for downstream water users and Irrigation Scheme members)	13 July 2023	10:00

8.3.3 Submission of the Final BAR and Way Forward

Upon the lapse of the draft BAR and EMPR public review period, the reports will be finalised to incorporate stakeholder inputs and will be submitted to the DFFE for decision making.

Stakeholders/I&APs will be notified once the decision (newspaper advertisement, direct notification) is issued and the opportunity to appeal the decision. A copy of the decision will be sent to registered I&APs and made available on the Naledzi website.

9. DESCRIPTION OF ATTRIBUTES OF SITE

This section provides a description of the natural, social, economic, and cultural features of Casteel Dam (i.e., on the Remaining Extent of the Farm Kasteel 231-JU) where the rehabilitation works are proposed; and how it may be affected by the proposed works and its logistical aspects.

Information pertaining to the description of the site, its attributes and how it will be affected have been sourced through the following means:

- Desktop analysis, literature review and use of Spatial Datasets
- DFFE Environmental Screening Tool Report (STR)
- Site verification through a site inspection conducted on 22 August 2022.
- Specialist investigations including inputs received from key stakeholders and I&APs

According to the STR the project site is linked to several sensitivity themes detailed in **Table 14 under section 5.3.2.1**. Naledzi and our team of specialist (detailed in section 1.2.4 of the report) verified the land use and sensitivity themes through field investigations of which the results are considered and included in the sections below.

9.1 CURRENT LAND USE

The Casteel Dam is a government waterwork located next to the R40 Acornhoek/Bushbuckridge Main Road and supplies water to downstream irrigation schemes and communities. The dam is accessible directly from the R40 main road by means of an informal two track gravel access road.

The dam is used by the local community for subsistence fishing, grazing, and firewood gathering. The community also uses the area for thoroughfare. Several footpaths are evident throughout the area. Tribal authorities also suggested that the community may perform customs and rituals at the dam which is discussed in more detail in section 9.12 below.

The area proposed for site establishment is covered in natural disturbed vegetation. The area on the western (right) bank of the dam where the alternative access road is proposed comprises modified old lands previously used for subsistence crops but now lies fallow.

During the construction works water will still be released to downstream water users, locals will still be able to fish and cattle to graze in areas not occupied by the site establishment area and works. Firewood collection will be possible from cleared woody vegetation and adjacent areas.

Refer to Plate 4 for site photographs.

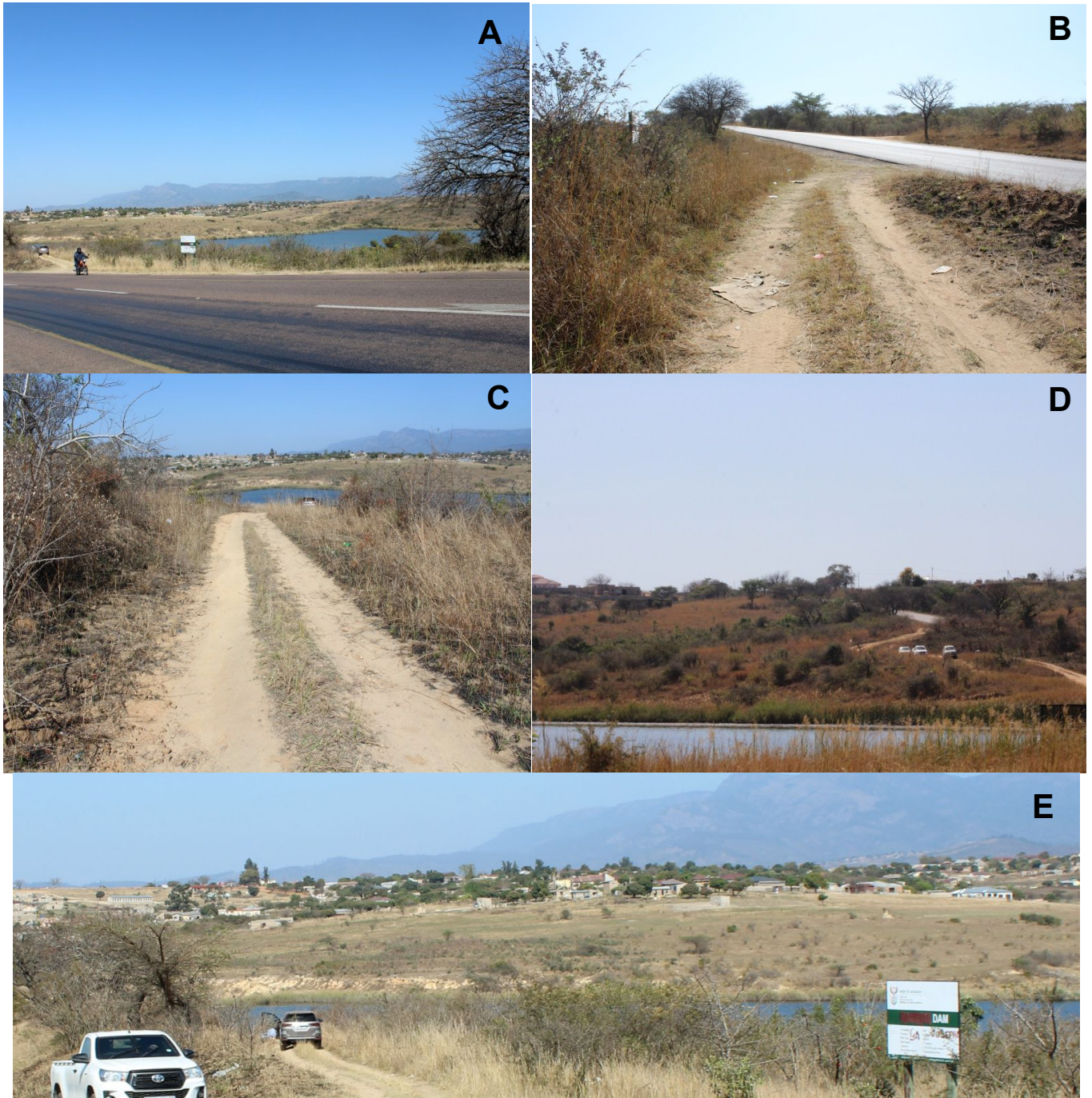


Plate 4: (A), (B) & (C) R40/Casteel Dam Road and intersection; (D) Temporary site establishment area for the construction phase; (E) Modified old lands on western flank of the dam where the alternative access road to the spillway is proposed.

9.2 TOPOGRAPHY

Casteel Dam is situated on the valley floor below and east of the Mpumalanga-Drakensberg escarpment at an elevation of 600 meters above sea level. The topography of the general area is gentle to moderately undulating (hilly) with shallow to deeply eroded drainage lines. The proposed repair works are located on the valley floor of the landscape and along the steep embankment of the dam (1:7.5 embankment slope). Refer to **Figure 9-1, 9-2 and 9-3** below and overleaf.



Figure 9-1: Tilted Google Earth imagery showing the location of Casteel Dam on the valley floor with shallow to deeply eroded drainage lines below the Mpumalanga-Drakensberg Escarpment.



Figure 9-2: Elevation profile of the location of Casteel Dam from North to South.

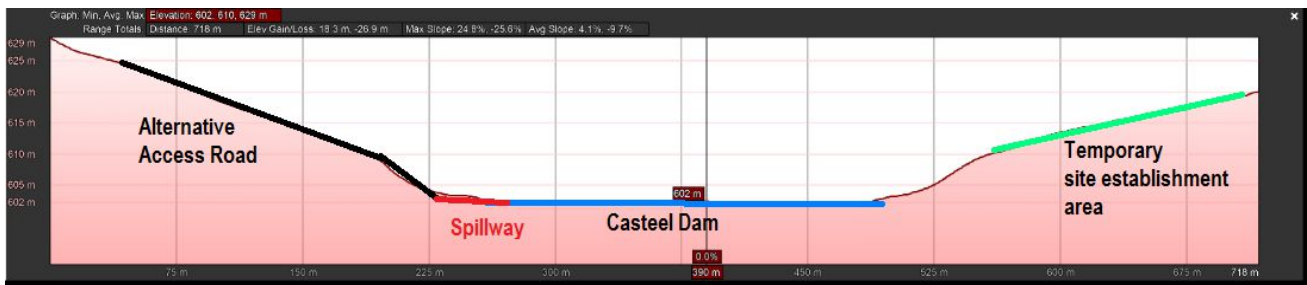


Figure 9-3: Elevation profile of Casteel Dam and its flanks from West to East

As part of the proposed rehabilitation works the unstable dam downstream slope (i.e., steep) at 1: 1,75 (**Figure 9-2**) and will be flattened to 1: 2,5 as part of the proposed rehabilitation works to avoid embankment failure (**Figure 9-4**).

The rehabilitation works are critical and does not result on any topographical impact. However, if the no-go option is implemented, the risk of dam failure is highly probable and could lead to permanent scarring of the landscape. The project will therefore result in the improvement of the structure and minimise the risk for dam failure and permanent scarring of the landscape.

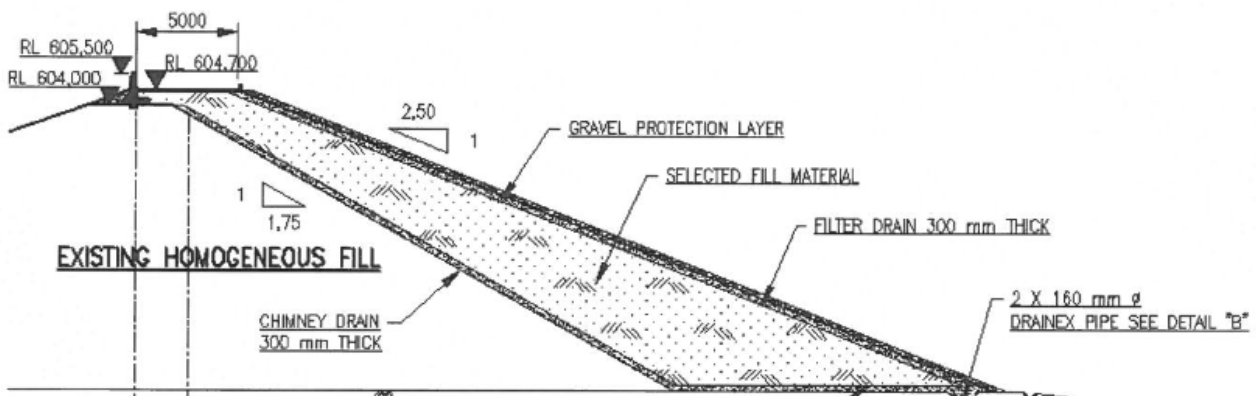


Figure 9-4: Downstream slope design where the existing 1:7.5 slope is flattened to 1: 2.5.

9.3 GEOLOGY

According to the 1:250 000 Geological Map of 2430 Pilgrims Rest (1986) the geology underlying Casteel Dam comprise medium-to-coarse grained beige to light grey granite type rock of the Cunning Moor Tonalite Formation of the Mashishimale Suite. The rock is over-saturated with silica, sphere-bearing, plutonic, igneous tonalite (Terroco Geotechnical cc, 2010). The granite rock gives rise to coarse sandy textured soils (Schulze and Horan, 2006/ Nepid 2022).

The DWS Design Report confirms that the dam appears to be constructed from basin material consisting of weathered, soft rock tonalite (Ramokopa, 2008).

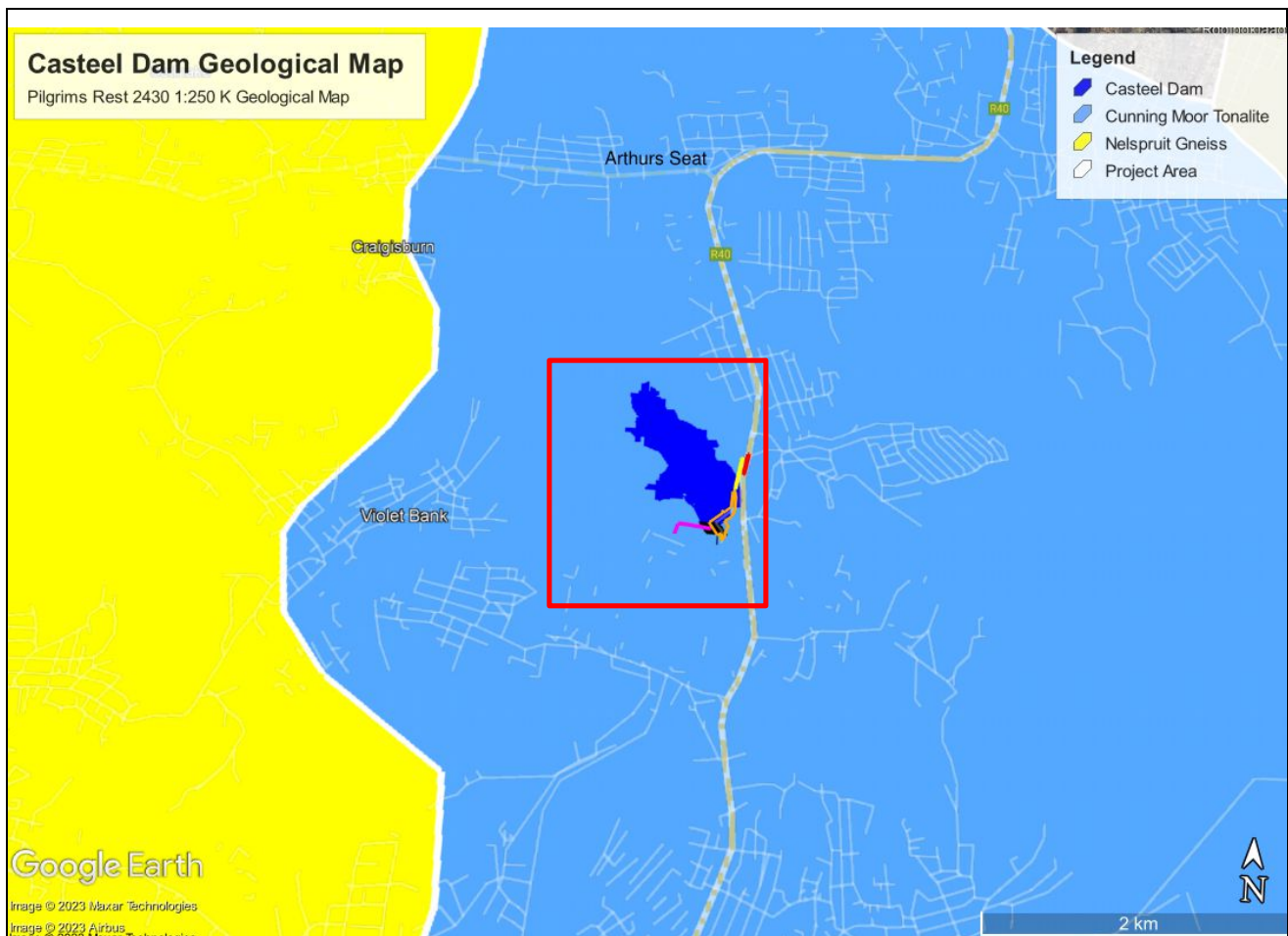


Figure 9-5: Casteel Dam Geological Map (Pilgrim’s Rest 2430 1: 250K Geological Map)

 Project Site



One of the identified shortcomings of the dam is that it is freely discharging from its spillway to the river and have resulted in deep gully erosion downstream of the spillway channel on the right flank of the dam (as illustrated Plate 3, Photo F under section 3.2). The gully erosion is 8 meters deep and working its way towards the spillway (Nepid, 2022) and is a risk for dam failure. Although the gully has eroded to bedrock, if not rehabilitated, will erode sideways and result in dam failure. The donga has also become a safety risk for livestock and humans.

The objective of the project is to repair the gully erosion by controlling it through lining the river return channel with rock and rubble masonry. A 1.2m high concrete barrier will also be constructed along both sides of the donga to prevent animals and humans from falling into the donga. The impact is therefore positive since it rectifies an existing eroded area.

Borrow material will also be imported for the rehabilitation works from a licensed commercial quarry (probably near Agin Court Region). The material will be imported within the first three (3) months of construction. The impacts associated with establishing a dedicated quarry is therefore avoided. The material volumes to be imported include:

- 28 000m³ of gravel
- 5000m³ of concrete
- 2500 m³ of rockfill

The importation of material will however generate construct traffic along the R40 either North or South bound. The road network intersections operate at acceptable levels with the added construction traffic, the impact should therefore be low. As a precautionary measures DWS will implement temporary construction signage and a flagman on the R40 (refer to section 9.9 in the below sections providing more details on the traffic aspects).

9.4 SOILS

Soils within the project area are classified as Haplic acrisols (Jones *et al.* 2013). Haplic acrisols are described as “*very acidic with clay-rich subsoil*” (Jones *et. al.* 2012). The soils in the area are characterised by course sandy texture and low pH. The risk of erosion in the area is classified as “high” (Schulze and Horan 2006).

The above is further supported by the National Soil Classification and Description dataset which classifies the soils of the project area as ‘*freely drained structureless soil*’ and ‘*Classes 1-4 undifferentiated structureless soils*’ comprising ‘*greyish sandy soils*’.

There are also seasonally and permanently wet soils downstream of the Casteel Dam embankment associated with a Channel Valley Bottom Wetland. The wetland comprises grey bleached orthic horizon over deep alluvial sands which was identified as Dundee Soil Formation according to the method of the Soil Classification Working Group (2018) (Nepid, 2022).

Given the study site soil structure and being prone to erosion, the western (right) bank of Casteel Dam is geomorphologically unstable and characterised by extensive areas of rill erosion (Nepid, 2022). As explained under section 9.3 there is also a large erosion gully downstream in the spillway. The extent of rill erosion is shown Plate 3, Photo D, and the large gully in the spillway in Photo F under section 3.2 of this report. It is also extensively illustrated in the Aquatic Biodiversity Study (**Appendix E4**)

The soil data infer the following for the construction of the Casteel DSRP:

- The soils are highly erodible. The project may result in soil erosion during high rainfall events, due to concentrated stormwater runoff.
- The proposed construction works can result in loss of land capability i.e., infestation of alien species affecting soil resources.
- According to the Terrestrial Biodiversity Study (Digital Earth, 2022) the landscape is also slow to recover from disturbance.

DWS will implement a soil erosion plan to protect cleared areas from erosion during the wet season and revegetation of cleared areas (i.e., rehabilitation). For this to be achieved available topsoil will be conserved and removed to stockpile for later rehabilitation of the cleared areas.

9.5 CLIMATE

Casteel Dam is in the Lowveld Region of the Mpumalanga Province which has a sub-tropical climate. It falls within the summer rainfall, dry winter zone of South Africa. The summer months are from October lasting until March with a shorter winter from May until August/September. The hottest summer days experienced in the area can reach temperatures of 37° C.

Temperature, Precipitation, Evaporation, Mean Annual Runoff

The closest climate and weather data to Casteel Dam is 10km North at Acornhoek (24.59°S 31.09°E, 645m asl). According to the last 30-years of simulated historical climate and weather data obtained from Meteoblue (**Figure 9-6**) the annual average maximum temperature is 29 ° C from October to March, with the hottest days recorded in November (**Table 18**). Temperatures drop from May to August to an average maximum temperature of 11 ° C in the day with cold nights of 7 ° C (**Table 18**). The annual average rainfall for the area is 487mm (**Table 18**).

Based on the Inkomati Water Availability Study (DWAF, 2009) the natural Mean Annual Runoff (nMAR) at Casteel Dam is 2.76Mm³, with significant variation in years with values ranging from 0.67Mm³ (1991) and 13.26Mm³ (1939). Dry season (low flows 0.089Mm³ or 34 l/s) occurs from May to November and Wet season from December to April. The height of the wet season at Casteel Dam is in February (natural flow of 45l/s and ranging between 23 and 285ml/s). (Nepid, 2022). Storm events can be expected at the height of the wet season which is in February.

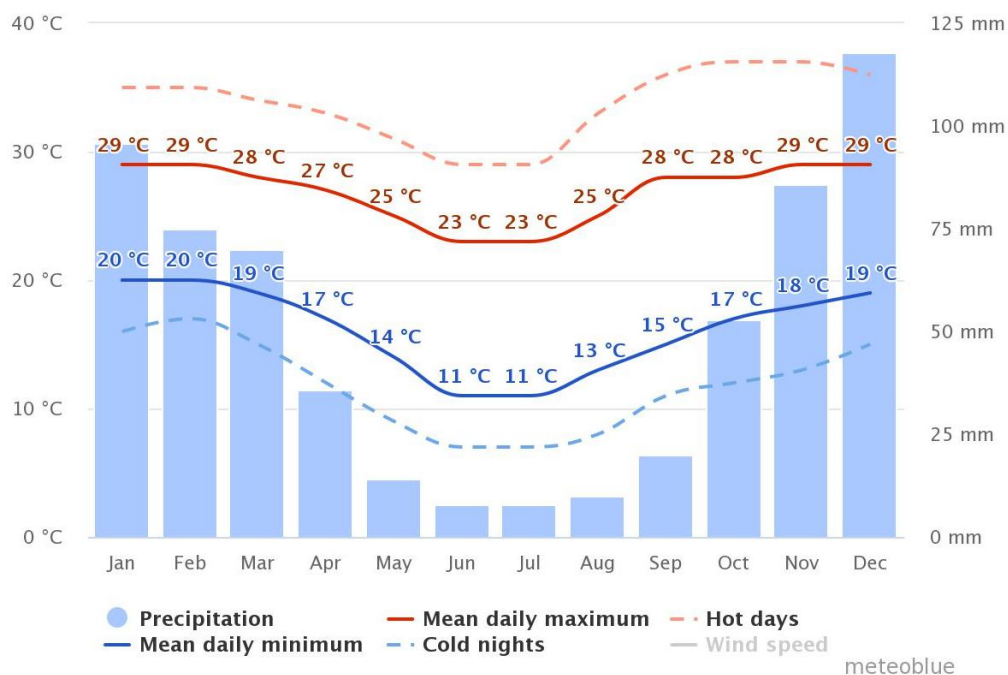


Figure 9-6: Average temperature and precipitation graph for Acornhoek (historical simulated data from Meteoblue)

Table 18: Annual average temperatures and precipitation for Acornhoek including mean annual runoff.

Month	Maximum (°C)	Minimum (°C)	Rainfall (mm)	Inkomati Water Availability Study (DWAf, 2009) Mean Annual Runoff
Jan	29	20	96	Wet Season
Feb	29	20	75	Height of wet Season 45l/s and ranging between 23 and 285ml/s
Mar	28	19	70	Wet Season
Apr	27	17	36	Wet Season
May	25	14	14	Dry Season 0.089Mm ³ or 34 l/s
Jun	23	11	8	
Jul	23	11	8	
Aug	25	13	10	
Sep	28	15	20	
Oct	28	17	53	
Nov	29	18	86	
Dec	29	19	118	Wet Season
Mean average	26.92	16.17	487mm	2.76Mm ³

Wind

The hourly wind speed and direction data for the project area (I.e., Acornhoek) are presented in the annual wind rose in **Figure 9-7**. The wind directions predominantly blow from south-east (SE) to northwest (NW) and east-southeast (ESE) blowing west-northwest (WNW).

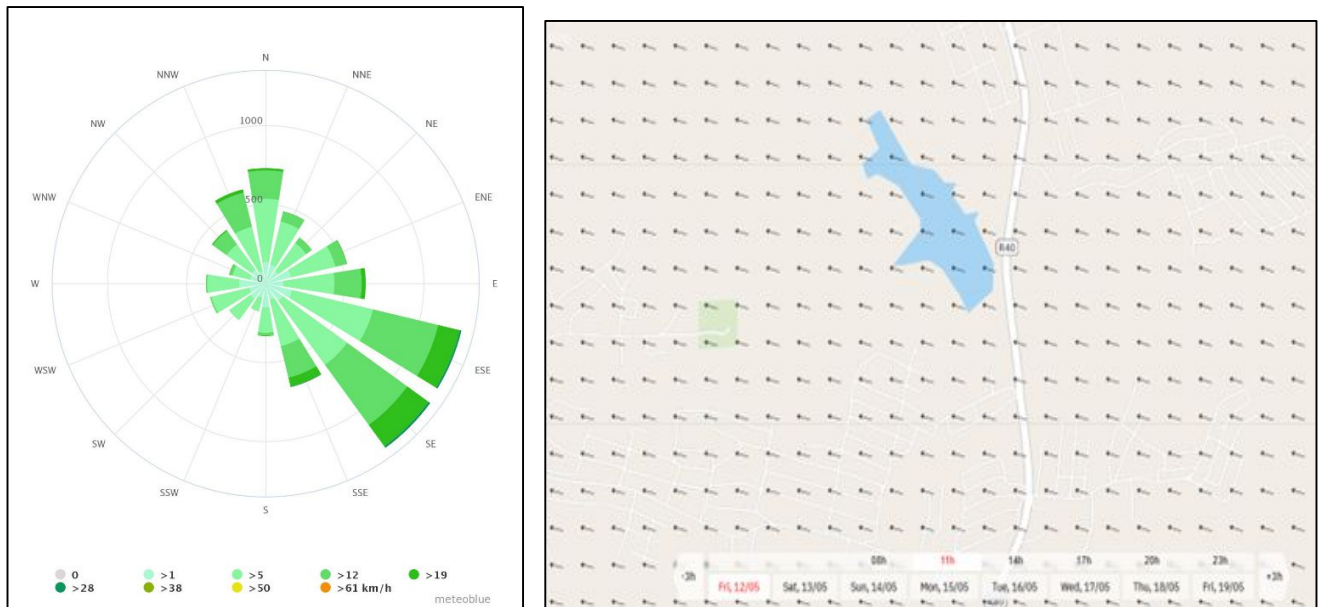


Figure 9-7 Acornhoek Windrose and wind direction map

The climate data infer the following for the proposed Casteel DSRP:

- Casteel Dam is in a high rainfall region with the wet season being from December to April and at its peak in February. Clearing activities and rehabilitation works must be conducted during the dry season from May to October to reduce the risk for soil erosion and sedimentation into the downstream wetland and river system.
- Vehicle entrained dust generated along the alternative access road to the spillway through Casteel Village will disperse towards the residential units west of the access road. Dust suppression measures (i.e., water spraying, 40km/hr speeds) will need to be implemented along this route.

9.6 TERRESTRIAL BIODIVERSITY

According to the DFFE Screening Tool Report (STR) the Terrestrial Biodiversity Theme sensitivity is ‘Very High’ with Animal and Plant Themes being ‘Moderate’, with the possibility of SCC and a Critical Biodiversity Area 2 present (see **Table 19** for applicable STR themes).

Based on the Terrestrial Biodiversity site verification and field assessment conducted by Digital Earth represented by Duncan McKenzie (**Appendix E3**), the project site sensitivity is ‘Low’ due to the small size of the proposed works area, lack of species of SCC and high disturbance levels present (**Table 19**).

The field survey was conducted over one day in the dry season (22 August 2022) and found the site to be in a degraded state due to impacts from overgrazing, firewood gathering, dumping, littering, soil erosion and modified habitat i.e., dam infrastructure and R40 Casteel Dam access road. The study findings are briefly discussed in the sections below. For full details refer to the study attached under Appendix 3.

Table 19: STR Themes and Site Verification Findings

Theme	Potential features	Site Verification Findings
Animal	African Wild Dog, Mammal Species No. 5, Tawny -, Crowned Eagle, African Finfoot and Caspian Tern, Maquassie Musk Shrew, Robert’s Marsh Rat, Bateleur,	Low likelihood of occurrence, not likely to venture this far from Kruger National Park, high disturbance levels not optimal for species.
Plant	Listed Species No.575, 1252, Woodia singularis (herb).	Rare in Mpumalanga, only degraded habitats present and none located during fieldwork.
Terrestrial	Critical Biodiversity Area 2	Area degraded, should be excluded from macro-scale assessment.
	FEPA Sub catchment, SWRA	Applicable
	Protected Area Expansion Strategy	Applicable, but closest protected area 10km away, and surrounding area is densely populated.

9.6.1 Ecologically Important Landscapes

The GIS analysis pertaining to the relevance of the proposed project to ecologically important landscape features is summarised in Table 20.

Table 20: Project area ecologically important landscape features

Desktop Information Considered	Relevance	Figure
<p>Critical Biodiversity Area (CBA)</p>	<p>According to the Mpumalanga Biodiversity Sector Plan (MPSP) / Ehlanzeni Bioregional Plan (EBP) the project overlaps with a CBA Optimal, Other Natural Areas, Heavily or Moderately Modified Old Lands.</p>	<p>9-8 overleaf</p>
	<p>According to the MBSP / EDBP ‘CBA Optimal’ areas should be maintained in a natural state, however the CBA Optimal area in the northern and north-eastern portion of the project site is degraded i.e., anthropogenic factors, historical agricultural lands, overgrazing, firewood gathering, alien plant infestation. It should be reclassified as ‘Moderately Modified / Other Natural Areas’.</p> <p>The south-eastern corner of the site is classified as ‘Other Natural Areas’. The desired management objective is to minimise habitat and species loss and ecosystem functionality. The Heavily or Moderately Modified area in the south-western and western portions of the project site are flexible in terms of management objectives and permissible land-uses.</p>	
<p>Protected Areas</p>	<p>N/A. More than 10km away from protected area.</p>	<p>N/A</p>
<p>Conservation Areas</p>	<p>Overlaps with ‘Transitional Zone’ of Kruger to Canyon Biosphere Reserve. Not core or buffer zone. Therefore, not applicable.</p>	<p>5-1</p>
<p>National Protected Areas Expansion Strategy</p>	<p>According to the NPAES 2016, the project area overlaps with an NPAES ‘Priority Focus Area’.</p>	<p>5-2</p>
	<p>The ‘Priority Focus Area’ is located more than 10km away from any protected area and the surrounding area is densely populated. The possibility of incorporating into or as part of a national protected area is low to unlikely.</p>	
<p>Threatened or Endangered Ecosystem</p>	<p>N/A. Overlaps with ecosystem of ‘Least Concern’.</p>	<p>N/A</p>
<p>NFEPA</p>	<p>Overlaps with FEPA Sub catchment according to 2011 NFEPA</p>	<p>9-12</p>
<p>Strategic Water Resource Area</p>	<p>Does not overlap a 2017 SWRA. Located east outside of the Mpumalanga-Drakensburg SWRA.</p>	<p>5-3</p>

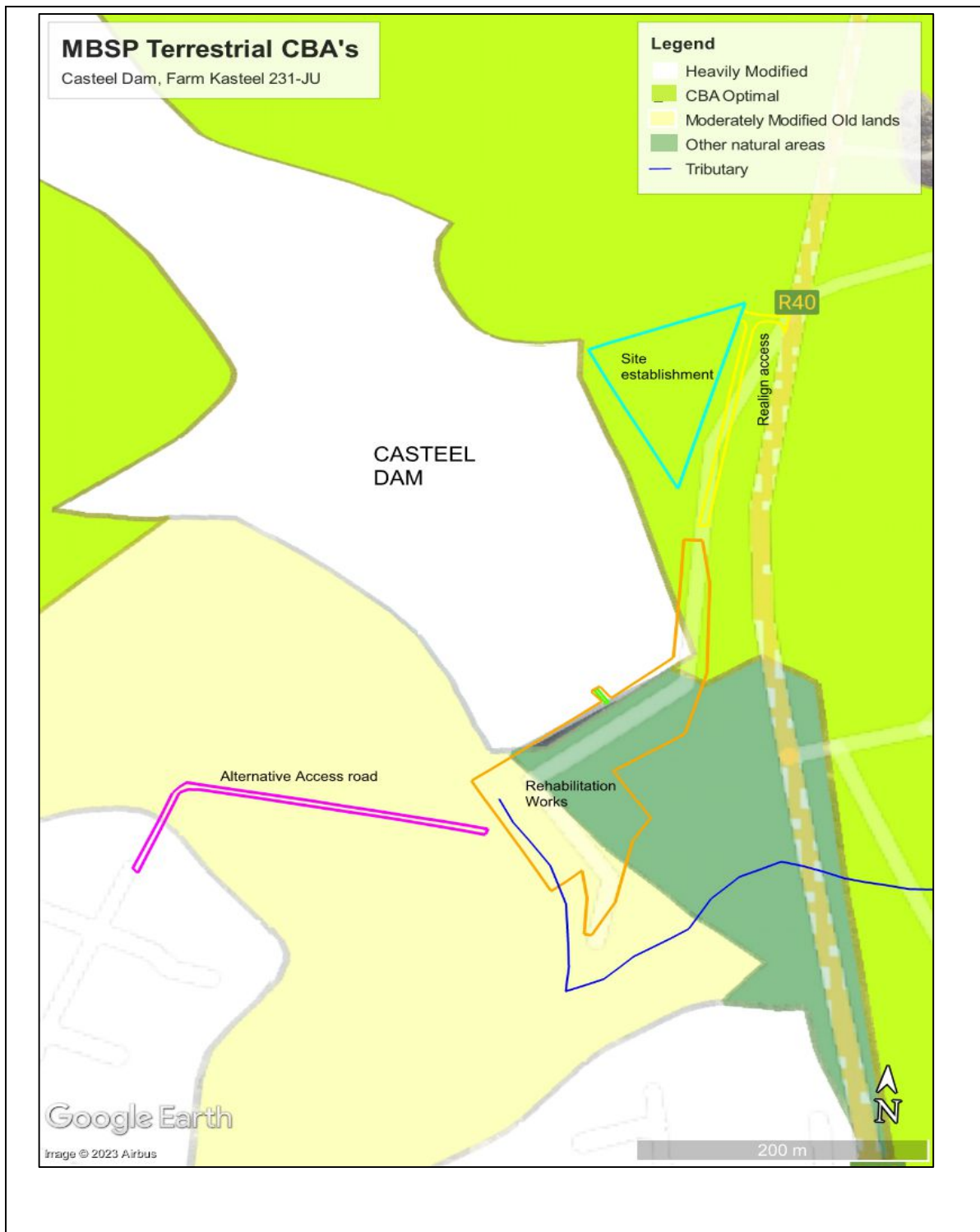


Figure 9-8: Mpumalanga Biodiversity Sector Plan / Ehlanzeni District Bioregional Plan assessment of the project site

9.6.2 Flora

The project site overlaps with the Granite Lowveld vegetation type (Mucina and Rutherford, 2006) which is 'Well Protected' with an ecosystem threat status of 'Least Concern'. Two vegetation communities were recorded onsite; the rest comprised modified areas i.e., Casteel Dam, access road.

Within these vegetation communities, a 144 plant species were recorded of which three (3) species were SCC, but none listed as 'Threatened/Near Threatened' (full list attached as Appendix 1 to the Terrestrial Biodiversity Study). Summer flowering herbaceous plants were under-represented since the survey was done in dry season.

Twenty (20) alien plant species, of which 8 are declared, were also recorded throughout the site indicative of moderate infestation. The most dominant species included Lantana (*Lantana camara*) and Guava (*Psidium guajava*).

The vegetation communities are presented in **Figure 9-9** overleaf and included:

- **Degraded Shrubland / Thicket Mosaic** comprising most of the study area.

The shrubland was characterised by Open-Closed shrubs, in some area's Low shrubs due to firewood harvesting. A 102 species were recorded in this community of which the dominant species included trees of which one is nationally protected and two provincially protected plant species i.e.,

Dominant tree species - Sickie Bush (*Dichrostachys cinerea subsp. Africana*), Mabola Plum (*Parinari curatellifolia*) including the nationally protected **Marula** (*Sclerocarya birrea*) which occurs in moderate density throughout the site. This is amongst other indigenous trees.

Rare tree species - Lowveld Honeysuckle Tree (*Turraea nilotica*) and Cork-bark Thorn (*Vachellia davyi*) were recorded.

Protected plants species i.e., Barberton Aloe (*Aloe barbertoniae*), succulent occurring in large numbers, and Thick-Leaved Gladiolus (*Gladiolus cf. crassifolius*), a geophyte rarely encountered.

- **Phragmites mauritianus: Leersia hexandra Wetland** limited to the seasonally to permanent wet soils in the south portion below the dam wall, spillway and along the shoreline of the dam.

The wetland was characterised by Short to High Closed Grassland with scattered trees and shrubs in drier fringes. A total of 50 species was recorded in this community. The dominant species included:

- The reed *Phragmites mauritianus*, the rush *Typha capensis* and grass *Leersia hexandra*. Additional graminoids and facultative wetland herbs are present (as detailed in the Terrestrial Biodiversity Study, Appendix E3).
- Blue start lotus / water lily (*nymphaeid Nymphaea nouchali*) on the open water areas.

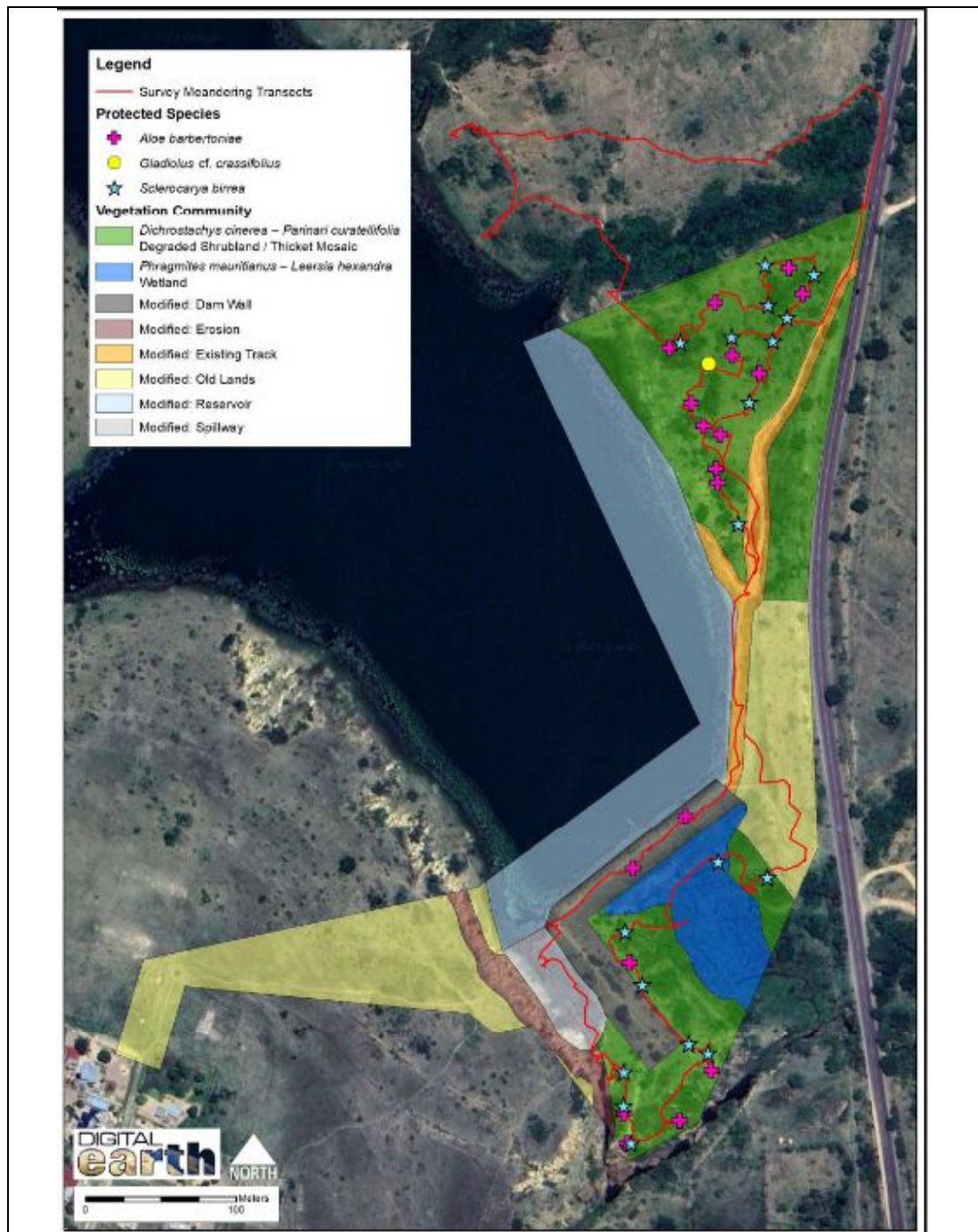


Figure 9-9: Spatial presentation of vegetation communities located within the study area. Image courtesy of Digital Earth, 2022



9.6.3 Fauna

9.6.3.1 Mammals

Despite a low total of 50 mammal species recorded for QDGS 2431 CA (Animal Demography Unit Virtual Museum database) only a few larger mammals and low to moderate variety of small mammals for QDGS 2431 CA would be supported onsite, of which none are endemic. The site is situated east of the R40 and surrounded by high human density. The untransformed area around the dam is used daily for grazing and firewood gathering with the informal fisherman using the dam.

The habitat available onsite include open water, open woodland, thicket, and wetland (**Figure 9-10 on page 53**) of which only two (2) native species were confirmed in the open woodland but are widespread and common in the area i.e., Slender Mongoose (*Herpestes sanguineus*), African Molerat (*Cryptomys hottentotus*).

18 Conservation important mammals potentially occur of which 14 were assessed as SCC of which 9 are considered threatened (refer to Appendix 3 of the Terrestrial Biodiversity Study). None were located during fieldwork or expected due to lack of habitat, disturbance levels and regional scarcity. No protected or alien species were observed.

9.6.3.2 Avifauna

The site is 9km east of the Global Blyde River Canyon Important Bird Area (IBA), but most of the area in between is modified, and no threatened species are likely to occur. The site is not located close to a Ramsar site.

Only 74 bird species have been confirmed within or immediately adjacent to the habitat represented in the study area (tabled below) compared to the 153 species recorded for the SABAP2 Database pentad 2240-1300.

HABITAT	Species %	RECORDED SPECIES
Open Woodland	51%	Cape Starling <i>Lamprotornis nitens</i> , Yellow-fronted, Canary <i>Crithagra mozambica</i> , Scarlet-chested Sunbird <i>Chalcomitra senegalensis</i> , Yellow-throated, Longclaw <i>Macronyx croceus</i> , Little Bee-eater <i>Merops pusillus</i> , White-bellied Sunbird <i>Cinnyris talatala</i> , Rufous-naped Lark <i>Mirafra africana</i> , African Hoopoe <i>Upupa africana</i> and Bronze Mannikin <i>Spermestes cucullata</i>
Thicket	27%	Southern Boubou <i>Laniarius ferrugineus</i> , Sombre Greenbul <i>Andropadus importunus</i> , Terrestrial Brownbul <i>Phyllastrephus terrestris</i> , White-throated Robin-Chat <i>Cossypha humeralis</i> , Spectacled Weaver <i>Ploceus ocularis</i> and African Firefinch <i>Lagonosticta rubricata</i>
Wetland	24%	African Reed Warbler <i>Acrocephalus baeticatus</i> , Little Rush Warbler <i>Bradypterus baboecala</i> , Tawny-flanked <i>Prinia Prinia subflava</i> and Red-faced Cisticola <i>Cisticola erythrops</i> . Seedeaters are often highly visible and included Southern Red Bishop <i>Euplectes orix</i> , African Golden

		Weaver <i>Ploceus xanthops</i> and Common Waxbill <i>Estrilda astrild</i> , Black Crake <i>Zapornia flavirostra</i> and Squacco Heron <i>Ardeola ralloides</i>
Casteel Dam	16%	African Jacana <i>Actophilornis africanus</i> , Reed Cormorant <i>Microcarbo africanus</i> , African Fish Eagle <i>Haliaeetus vocifer</i> , Malachite Kingfisher <i>Corythornis cristata</i> , Little Grebe <i>Tachybaptus ruficollis</i> and Cape Wagtail <i>Motacilla capensis</i> , Brown-throated Martin <i>Riparia paludicola</i> , White-throated Swallow <i>Hirundo albigularis</i> and Wire-tailed Swallow <i>H. smithii</i>

Only 2 of the potentially occurring 19 SCC have previously been recorded in the area i.e., Lanner Falcon and African Pygmy Goose. None were recorded during the site survey and the rest have a very low likelihood of occurrence due to the disturbance levels, lack of suitable habitat, regional rarity, or shortage of suitable nesting sites i.e., tall trees and cliffs. No raptor sites were located within the study area.

The Lanner Falcon may occasionally forage within the study area. The African Pygmy Goose was sited once at Casteel Dam in December 2020, presumably vagrant since its very rare in the Lowveld. None were sited during the August 2022 survey and is unlikely to occur regularly.

Except for waterfowl and problem birds, most bird species are protected in Mpumalanga under the MNCA none of the potentially occurring species are protected under NEMBA Tops.

Three alien bird species were recorded i.e., Rock Dove, House Sparrow, and Common Myna. All three are expected to be resident in the area.

9.6.3.3 Herpetofauna

The Reptile Atlas of South Africa indicate that 67 species of reptile and 27 frog species have been recorded in QDGS 2431 CA. Of the 67 potentially occurring reptile species only two were recorded in the deep erosion gully below the spillway which are both common and widespread i.e., Striped Skink, Rainbow Skink. No frog species were recorded but at least some would be present.

Two nationally threatened reptiles have a 'Very Low' likelihood of occurrence in proximity of the site i.e., Listed Sensitive Species No. 1, Natal Hinged Tortoise (VU). Sensitive Species No. 1 is apparently no longer present (DWS pers.com). The SA Rock Python is protected under NEMBA Tops but unlikely to regularly occur within the study area. No potentially occurring frog species are SCC. No alien herpetofauna species were recorded or are expected in the study area.

9.6.3.4 Site Ecological Drivers and Connectivity

Major ecological drivers identified for the savanna biome include (Sankaran et. al 2005):

- Availability of resources i.e., water and nutrients; and
- Disturbance regimes i.e., fire, herbivory

Some of these primary ecological drivers may be absent from site due to high levels of development surrounding the project site, except for fire and herbivory. Rotational burning is assumed not be implemented in the area.

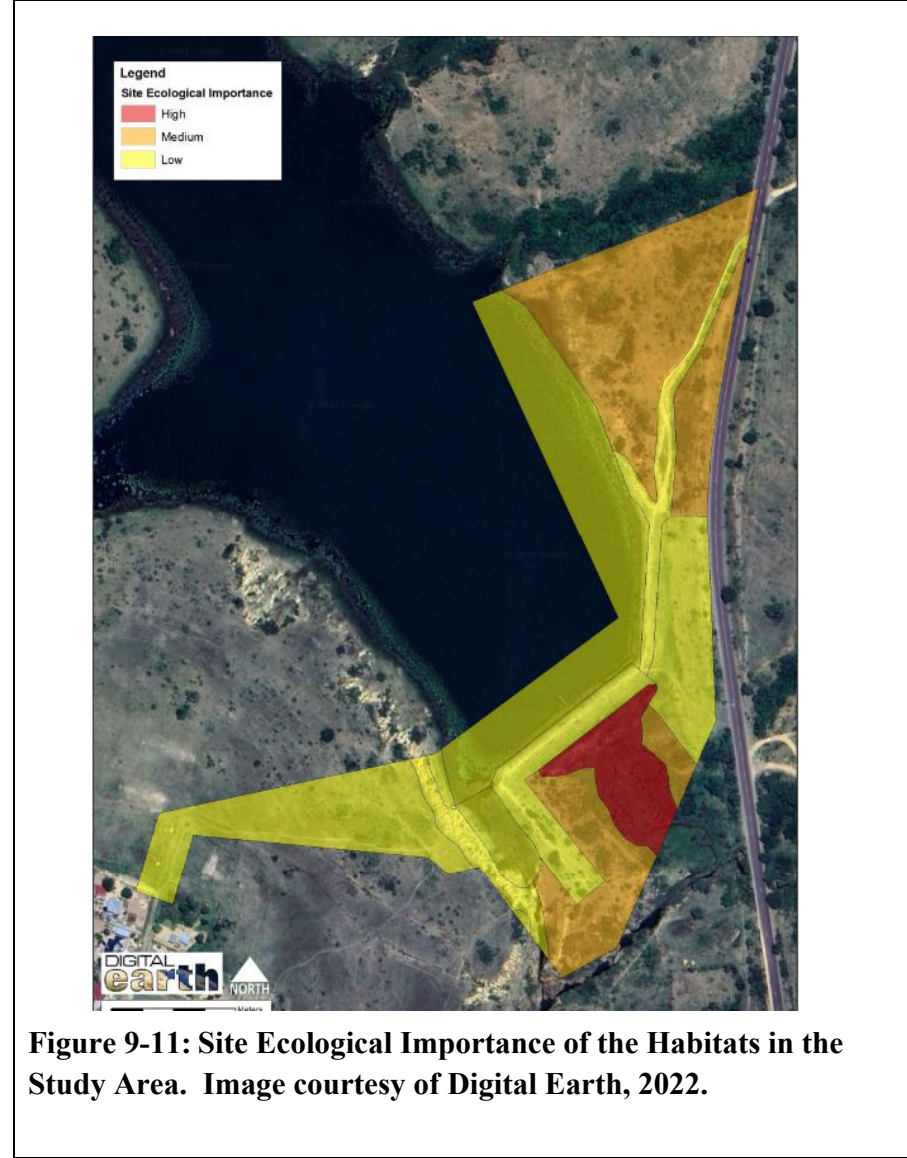
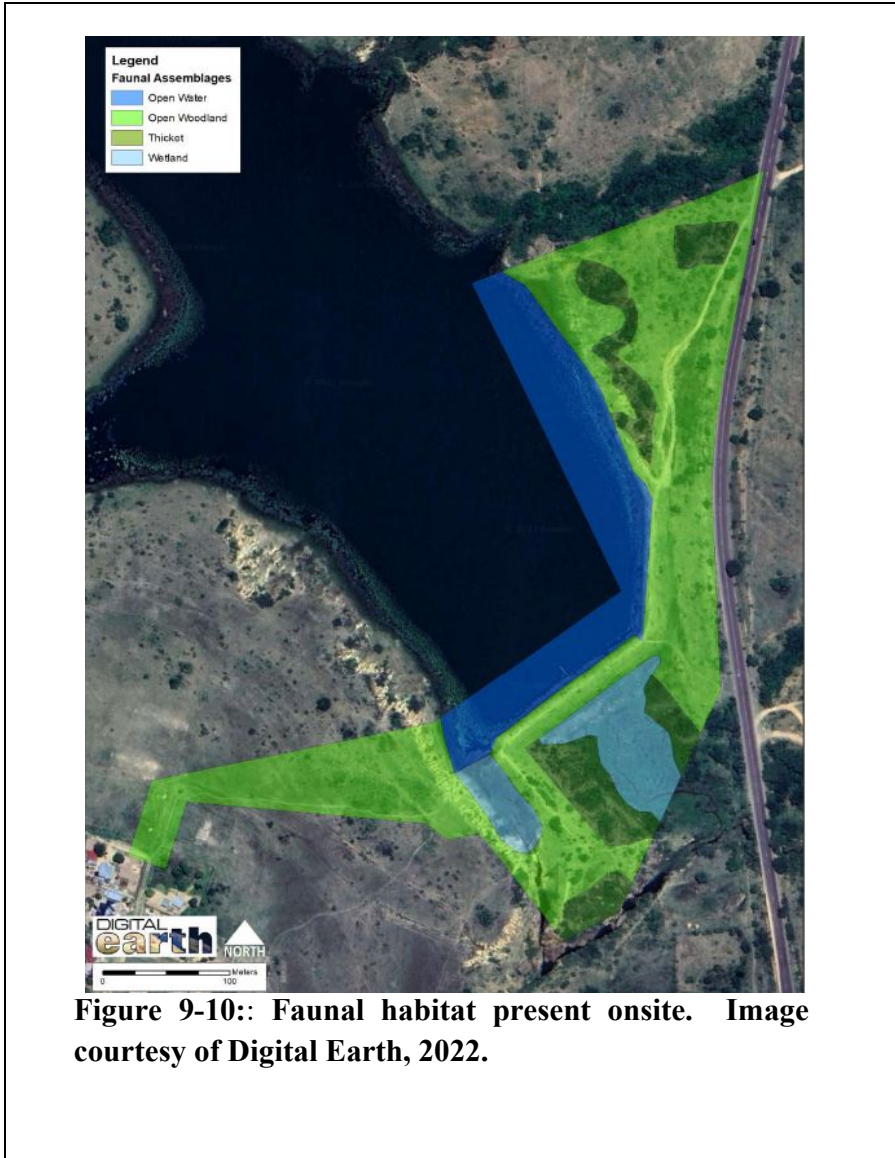
The site is at low-altitude savanna and its unlikely that climate-change refugia, mostly located in higher-altitude areas, would be impacted by the project. No important landscape corridors have been identified, except for the Tlulandziteka River providing important biological connectivity to up and downstream habitats.

9.6.3.5 Site Ecological Importance (SEI)

The integrated Ecological Importance analysis for the four faunal assemblages and two vegetation communities represented in the study area is presented in **Table 21** and **Figure 9-11** below and overleaf.

Table 21: Site Ecological Importance

Assessment Criteria	Faunal assemblages & vegetation units			Comments
	Degraded Woodland	Wetland	Modified	
Conservation Importance	Medium	High	Low	Woodland supports 3 protected species. Wetland is a vital ecological corridor and mostly intact.
Functional Integrity	Medium	High	Low	Woodland is degraded and has moderate level of alien infestation. Wetland has low level of alien infestation and disturbance.
Biodiversity Importance	Medium	High	Low	None
Receptor Resilience	Medium	Medium	Medium	All units recover slowly (more than 10 years).
SITE ECOLOGICAL IMPORTANCE	Medium	High	Low	High SEI - Avoid/minimise impact. Changes to project infrastructure design to limit the amount of habitat impacted, limited activities of low impact acceptable. Offset mitigation may be required for high impact activities.
				Medium SEI – Minimise/restore impact. Medium impact activities acceptable followed by minimization/restoration mitigation.
				Low SEI – Medium to High impact activities acceptable followed by restoration mitigation.



9.6.3.6 Potential impacts on fauna and flora

Generally, the project site is of 'Low' ecological sensitivity, lack SCC and high disturbance levels are present.

The flora data infer the following impacts from the proposed Casteel DSRP construction phase:

- Destruction of vegetation community with 'High' SEI and loss of habitat with 'Very High' Terrestrial Biodiversity Theme (i.e., Wetland). However, the impact will be limited to 0.5 hectares therefore of **Medium** significance and can be mitigated to **Low-Medium** significance.
- Additional low-moderate infestation of alien invasive species into the natural habitat. Twenty (20) alien species, of which 8 are declared, were recorded onsite. The impact is of 'Medium' significance and can be easily mitigated to reduce it to '**Low-Medium**' significance.
- Potential for soil erosion and sedimentation of the downstream wetland and river system due to rain and sediment runoff from exposed soils/areas cleared of vegetation. The impact can be managed by conducting clearing activities during the dry season and implementing a soil erosion plan resulting in a '**Low** significance' impact.
- Increase in poaching due to unsupervised construction workers participating in small scale fishing in Casteel Dam and Tlulandziteka River and harvesting of medicinal plants. However, the impact is of '**Low** significance' with or without mitigation since fishing activities already take place, there is a low number of threatened species present, lack of access control therefore only the local area would be affected.
- Destruction of three protected plant species due to the movement of heavy machinery on the entire site and will be of permanent consequence i.e., Marula (nationally protected), Barberton Aloe and Thick Leaved Gladiolus (provincially protected). The impact can be avoided/remedied to '**Low-Medium** significance'.

DWS and its appointed 'Contractor' will limit/minimize destructive activities in the wetland to 0.5-hectares since it cannot be avoided given the objective of the rehabilitation works is to achieve dam safety wherein dam failure is considered more destructive viz. wetland habitat to be impacted.

The DWS as part of the EMPR recommendations will ensure that all specimens of *Aloe barbertoniae* within the rehabilitation works footprint areas be carefully dug-up with their roots intact and transplanted into either adjacent habitat or used in landscaping/re-vegetation around the construction site. No destruction permits are therefore required from MDARDLEA.

Several individual Marula trees will need to be removed for the site establishment area and works on the dam embankment. Destruction permits will be obtained in terms of section 15 (1) of the act from the DFFE: Forestry Regulation about the removal of the tree Marula.

The EMPR also recommends for declared alien plant species within a 100m buffer around the project to be eliminated as per the DEA published guidelines (DEA, 2015).

The fauna data infer the following impacts from the proposed Casteel DSRP construction phase:

- Construction activities (i.e., noise, human presence) may displace animals and reduce fauna habitat/natural vegetation of up to 3-hectares.
- Due to the limited scale of the proposed rehabilitation works and few SCC likely to ever be present the impact to fauna species will be area specific for the entire construction period with Low-Medium significance. The impact can be reduced to **'Low' significance** with the implementation of mitigation measures.

9.7 AQUATIC ECOSYSTEMS

According to the DFFE STR the aquatic biodiversity sensitivity theme for the project site is **'Very High'** because it coincides with a Critical Biodiversity Area River (i.e., Tlulandziteka River) and Ecological Support Areas (i.e., FEPA Important sub catchment and wetlands), as specified by the 2019 MBSP/EBP Freshwater Assessment (refer to **Figure 9-13**).

Nepid Consultants represented by Rob Palmer was contracted to investigate the study area and prepare an Aquatic Biodiversity Assessment Study attached to this report under Appendix E4. The findings of the study are detailed in the below sections. The survey and investigation took place in August 2022.

9.7.1 Hydrology

Casteel Dam is in an unnamed seasonal tributary of the Tlulandziteka (Sand) River, in the upper reaches of the X32A-2 quinary catchment in the Inkomati Water Management Area (**Figure 9-12**). The catchment area of Casteel Dam covers 1 430-hectares (14.3km²) and comprise the following land uses:

- 65% undeveloped land i.e., wetlands, veld used for cattle grazing.
- 23% Rural-residential small holdings
- 12% Open water created by Casteel Dam
- <1% Sand mining
- Road network paved and unpaved roads.

The MAR at Casteel Dam is 2.76Mm³ (DWAf, 2009). The runoff in the dry season (May to November) is estimated at 0.089Mm³ (34 litres/second) and in the wet season (December to April) peak flows (February) are 45 litres/second but can range between 23 l/s to 285 l/s.

The Casteel Dam storage capacity is 1.18Mm³ which is 0.4 times that of the MAR. The dam is therefore relatively small and underutilised due to the defective outlet. Drawdowns are minimal consequently the delay in seasonality is likely to be small. The observed flow during August 2022 was 'Low'. The dam water level was close to Full Supply with water flowing into and out of the dam. Outflow was via the siphon outlet and via uncontrolled seepage.

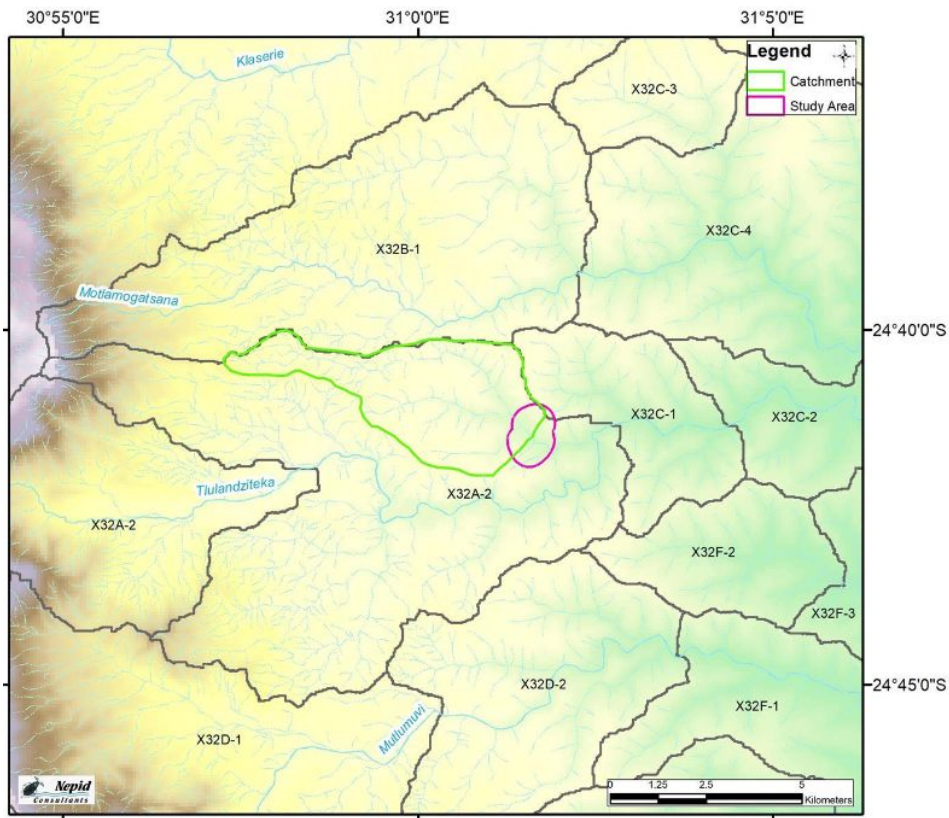


Figure 9-12: Quaternary Catchment of Casteel Dam (Nepid, 2022)

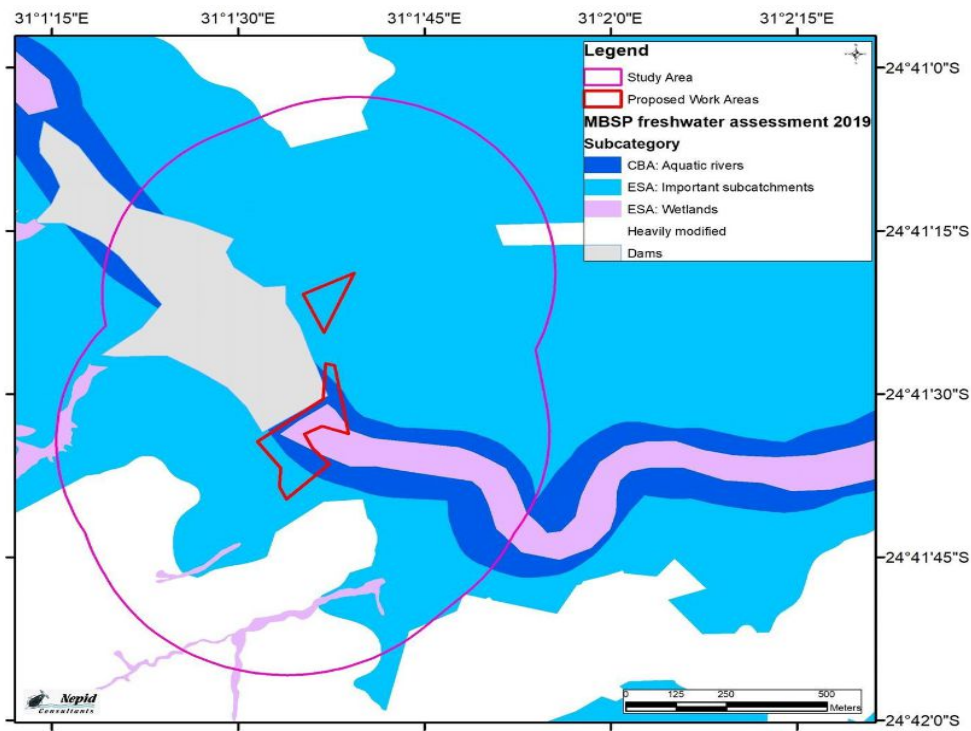


Figure 9-13: Mpumalanga Biodiversity Sector Plan superimposed on the project site.

9.7.2 Delineated Aquatic Ecosystems

Nepid delineated five (5) aquatic ecosystems including several episodic drainage lines within 500m of the proposed rehabilitation works area. One (1) of the aquatic ecosystems are natural and four (4) artificial. The drainage lines aide in stormwater management but don't support biota thus not considered aquatic ecosystems. The five delineated aquatic ecosystems, ecological status and composition is shown in **Table 22** and illustrated in **Figure 9-14 and 9-15**. These are considered the direct area of influence i.e., Dam wall, spillway, and immediate surroundings. However, the artificial systems are not considered ecological important or sensitive.

The indirect area of influence is downstream of the dam to the confluence with Tlulandziteka River (distance of 1.8km) where the works is likely to have a measurable indirect impact. The dam water level will be lowered for the works but is expected to be within operating levels therefore not treated as an indirect impact.

The aquatic survey sampled fish, water quality and aquatic macroinvertebrates at the dam spillway (site C1) and 1km downstream of Casteel Dam (site C2) to help classify the present ecological state of the natural aquatic ecosystems within the direct and indirect area of influence. The specialist confirmed the aquatic biodiversity sensitivity to be **'High'** based on the sampled sites and site inspection, due to the high diversity and abundance of fish species.

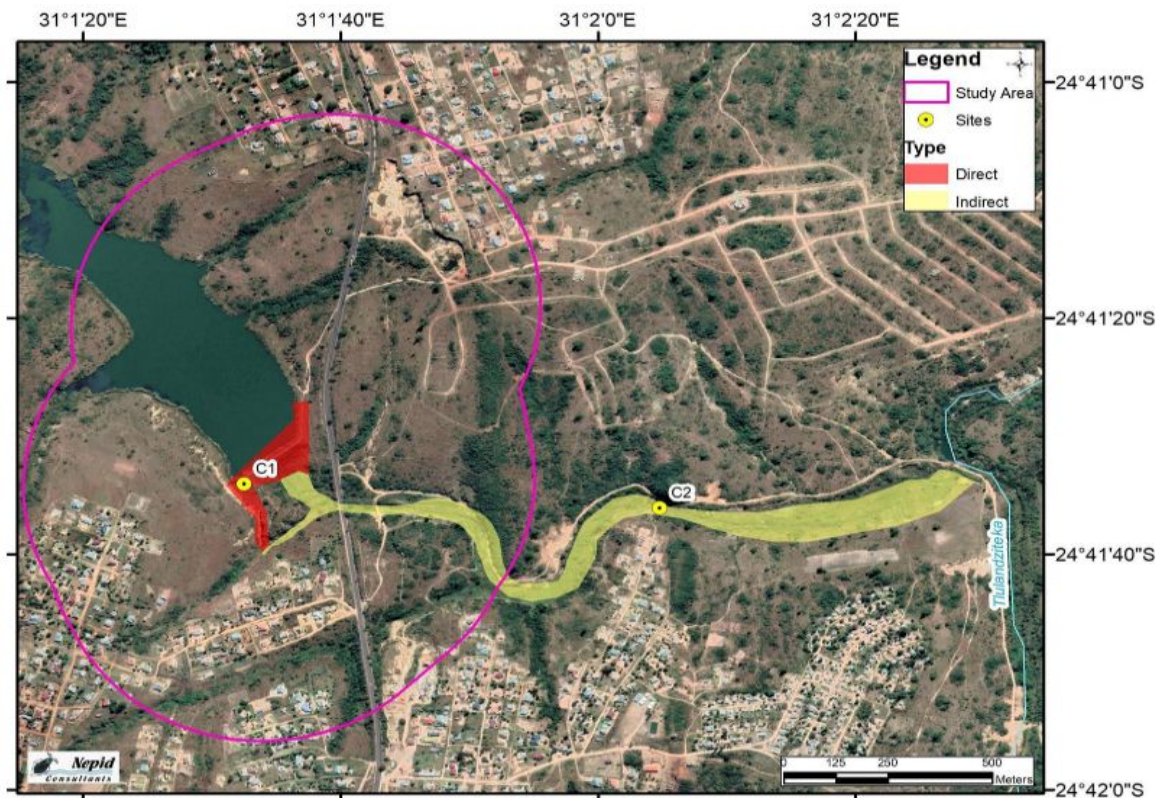


Figure 9-14: Area of Direct and Indirect Influence on Aquatic Ecosystems (Nepid, 2022)

Table 22: Delineated Aquatic Ecosystems within the 500m area of influence, ecological and hydrological status, and composition

No	Aquatic Ecosystem	Size	Description and Vegetation*	Ecological Importance & Sensitivity (EIS)	Present Ecological/ Hydrological State
DIRECT AREA OF INFLUENCE					
NATURAL SYSTEMS					
1	Channelled Valley Bottom	12.6 ha	Evident from historical images from 1944 prior to Casteel Dam. Vegetation: Permanently wet zone - Lowveld Reed (<i>Phragmites mauritianus</i>); Grass (<i>Leersia hexandra</i>). Small portion upstream of R40 road crossing is terrestrialised due to gully erosion caused by dam spillway comprising Sickle Bush <i>Dichrostachys cinerea ssp. Africanus</i> , Custard-Apple <i>Annona senegalensis ssp. Senegalensis</i> , Vahl <i>Hoslundia opposita</i> , Tropical Spike-Thorn, Blue Butterfly Bush <i>Rothea myricoides</i> .	Not available	C: Moderately Modified
ARTIFICIAL SYSTEMS					
2	Casteel Dam	20 ha	Built by DWS in 1965. Fringed by Lowveld Reed, Bulrush <i>Typha capensis</i> and Cape Water Lily <i>Nymphaea nouchali</i> .	Not available	N/A Artificial
3	Seepage Wetland	0.2 ha	On dam wall maintained by seepage. Central zone of wetland comprises ‘water felt’ (yellow-green algae) and the seasonal zone cogongrass <i>Imperata cylindrica</i> .	N/A Artificial	N/A Artificial
4	Spillway apron	40cm deep	Seasonal to permanent pool characterised by concrete overhangs provides cover for fish.	N/A Artificial	N/A Artificial
5	Gully erosion and Pools in Spillway	8m deep, 200m distance	Upper 90m within dam spillway other 110m in episodic stream. The erosion created permanent pool.	N/A Artificial	N/A Artificial
INDIRECT AREA OF INFLUENCE					
NATURAL SYSTEMS					
6	Tlulandziteka River (Reach X32A-00583)	600m - 1.8km	600m to 1.8km downstream of Casteel Dam.	‘Very High’	C: Moderately Modified

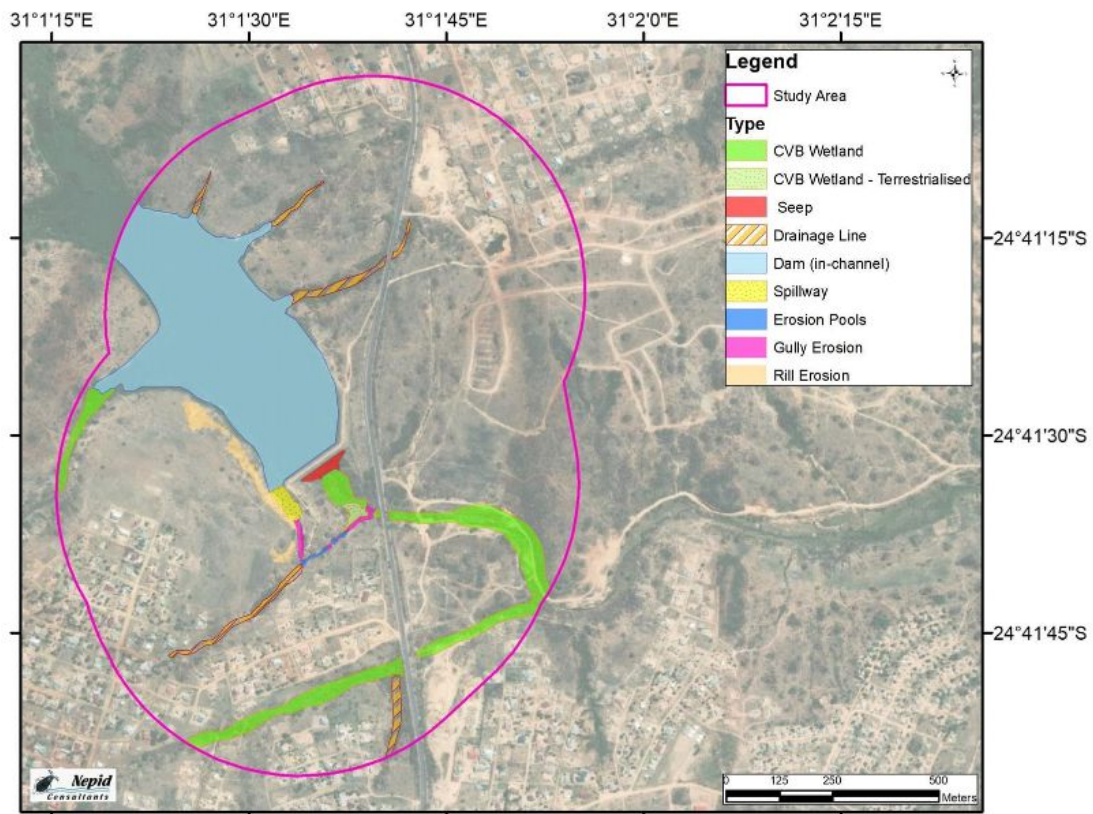


Figure 9-15: Delineated aquatic ecosystems with the Study Area (Nepid, 2022)

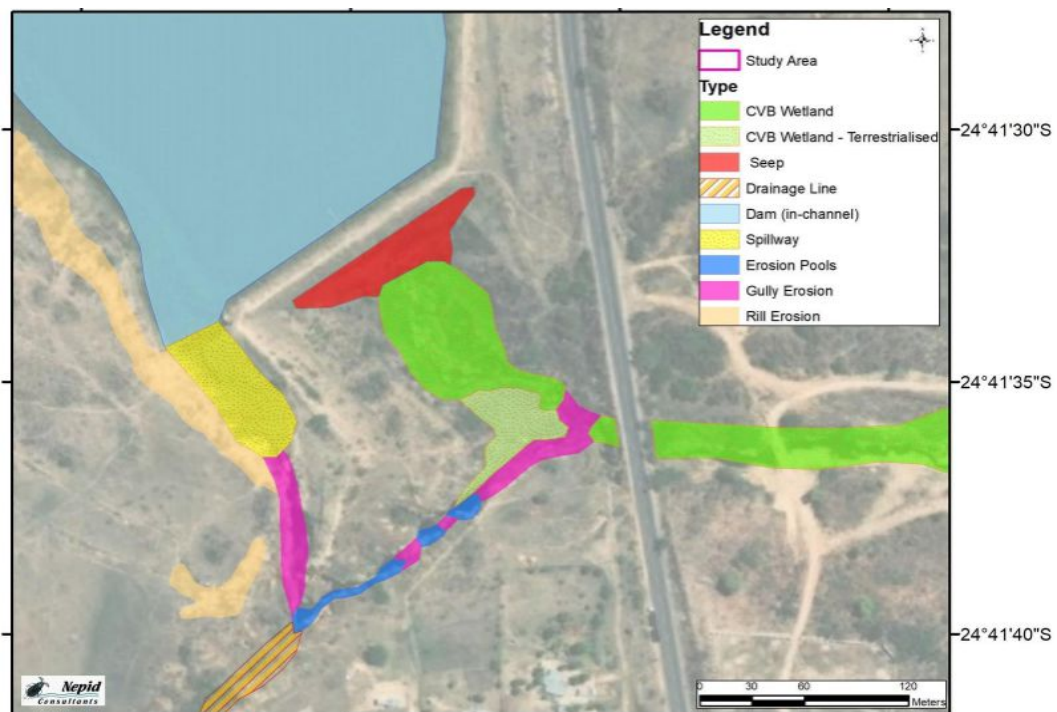


Figure 9-16: Delineated aquatic ecosystems at the proposed works area (Nepid, 2022)

9.7.3 Soils of Aquatic Ecosystems

The western bank of Casteel Dam is characterised by rill erosion and its dam wall colonised by fungus growing termites i.e., *Macrotermes sp* which has compromised the structural stability of the wall.

9.7.4 Ecological Reserve

The gazetted Ecological Reserve for the Tlulandziteka (Sand) River at EWR S7 for a Category C ecological state is 32.67% of the MAR. The ecological reserve for Casteel Dam is provided in **Table 23** including the minimum flows to be released from the dam during normal/high rainfall and drought periods.

Table 23: Ecological Reserve

Aquatic Ecosystem	Ecological Reserve			Minimum Flows to be released	
	Annual	October (Driest period)	February (Wettest period)	High rainfall Periods	Drought Periods
Casteel Dam	~0.90 Mm ³	~0.027 Mm ³ (10 ℓ/s)	~0.077 Mm ³ (32 ℓ/s)	10-32 ℓ/s	8-16 ℓ/s

9.7.5 Water Quality

The water quality was recorded downstream of Casteel Dam at Site C2 (see Figure 9-14), and the results are provided in **Table 24**.

Table 24: Field Water Quality Results

Survey point	pH	Electrical conductivity	Turbidity	Observations
C2 - CVB	8.2	14mS/m	3 NTU	Benthic algae present in low abundance (<5% cover) – no eutrophication. No free floating macrophytes.
	Slightly alkaline	Low electrical conductivity	Low turbidity	

9.7.6 Aquatic Macroinvertebrates

20 SASS5 taxa were recorded at Site C2, which is a CVB wetland downstream of Casteel Dam. Since the ecosystem is a wetland the SASS method could not be applied. The taxa are tolerant to water quality deterioration. Three notable species were recorded i.e.,

- Parasitic flatworm that causes rectal bilharzia *Biomphalaria pfeirleri*, an intermediate host of *Schistosoma mansoni*;
- Parasitic flatworm that causes urinary bilharzia *Bulinus natalensis* an intermediate host of *Schistosoma haematobium*;
- Australian redclaw crayfish *Cherax quadricarinatus*

The rest included three sensitive taxa (i.e. Atyidae *Caridina africana*, Hydracarina and *Baetidae* (3 spp), including the highly tolerant *Baetis harrisoni*); low abundance of filter feeders and sediment sensitive taxa including a moderate (26%) abundance of air-breathing taxa. This suggests that oxygen may be partially limited and sedimentation levels are elevated.

9.7.7 Observed Fish Species

Twenty-eight (28) species of fish potentially occur in the Tlulandziteka River (Nepid, 2022) of which 7 species are expected at sampling points C1 and 8 species at C2. Among these species two are expected to be of conservation concern (i.e., *Serranochromis meridianus*/Lowveld Largemouth – Endangered; *Oreochromis mossambicus*/Mozambique Tilapia– Vulnerable).

Six (6) species were confirmed at site C1 and seven (7) at site C2 (Table 25). Only one SCC was confirmed during the survey i.e., Mozambique Tilapia also known as Bream or Kurper.

Table 25: Fish Species observed in the Study Area

Survey Site	Present Ecological State	No. of Species	Observed Species	Dominant	Alien fish
C1 – Spillway Apron	C	6	<ul style="list-style-type: none"> ▪ <i>Oreochromis mossambicus</i>; ▪ <i>Enteromius paludinosus</i>; ▪ <i>Clarias gariepinus</i>; ▪ <i>Enteromius viviparus</i>; ▪ <i>Marcusenius pongolensis</i>; ▪ <i>Coptodon rendalli</i>]. 	<i>Enteromius viviparus</i> <i>Oreochromis mossambicus</i>	None recorded
C2 – CVB Wetland	B	7	<ul style="list-style-type: none"> ▪ <i>Labeobarbus marequensis</i>; ▪ <i>Coptodon rendalli</i>; ▪ <i>Micralestes acutidens</i>; ▪ <i>Oreochromis mossambicus</i>; ▪ <i>Enteromius trimaculatus</i>; ▪ <i>Enteromius annectens</i>; ▪ <i>Enteromius eutaenia</i>. 	<i>Micralestes acutidens</i> , <i>Enteromius annectens</i> and <i>Oreochromis mossambicus</i>	None recorded

9.7.8 Ecological and Functional Importance of CVB Wetland

The Ecological Importance of the CVB Wetland downstream of Casteel Dam is rated ‘Moderate’. The Functional importance is rated as ‘High’ and so too are the direct human benefits derived from it (Table 26).

MPBSP classifies the CVB wetland as a CBA therefore its of regional ecological importance. Casteel Dam provides direct human benefits wherein it provides irrigation water to Dingley Dale Irrigation Scheme and provides an important area for subsistence fishing and is grazed by livestock. There is evidence that it is used for ceremonial purposes. Its main function is flood attenuation, sediment trapping, nutrient and toxicant assimilation and important to control erosion.

Table 26: Overall Ecological, Function and Direct Human Benefit Importance (Ecosystem Services)

Ecological Importance (EI)		Functional Importance (EI)		Direct Human Benefit (DHB)	
Service	Importance	Service	Importance	Service	Importance
Red Data Species	Low	Flood attenuation	High	Water for Human Usage	Very High
Unique Species	None	Streamflow Regulation	Moderate	Harvestable Resources	Very High
Migration/Breeding/Feeding	Moderate	Sediment Trapping	High	Cultivated Foods	None
Protection Status – Wetland	Low	Nutrient & Toxicant Accumulation	High	Cultivated Heritage	High
Protection Status- Vegetation Types	None	Erosion Control	Very High	Education and Research	Low
Regional Context	High - CBA	Carbon Storage	Low		
Size and Rarity	Low	Overall, FI:	High	Overall DHB:	High
Diversity of habitats	Moderate				
Sensitivity to Floods	Moderate				
Sensitivity to Low Flows	Moderate				
Sensitivity to Water Quality	Low				
Overall EI Score	Moderate				

9.7.9 Potential impacts on aquatic ecosystems

The works will only impact on the CVB wetland downstream of Casteel Dam. The impacts on the artificial wetlands are not assessed since these are not ecological important or sensitive.

The aquatic ecosystem and hydrological data infer the following impacts from the proposed Casteel DSRP construction phase:

- Permanent **destruction of** a small portion (0.1-hectares) of the **wetland habitat** due to bulk earthworks and earth fill material during rehabilitation works. The impact will be limited to the site. The wetland is already affected by the dam wall and given the limited destruction the impact is expected to be **minor**.
- Serious **increased spread of alien invasive vegetation** will take place due to the vegetation clearance and disturbance of soils for the rehabilitation works. The impact will extend for the

duration of the project (24-months). The current level of alien infestation onsite is moderate. By implementing a long-term programme to control alien invasive species the impact will be reduced to **minor intensity**.

- **Water quality deterioration** may take place due to potential contamination of the surface water in and downstream of Casteel Dam i.e., concrete batching, washing of equipment, refuelling, spills and leaks, ablution, and sediment mobilisation. The pollution can extend to the confluence with the Tlulanziteka (Sand) River. It will however be a short-term impact and mitigation measures should reduce the intensity to minor / **negligible**.
- **Increased solid waste** due to discard of excess building materials and general domestic waste could negatively impact the CVB downstream of Casteel Dam. The impact would be local and with implementation of mitigation measures (solid waste management) should be **negligible**.
- The proposed works is likely to **alter the flow pattern downstream of Casteel Dam** and pose a negative consequence for aquatic biota. It would be short term impact and may extend up to the confluence with the Tlulanziteka River. By implementing the ecological Reserve and continuing to release water downstream to the irrigation scheme users the impact is improbable to take place and if it does the intensity would be negligible.
- Casteel Dam is at **risk of dam failure** due to gully erosion and the wall is compromised by infestation of termites. The structural stability of the wall is also compromised by woody vegetation that has colonised the wall. The risk is critical and could result in catastrophic ecological implications and high sediment loads in the watercourse including permanent scarring of the landscape beyond the project life extending up to the confluence with the Tlulanziteka River. By implementing the rehabilitation to the spillway donga and addressing the termite infestation the probability of dam failure occurring is probable to improbable.

By implementing rehabilitation works to the donga and no cumulative impacts are anticipated on the aquatic ecosystem. The residual effects on the aquatic ecosystems will be minor to negligible. The ecological function of the CVB wetland can be easily restored by rehabilitating the disturbed area and controlling the spread of alien invasive species. The Fish SCC i.e. Mozambique Tilapia/Kurper/Bream is unlikely to be negatively impacted by the rehabilitation works.

The dam has already incurred direct impacts on the aquatic habitats and will have no significant further impact on aquatic ecosystems therefore will not alter the present ecological state (PES). The works may alter the flow patterns in the CVB wetland downstream of the dam but can be managed.

Increased sediment transport is expected but can be managed by implementing a Stormwater Management Plan. Water quality deterioration can be managed by implementing good 'Housekeeping' rules.

By releasing the appropriate flow of water downstream during the construction period the direct negative impact on the Dingley Dale Irrigation Scheme and other downstream water users can be managed/avoided. The project will not impact negatively on ecosystem services.

9.8 TRAFFIC

The predicted construction traffic generated on and off site due to the proposed rehabilitation works is expected to be 62 AM trips and 62 PM trips (**Table 27**). The vehicles trip generation will mostly be tipper trucks, importing material from a commercial quarry to the dam wall and public transportation transporting workers to and from the site.

The construction traffic will use the R40 Bushbuckridge/Acornhoek Road, the existing R40/Casteel Dam access intersection and the R40/D3950 Wales Road intersection. The regulated vehicle speed on the R40 at the dam intersection is 100km/hr. The R40 is two-lane carriageway road of 10m wide.

Tipper trucks (importing material) will either approach Casteel Dam from North or South on the R40, but likely from the South. The R40/D3950 intersection (Wales Road) will be used to access the spillway section on the right flank of the dam. DWS will slightly realign the R40/Casteel Dam access intersection to improve manoeuvrability and proposed to place a flagman and temporary warning signs along the R40 in proximity of the intersection.

Table 27: Development Trip Generation (Hamantino Consulting Engineers, 2023)

Activity	Volume / No	Truck Volume (m ³)	Duration of Activity (Months)	Work Days / Month	Work Hours / Day	Directional Split (peak hour)		Trucks / Busses		Midi Busses	
						IN	OUT	IN	OUT	IN	OUT
Tipper Trucks (Fill)	28000	6	4	22	8	7	7	7	7		
Concrete Trucks	5000	5	3	22	8	2	2	2	2		
Tipper Trucks (Rock Fill)	2500	6	2	22	8	2	2	2	2		
Workers	200	10/midi bus				20	20			20	20
Total						31	31	11	11	20	20

Hamantino Consulting Engineers conducted a Traffic Impact Study (**Appendix E5**) along the R40 at Casteel Dam to retrieve peak hour traffic counts (i.e., 06h00 – 09h00 and 15h00 – 18h00) to determine the existing background traffic volumes of vehicles travelling north and south bound (see Annexure A for the Traffic Study). The traffic counts were done on general weekdays and at extreme peaks on Friday afternoon and Saturday morning to afternoon.

From the 11 901 vehicles sampled during the survey, majority were travelling at 70-79km/hr at an average speed of 72km/hr past the site. The background traffic volume recorded during the count was 460 vehicles at AM peak hour (07h00 – 08h00) and 399 vehicles at PM peak hour (15h00 – 16h00) with absolute peaks on Friday at 531 vehicles (14h00 – 15h00) and Saturday at 374 vehicles (10h00 – 11h30).

According to the traffic analyses the analysed intersections currently operate at an acceptable level of service (LoS) (i.e., Level of Service B). No intersections need to be upgraded to accommodate the existing background traffic. LoS B is indicative of low flow with a volume to capacity ration between 0.1 to 0.3.

9.8.1 Level of Service of Access intersections with Construction Traffic

During the rehabilitation works material will probably be imported from a source at Agin Court, located south of the construction site. Majority of the import material (tipper truck traffic) will be brought to site in the first 3-4 months of construction.

After adding the expected construction traffic (62AM and PM trips), whether the quarry is located north or south of the dam, all analysed intersections are still expected to operate at an acceptable LoS i.e., LoS B (Table 28 and 29).

Table 28: Peak Hour Level of Service (Quarry located to the south)

INTER-SECTION	LEVELS OF SERVICE AND DELAY (s)												
	Northbound			Southbound			Eastbound			Westbound			Int
	L	S	R	L	S	R	L	S	R	L	S	R	LOS
WEEKDAY AM													
R40 / D3950	A	A	A	A	A	A	B	A	C	n/a	n/a	n/a	B
	0	0	0	0	0	8.3	14.4	0	15.6	n/a	n/a	n/a	13.3
R40 / Access	A	A	A	A	A	A	A	A	A	B	A	B	B
	0	0	8.0	0	0	8.1	0	0	0	12.9	0	13.2	13.2
WEEKDAY PM													
R40 / D3950	A	A	A	A	A	A	B	A	C	n/a	n/a	n/a	B
	0	0	0	0	0	8.5	10.9	0	16.4	n/a	n/a	n/a	14.1
R40 / Access	A	A	A	A	A	A	A	A	A	B	A	B	B
	0	0	8.1	0	0	8.3	0	0	0	14.1	0	12.6	14.1

Table 29: Peak Hour Level of Service (Quarry located to the North)

INTER-SECTION	LEVELS OF SERVICE AND DELAY (s)												
	Northbound			Southbound			Eastbound			Westbound			Int
	L	S	R	L	S	R	L	S	R	L	S	R	LOS
WEEKDAY AM													
R40 / D3950	A	A	A	A	A	A	B	A	C	n/a	n/a	n/a	B
	0	0	0	0	0	8.3	10.4	0	15.1	n/a	n/a	n/a	12.9
R40 / Access	A	A	A	A	A	A	A	A	A	B	A	B	B
	0	0	8.0	0	0	8.1	0	0	0	11.3	0	13.8	13.8
WEEKDAY PM													
R40 / D3950	A	A	A	A	A	A	B	A	C	n/a	n/a	n/a	B
	0	0	0	0	0	8.5	10.8	0	15.8	n/a	n/a	n/a	13.6
R40 / Access	A	A	A	A	A	A	A	A	A	B	A	B	B
	0	0	8.1	0	0	8.3	0	0	0	12.1	0	13.0	13.0

9.8.2 Access Intersection Locality Safety

The sight distance towards the north and south along the R40 at Casteel Dam access road is acceptable based on a road speed limit of 100km/hr and meets the prescriptions of the ‘GAP acceptable sight distances’ as detailed in **Table 30**. The required stopping sight distance is 205 m and is available on site at the access intersections locality.

Table 30: Summary of Sign Distance Calculations (100km/hr)

INTERSECTION	REFERENCE	SIGHT DISTANCE TOWARDS	REQUIRED (m)	AVAILABLE	RESULT
R40 / Access	TMH 16	Towards north (right turn)	264	275	OK
		Towards south (left turn)	236	263	OK

9.8.3 Potential Traffic Impacts

The potential impact from construction traffic on the R40 is expected to be low and will be limited to the areas of the two access intersections in the local area. All analysed access intersections are expected to operate at acceptable LoS and safe sight – and stop distances are available at the intersections.

A vast number of workers will be dependent on public transport. Public transportation will be provided by means of mini-bus taxis and private transportation companies.

Irrespective of the access intersection locality being safe, some construction vehicles may be slow to enter/exit the R40 at the access intersection which may pose a safety hazard.

DWS will implement additional safety precautions to ensure road safety:

- Additional safety precautions will be implemented for the duration of the construction period at the R40/Casteel Dam access intersection located north of the dam i.e.
 - Temporary flagmen; and
 - Temporary construction signage in accordance with the SA Road Traffic Signs Manual.
 - Reduce speed to 60km/hr at the locality of the access.
- Safe drop off and collection area at the construction site for daily commuters on public transport.

SANRAL is also proposing to upgrade the R40 from Hazyview to Maviljan, and to Athur’s Seat which passes Casteel Dam. DWS will require approval from SANRAL to implement the temporary construction signage along the R40 and realignment of the dam access intersection with the R40. SANRAL and its consultation engineers (i.e., BVi) are being engaged as key stakeholders in the process.

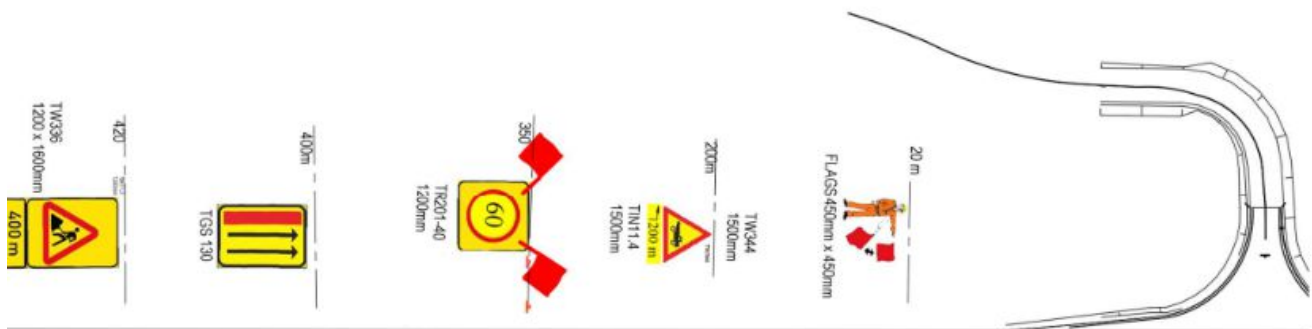


Figure 9-17: Typical construction signs to be implemented on both sides of the R40/Casteel Dam access intersection.

9.9 AIR QUALITY

The ambient air quality at the study area is very good. It's in a rural area with relatively few sources of dust or air emissions. Current sources may include i.e.

- Wood burning for cooking and heating at the residential sections.
- Vehicle entrained dusts from vehicles travelling on gravel access roads in the rural settlement areas.

During the construction phase, dust fall from rehabilitation works and vehicle entrained dust along access roads will be released because of the use of heavy construction machinery and $6m^3$ trucks transporting construction material to site. Surrounding land uses that may be affected are in Casteel village along the alternative access road to the spillway.

The impact will be short term and will be site specific since majority of the construction material will be delivered in the first four months of construction.

The National Dust Control Regulations (NDCR) were gazetted on 1 November 2013 in terms of Section 53 (o), read with Section 32 of the NEM: AQ (39 of 2004). These regulations prescribe a standard for acceptable dust fall rate for residential ($<600mg/m^2/day$). The minimum thresholds as stipulated in the NDCR will not be crossed by the proposed project. The dust emissions are easily managed by dust suppression methods i.e., water spraying.

9.10 NOISE

Casteel Dam is located next to the R40 Main Road and surrounded by a densely populated area. The most significant noise sources in the area were vehicle noise along the R40 otherwise the study area has the ambient noise levels of a rural settlement area.

The potential noise sources that would contribute to the ambient noise level during the construction phase will include the movement of construction trucks and machinery on site and along the alternative access road through Casteel village. The increase in noise will be low. It may affect nearby residents (sensitive receptors) but will not exceed the SANS 10103:2008 recommended ambient noise rating levels for residential districts of 50dBA during daytime.

The noise impact will be localised and only be for the duration of the construction period. Mitigation measures for noise will be carried out in terms of the EMPr attached as Appendix G to this report.

9.11 VISUAL

The proposed rehabilitation works, and associated infrastructure will take place next to the R40 main road at the existing Casteel Dam. The clearing of vegetation and earth works will be visible to motorists, locals frequenting the dam for fishing, passing through the site on foot and nearby residents.

The impact is foreseen to be low to negligible given the undulating nature of the topography which can absorb some of the views towards the project site. The impact will be a short-term impact limited to the local area and is easily manageable through good housing keep rules. The area of works will also have a limited extent.

9.12 HERITAGE AND CULTURAL RESOURCES

The DFFE Screening Tool Report indicates the site overlaps with an area of 'Low' archaeological sensitivity. Agri Civils Geo-Tech & Heritage Consultants represented by Mr Tobias Coetzee was contracted to investigate the study area and prepare a Phase 1 Archaeological Impact Assessment Study attached to this report under **Appendix E6**. The investigation was undertaken in February 2023.

According to the study findings only one historical site consisting of an enclosure within a clearing was noted in 1954 historical aerial imagery (Site B01). The site however falls outside the project area and has completely been demolished and is not associated with surface remains (**Figure 9-18**). The site is therefore not considered to be sensitive from a heritage perspective and is not at risk of being impacted by the proposed rehabilitation works. Please refer to the study for more information.

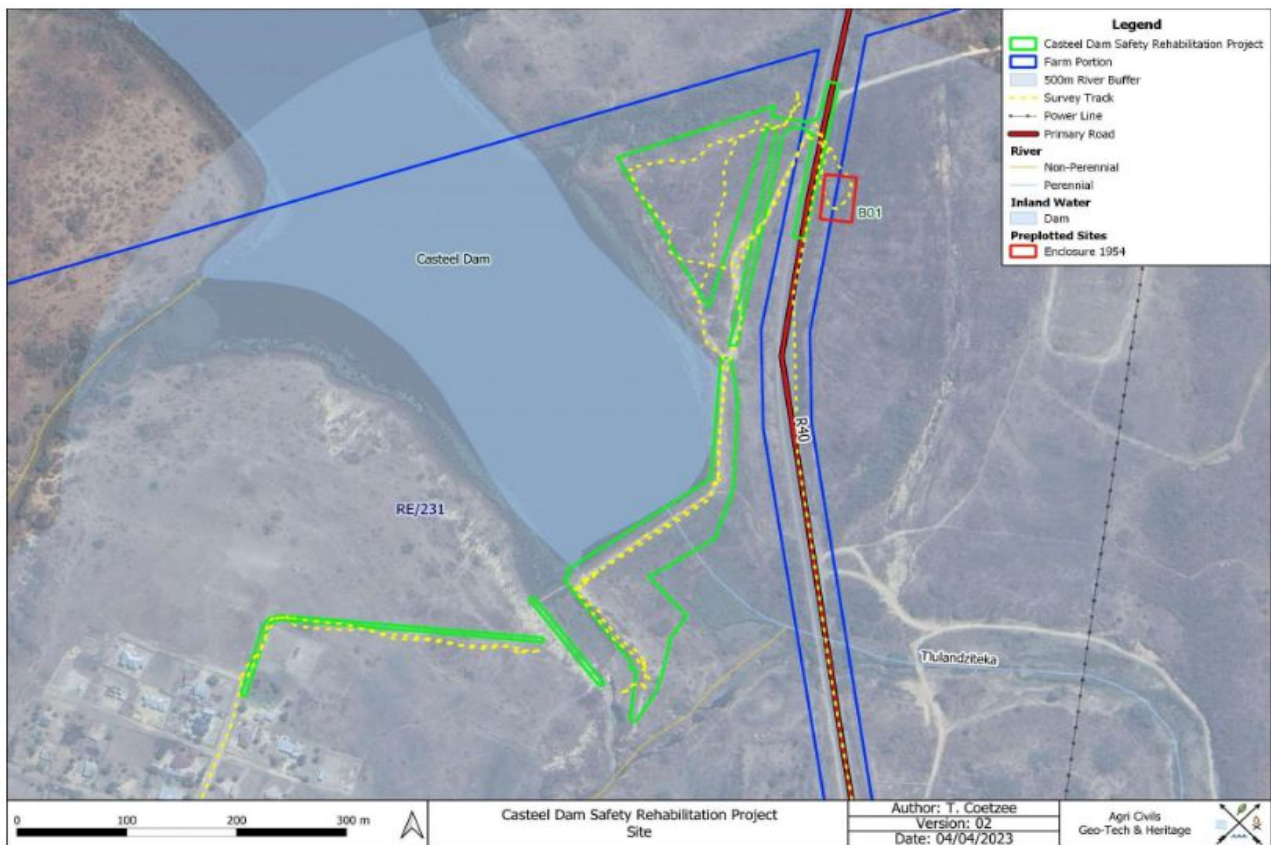


Figure 9-18: Survey area and surveyed tracks portrayed on 2022 satellite imagery (Image by Agri Civis Geo-Tech & Heritage Consultants, 2023)

The local community mentioned that rituals are conducted at the dam. According to the Moreipuso Traditional Authority, only crocodiles and hippopotamuses inhabit the dam and they do not object to the project.

The data infer the following for the project:

- Artefacts generally occur below surface; the possibility exists that culturally significant material may be exposed during the construction works. It is however unlikely that this impact will take place since majority of the works are proposed in previously disturbed areas.
- The project may potentially impact on the community rituals conducted at Casteel Dam.

Liaising with the local community regarding the potential impact of the project on rituals and beliefs will be conducted during the Draft BAR review as part of the project steering committee (PSC) discussions with traditional councils prior to construction works.

According to the specialist the proposed rehabilitation works may proceed subject to approval by SAHRA and implementation of specified recommendations which are contained in the project EMPR attached to this report under Appendix G.

9.13 PALAEOLOGICAL FEATURES

In terms of palaeontological heritage, the SA Palaeontological Sensitivity Map indicates that the study area has ‘Insignificant/Zero’ fossil sensitivity, based on the underlying geological formation as set out in the 1: 250 000 Geological Formation Maps as provided by the Council of Geoscience and requires no palaeontological studies.

According to the Geological Formation Map the site is underlain by Archaean Granite Gneiss Basement Formation (i.e., Cuning Moor Tonalite) which has no fossil heritage. The rock types and age of the Archaean Granite and Gneiss include intrusive granitoids, gneisses and migmatites. The Cuning Moor Tonalite lithology comprises grey, medium-grained equigranular tonalite.

9.14 SOCIO-ECONOMIC CONTEXT

9.14.1 Regional Scale

The project site is in Ward 16 and 32 of the Bushbuckridge Local Municipality in the Ehlanzeni District Municipality of the Mpumalanga Province. The economic centre and head office of the Bushbuckridge Local Municipality is in Bushbuckridge Town. The R40 is the main road through the municipal area and in the process of being upgraded by SANRAL.

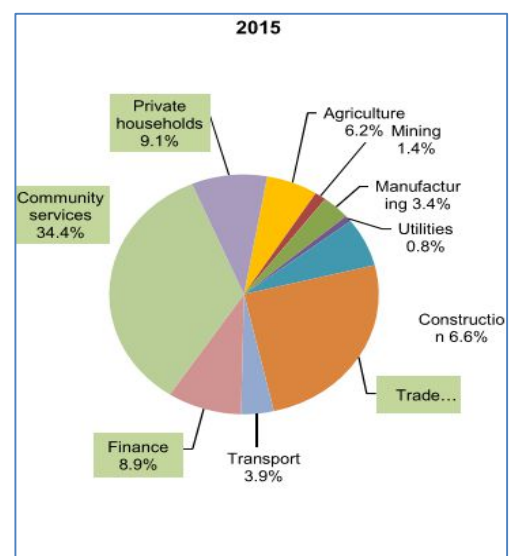
The municipal area has a population of about 548 760 people (Community Survey, 2016), residing in 133 dispersed villages and rural settlements. The municipal area is divided into eleven (11) regions comprising Acornhoek, Agincourt, Mariti, Thulamahashe, Shatale, Lilydale, Casteel, Dwarsloop, Maviljan, Hluvukani and Mkhulu. According to the Bushbuckridge Local Municipality IDP (2017 -2022) the Casteel Dam is in Casteel (Region 7) and Thulamahashe (Region 4), which is in central Bushbuckridge.

The municipality also has ten (10) traditional council areas. The project falls within the Moreipuso and Setlhare Traditional Council areas.

Economic Profile

According to the municipal IDP (BLM IDP, 2017-2022) the main economic drivers in the regional area are agriculture and tourism. The leading industries providing employment in the area are community services (government - 34.4%) and trade (25.3%).

The municipal area has a high unemployment rate, poverty, unregulated influx of foreign nationals, back-log of service delivery, Skills shortage, High illiteracy, rural nature, HIV/AIDS epidemics and more certainly the lack of adequate access to basic services.



Level of unemployment

The municipality has a poverty rate of 47.7% owed to a high unemployment rate of 46.4% (IHS Global Insight). The general household income is low at R 36 596 / annum, which is mere R 3047.42 / month. But the level of unemployment and poverty is decreasing. The unemployment rate decreased since 2011 from 52.1% to 47.7%. The poverty rate decreased from 67.9% to 47.7%. This is a result of government and private sector's role in creation of employment opportunities (BLM IDP, 2017 – 2022). There is increasing role/share of community services as employer & decreasing role/share of agriculture and trade.

Level of Education

The municipal area has 213 primary schools, 119 secondary schools (1 NEPAD e-school), 4 combined schools and further education and training institutions. However, higher education remains a challenge since there is no proper higher education institution nearby.

According to the IDP, 54, 696 people aged 20 and above in the municipal area have no Schooling. Based on the 2011 – 2015 Matric Results the municipal area has a 76% pass rate. The municipality is assisting with programs to assist matriculants and bursaries for those that pass with merit to further their studies in tertiary level.

9.14.2 Local Scale

Casteel Dam is located amid the densely populated settlement of Casteel. The Dam provides irrigation water to two large downstream irrigation schemes (i.e., Dingley Dale and New Forest) including domestic water to downstream communities located in the Thulamahashe Region 4. The irrigation schemes service in order of 1000 farmers. The rehabilitation works will improve the function and operation status of the dam and ensure continued supply.

Bushbuckridge Clay Factory is also located 1 kilometre upstream from Casteel Dam and subsistence fishing is undertaken at Casteel Dam by locals. The cattle also graze the proposed site establishment area next to the dam.

The project construction works will be undertaken by the DWS Chief Directorate of Construction Management. Between 150-200 workers will be onsite. Skilled labour will be supplied by the DWS, and unskilled labour will be sourced from the local communities.

The DWS will also purchase construction material from a commercial quarry in the regional area, most likely in Agincourt.

The construction traffic will use the R40 main road to haul material and temporary signage is proposed along the R40 at the Casteel Dam access road.

9.14.3 Potential Socio-economic impacts

The project will in general have a positive socio-economic impact. It will create employment opportunities for the local community and result in expenditure in the area through the purchase of construction material and goods in the local area. Further, by improving the safety of the dam it will ensure continued supply of water to downstream farmers and communities.

There are however a few socio-economic impacts to consider based on the provided socio-economic data for the proposed Casteel DSRP:

- During the planning phase stakeholder expectation in terms of job creation from the project must be managed.
- During the construction phase likely impacts that can easily be avoided included:
 - Temporary restriction of fishing and grazing in areas occupied by the construction works.
 - Social tensions between communities and traditional councils regarding job opportunities.
 - Temporary restriction on cultural rituals and customs (also mentioned under section 9.13.)

The address or avoid the above impacts the DWS will do the following:

- Establish a project steering committee (PSC) with the political principals, traditional councils, local authority to serve as ‘a stakeholder committee’ responsible to identify local labour for the project. The DWS contractor/construction team will be introduced to the PSC during the procurement phase and will together agree on a ‘Social Economic Development (SED) Plan’ on the employment of unskilled labour from the communities.
- Have a dedicated Stakeholder Liaison Officer (perhaps at Thusong Centre) during the construction works.
- Continue to release water to downstream users during the rehabilitation works to avoid disruption of water supply. One out of the three existing outlet pipes will always be available to release water.
- Subsistence fishing and grazing may continue during the construction works but at other areas around the dam until the repair works are completed.
- Any rituals or customs by the community will be respected by the DWS Team and logistics around these can be committed to during the PSC sitting during the procurement phase.

10. ENVIRONMENTAL IMPACT DETERMINATION AND EVALUATION

This section provides an assessment of the direct, indirect, and cumulative impacts that are likely to occur because of the planning and construction phase of the proposed Casteel DSRP since it only entails rehabilitation works. This section also provides mitigation measures that may eliminate or reduce the potential impacts listed.

The list of impacts has been identified as follows:

- Informed by typically known impacts for such an activity.
- As identified by Stakeholders during the public participation process (refer to table 17 section 8.2.9).
- As identified by specialists' investigations.

The list of identified impacts is currently subject to a 30-day consultative process to identify any additional impacts not previously anticipated/known.

According to the NEMA EIA Regulations, a significant impact means 'an impact that may have a notable effect on one or more aspects on the environment or may result in non-compliance with accepted environmental quality standards, thresholds, targets and is determined through rating the positive and negative effects of an impact on the environment based on criteria such as duration, magnitude, intensity, and probability of occurrence and to which degree the impact and risk can be mitigated.'

The relevance of the impacts is considered, a significance rating assigned and where necessary, mitigation measures are proposed to reduce/avoid/minimise any negative impact and or enhance positive impacts.

Since the project involves repair works to an existing dam, only the preferred alternative has been considered. The impacts are therefore assessed based on the proposed rehabilitation works at the existing dam for only the following project stages:

- Planning Phase (refer to **Table 33** under section 10.2 of this report)
- Construction Phase (refer to **Table 34** under section 10.3 of this report)

Decommissioning is not foreseen soon. Any decommissioning will be subject to a separate Basic Assessment process in terms of the NEMA EIA Regulations.

10.1 Methodology used to determine the significance of impacts

The list of identified impacts for the proposed Casteel DSRP will be evaluated using several rating scales as listed below. These ratings include extent, duration, intensity, significance, the status of impact, and probability. The calculation of the significance of the impacts is then simplified as follows:

Significance = (Extent + Duration + Intensity) x Probability

The rating system is described below in table format.

Table 31: Assessment Methodology

Criteria: STATUS – Describes whether the impact would have a negative, neutral or positive effect on the affected environment		
RATING		DESCRIPTION
+	Positive	Benefit to the environment
=	Neutral	Standard / impartial
-	Negative	cause damage to the environment
Criteria: PROBABILITY – Describes the likelihood of impact occurring		
RATING		DESCRIPTION
0	Improbable	Where the possibility of the impact occurring is low.
1	Probable	Where there is a distinct possibility that the impact will occur.
2	Highly probable	Where it is most likely that the impact will occur.
3	Definite	Where the impact will occur regardless of any prevention measures.

Criteria: EXTENT – Defines the physical extent or spatial scale of the potential impact		
RATING		DESCRIPTION
1	Site specific	Impacts extending as far as the activity, limited to the site and its immediate surroundings
2	Local	Impacts extending within 5km from the site boundary
3	Regional	Impacts extending to the district (20km from the boundary of the site)
4	Provincial	Impacts extending to provincial scale e.g., Mpumalanga Province
5	National	Impacts extending to within the country i.e., South Africa.
6	International	Impacts extending beyond international border / the borders of South Africa/Namibia/Mozambique

Criteria: DURATION – Defines the temporal scale (for how long the impact will endure)		
RATING		DESCRIPTION
1	Immediate	Less than 1 year
2	Short term	1-5 years
3	Medium term	6-15 years
4	Long term	Between 16 – 30 years
5	Permanent	Over 30 years. Where mitigation either by natural processes or by human intervention will not occur in such a way or in such time span that the impact can be considered transient.

Criteria: INTENSITY NEGATIVE FOR ALL ASPECTS EXCEPT ECOLOGY			
Establishes whether the impact would be destructive or benign			
Status	RATING		DESCRIPTION
Negative	0	Negligible	Where impacts do not really affect the environment and no mitigation is required
	1	Low	Where impacts will result in short-term effects on the social and/or natural environment. These impacts are not deemed largely substantial and are likely to have little real effect. (Marginally affected)
	2	Medium	Where impacts will result in medium-term effects on the social and/or natural environment. These impacts will need to be considered as constituting an important and usually medium-term change to the environment, these impacts are real but not substantial. Impacts are easy to mitigate
	3	High	Whereby effects will be long-term on social, economic and/or bio-physical environment. These will need to be considered as constituting usually long-term change to the environment. Mitigation is considered challenging and expensive
	4	Very High	Where impacts should be considered as constituting major and usually permanent change to the environment, and usually result in severe to very severe effects. Mitigation would have little to no effect on irreversibility.

Criteria: INTENSITY POSITIVE FOR ALL ENVIRONMENTAL ASPECTS			
Status	RATING		DESCRIPTION
Positive	0	Negligible	Where impacts affect the environment in such a way that natural, cultural and social functions and processes are not great and in instances, no mitigation measures will be required. (Environment not really affected)
	1	Low	Minor improvement is anticipated over the short term in the social and/or natural environment.
	2	Medium	Where moderate improvements are anticipated over a medium- to long-term on the social and/or natural environment.
	3	High	Where large improvements are anticipated over a long-term period on the social, economic and/or bio-physical environment.
	4	Very High	This results in permanent improvements of the social/or natural environment.

Criteria: INTENSITY RATING FOR ECOLOGY		
Establishes whether the ecological impact would be destructive.		
Status	RATING	DESCRIPTION
Negative	0	Negligible Where impacts do not really affect the environment and no mitigation is required
	2	Minor A limited impact is foreseen which could possibly affect the environment and these impacts are not substantial and can easily be mitigated.
	4	Low Where impacts will result in short-term effects on the social and/or natural environment. These impacts are not deemed largely substantial and are likely to have a little real effect. (Marginally affected)
	6	Medium Where impacts will result in medium-term effects on the social and/or natural environment. These impacts will need to be considered as constituting an important and usually medium-term change to the environment, these impacts are real but not substantial. Impacts are easy to mitigate.
	8	High Whereby effects will be long-term on social, economic and/or bio-physical environment. These will need to be considered as constituting usually long-term change to the environment. Mitigation is considered challenging and expensive.
	10	Very High Where impacts should be considered as constituting major and usually permanent change to the environment, and usually result in severe to very severe effects. Mitigation would have little to now effect on irreversibility.

Table 32: Methodology of determining the significance rating of an impact

Criteria: SIGNIFICANCE		
“Significance”- attempts to evaluate the importance of a particular impact with mitigation measures included and also excluded. The significance was calculated using the following formula: Significance = (Extent + Duration + Intensity) X Probability		
RATING		DESCRIPTION
0-4	Very Low	Where the impacts will not influence the development, social, cultural or natural environment
5 -12	Low	Where impacts will result in short-term effects on the social and/or natural environment. The impacts merits attention however are not deemed largely substantial and are likely to have little real effect
13-25	Medium	Where impacts will have a medium-term effect on the social and/or natural environment. These impacts need to be considered as constituting an important and usually medium-term change to the environment, these impacts can be mitigated by implementing effective mitigation measures.
26-44	High	Whereby effects will be long-term on the social economic and or bio-physical environment. The impacts could have a major effect on the environment. This may bring forth the consideration of no-go areas/open areas on the development land regardless of mitigations implemented. Mitigation is however possible.
45	Very High	Whereby effects will be permanent on the social economic and or bio-physical environment. Such impacts cannot be mitigated.

10.2 IDENTIFIED PLANNING PHASE IMPACTS

Table 33: Potential Planning Phase Impacts identified for proposed Casteel DSRP

Aspect, Activity & Potential Impact	SIGNIFICANCE PRE-MITIGATION					PROPOSED MITIGATION MEASURES	SIGNIFICANCE POST MITIGATION							
	Status (-) / (+)	Probability	Extent	Duration	Intensity		Significance Rating	Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating	RESIDUAL RISK
DIRECT AND INDIRECT IMPACT														
1. IMPACT ON COMMUNITY CULTURAL CUSTOMS														
Planned rehabilitation works and site establishment at Casteel Dam may potentially impact on community rituals and beliefs conducted at Casteel Dam.	-	2	2	2	3	Moderate (14)	<ul style="list-style-type: none"> The DWS Contractor / appointed Community Liaison Officer to engage the traditional council during procurement/planning phase to determine when and where such rituals are performed, or the community have any customary beliefs they would like to perform prior to the commencement of the construction activities. 	-	1	1	2	0	Very Low (3)	Negligible
2. IMPACT ON ROAD NETWORK PLANNING (TRAFFIC)														
Potential impact on SANRAL R40 road upgrade logistical planning. The DWS construction phase, adding a gravel road shoulder to R40/Casteel Dam access road and planned implementation of construction safety traffic signs along R40 may influence the SANRAL R40 road upgrade logistics.	-	2	2	2	3	Moderate (14)	<ul style="list-style-type: none"> DWS to obtain approval from SANRAL during the planning phase i.e., <ul style="list-style-type: none"> For the R40/Casteel Dam access road realignment and adding a gravel shoulder. For the implementation of additional safety precautions during the construction period at the R40/Casteel Dam access intersection i.e., temporary flagmen, construction signature. DWS to notify SANRAL of the construction start and end dates for consideration by SANRAL during the R40 upgrade. 	-	1	1	2	0	Very Low (3)	Negligible
3. SOCIAL AND ECONOMIC IMPACTS														
Stakeholder expectations in terms of job creation from the project may create social tension between communities and traditional authorities hoping to gain from the available job opportunities. This has the potential to delay preparation to start construction.	-	2	3	2	3	Moderate (16)	<ul style="list-style-type: none"> Establish a project steering committee (PSC) with the political principals, traditional councils, local authority to serve as 'a stakeholder committee' responsible to identify local labour for the project. The DWS contractor/construction team to be introduced to the PSC during the procurement phase and together agree on a 'Social Economic Development (SED) Plan' on the employment of unskilled labour from the communities. 	-	1	3	2	0	Low (5)	Low
CUMULATIVE IMPACT														
NONE														

10.3 IDENTIFIED CONSTRUCTION PHASE IMPACTS

Table 34: Identified Potential Construction Phase Impact for Proposed Casteel DSRP

Aspect, Activity & Potential Impact	SIGNIFICANCE PRE-MITIGATION						PROPOSED MITIGATION MEASURES	SIGNIFICANCE POST MITIGATION						
	Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating		Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating	RESIDUAL RISK
DIRECT AND INDIRECT IMPACT														
1. IMPACT ON TOPOGRAPHY AND LANDSCAPE														
No impact on topographical features or landscape foreseen only if the no-go alternative is implemented. However, no-go is not preferred.							N/A						N/A	
2. IMPACT ON GEOLOGICAL RESOURCES														
N/A - Construction material will be imported from a local commercial quarry.							N/A						N/A	
3. IMPACT ON TERRESTRIAL BIODIVERSITY (FAUNA AND FLORA)														
Loss of habitat with 'Very High' Terrestrial Biodiversity Theme (STR) and wetland vegetation community with 'High' SEI due to clearing of vegetation and earthworks. But the portion of wetland affected is limited to less than 0.5-hectares.i.e. 0.1-hectares.	-	3	1	4	6	Moderate (23)	<ul style="list-style-type: none"> An independent Environmental Compliance Office (ECO) should be appointed prior to any construction activities. The ECO will be responsible for compliance with the Environmental Management Plan by the developer during the onstruction phase. It is recommended that clearing be conducted in the dry months between April and September,prior to the onset of the rains. The seasonal arrival of the rain season subsequent to construction will then allow for the natural re-vegetation of bare areas from the seedbank within the soil. No additional construction activities or tracks should be placed within any wetland or riparian areas. All diesel and other harmful chemicals should be stored in environmentally safe areas away from the dam and river. All building rubble should be removed from the site and not remain within the development area. 	-	3	1	4	2	Low (11)	Minor. Limited to footprint area.
Additional invasion of natural habitat by alien invasive plant species due to clearing of vegetation and earthworks. 20 Alien species of which 8 are declared have been recorded onsite. Additional invasion is likely due to construction activities.	-	2	2	4	4	Moderate (14)	<ul style="list-style-type: none"> All declared alien plants within a 100 m buffer around the proposed development must be eliminated according to the DEA's published guidelines (DEA, 2015). These are species that have been listed under the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004). It is important that weed control, if involving herbicides, be managed correctly to reduce the impact on the adjacent natural vegetation. 	-	2	1	4	2	Low (9)	Moderate
Destruction of Protected Plants: 3 Protected species i.e., Marula (National), Aloe barbertoniae (in high density) and Gladiolus cf. crassifolius	-	3	2	5	6	Moderate (25)	<ul style="list-style-type: none"> All specimens of Aloe barbertoniae within the proposed development footprints should be carefully dug up with their roots intact and transplanted into either adjacent habitat or used in landscaping / re-vegetation around the onstruction site. 	-	3	1	5	2	Low (12)	Negligible

Aspect, Activity & Potential Impact	SIGNIFICANCE PRE-MITIGATION						PROPOSED MITIGATION MEASURES	SIGNIFICANCE POST MITIGATION						
	Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating		Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating	RESIDUAL RISK
							<ul style="list-style-type: none"> Destruction permits from the relevant authorities may have to be applied for, particularly with regard to the destruction of the tree <i>Sclerocarya birrea</i>. 							
Destruction of Habitat for Faunal SCC: 2 Mammals, 2 Reptiles and 74 bird species have been confirmed onsite. A low number of SCC potentially occur, as foraging species. Construction works may displace these animals through noise and human presence also reduce habitat/natural vegetation by up to 3 hectares. But the spatial extent of project is limited and only few SCC is likely to ever be present.	-	2	2	2	6	Moderate (16)	<ul style="list-style-type: none"> During the construction phase, the surrounding area should be deemed out of bounds to restrict movement of workers and disturbance of the surrounding habitat. 	-	2	1	2	2	Low (7)	Low
Increase in poaching activities: Due to unsupervised construction workers participating in small-scale poaching through netting of fish in Casteel Dam and downstream Tlulandziteka River. Harvesting of medicinal plants for local retail markets. But managing it will be difficult due to lack of access control.	-	2	2	1	4	Low (11)	The ECO should perform regular inspections around the construction site to search for evidence of poaching.	-	2	1	1	2	Low (6)	Low
Potential for soil erosion and sedimentation of downstream CVB and Tlulandziteka River due to rain and sediment laden runoff from loose and bare soils around cleared areas and hardened surfaces.	-	2	2	3	2	Moderate (14)	<ul style="list-style-type: none"> Suitable drains and other stormwater infrastructure should be constructed in areas where run-off is likely. DWS will rehabilitate the large areas of active sheet erosion on the western side of the dam wall and spillway by establishing/constructing slope protection to prevent further sedimentation of downstream wetland and riparian areas. Every effort should be made to avoid unnecessary erosion of soil and sedimentation of downstream areas around the construction works. This may include, but not be restricted to, the installation of drains along the access road and sediment traps below construction areas. 	-	2	1	3	1	Low (10)	Low
4. IMPACT ON AQUATIC ECOSYSTEMS (CVB WETLAND AND TLULANDZITEKA RIVER)														
Destruction of wetland habitat: Vegetation clearance and bulk earthworks associated with the rehabilitation works will result in the destruction of 0.1ha of CVB wetland habitat. But the wetland is already affected by the existing dam wall therefore the intensity would be minor.	-	3	2	5	1	Moderate (24)	<ul style="list-style-type: none"> An independent ECO must be appointed by DWS to monitor compliance with the authorisation during construction. The ECO must be appointed prior to commencement of construction and be involved in all aspects of project planning that can influence environmental conditions on the site. Where possible, the ECO must attend relevant project meetings, conduct inspections to assess compliance with the authorisation and relevant Health and Safety regulations, and be responsible for providing feedback on potential environmental problems associated with construction. The ECO must be vigilant for any impacts that were unforeseen and take appropriate steps to avoid or minimise any such impacts. Construction activities in the CVB Wetland downstream of Casteel Dam must be minimised. All support operations should be done outside the wetland. A buffer zone of at least 50 m from the edge of the wetland is recommended for all activities that are not needed within the wetland. All portions of the CVB Wetland downstream of Casteel Dam that are disturbed during construction but not covered by fill for the extended wall must be rehabilitated. The aim of the rehabilitation must be to recreate the same mix of habitats, including natural topography and substrates that were present prior to disturbance. 	-	3	1	5	0	Moderate (18)	Low. Limited to footprint area.

Aspect, Activity & Potential Impact	SIGNIFICANCE PRE-MITIGATION						PROPOSED MITIGATION MEASURES	SIGNIFICANCE POST MITIGATION						
	Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating		Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating	RESIDUAL RISK
Water Quality Deterioration: Construction works i.e., concrete batching, washing of equipment refuelling, spills and leaks, ablation and sediment mobilisation have the potential to contaminate surface water in and downstream of Casteel Dam.	-	1	2	2	3	Low (7)	<ul style="list-style-type: none"> The proposed works must be scheduled to take place during the dry season (i.e., May to November, inclusive). No washing of vehicles or equipment should be undertaken within 50 m from the Full Supply Level of the dam, or within 50 m from the wetland. Washing and maintenance of vehicles and equipment should be conducted in the areas designated for this purpose. No refuelling should be allowed within 50 m from the Full Supply Level of the dam, or within 50 m from the wetland. Diesel/fuel should be stored on an impermeable surface. Provide drip pans for generators, or any machinery that will be in position for longer than one day. Provide bunding around all diesel tanks, oil drums and generators. Where oil and fuel spills are expected, parking is to be on an impervious surface with adequate pollution control mechanisms in place. Accidental spills must be attended to immediately and details recorded in an on-site logbook. The details will include date and locality of spill, distance to the nearest watercourse, type of material, estimated quantity of spill, contact details of the people involved, mitigation steps taken and results of any subsequent monitoring. Small quantities of soils contaminated by hydrocarbons should be treated in situ using bioremediation. Large quantities of contaminated soil or other materials should be removed and treated as hazardous waste in an appropriate manner. Contractors should be responsible for the bioremediation of their own soil until the following standards are met: i) there is no hydrocarbon odour; ii) soil particles do not coagulate because of hydrocarbon contamination; iii) there is no visual evidence of hydrocarbons in the soil. Where there is uncertainty, the soil shall be sent for analysis. Temporary (mobile) on-site toilet facilities should be available and properly maintained. Provision shall be made for at least one toilet per 10-15 personnel on site. Staff shall not be permitted to use the natural environment as a toilet. Stormwater Management Plan. A plan to manage stormwater runoff must be developed and implemented. The aims of this plan should be: 1) to minimise the transport of sediments from the proposed work area; 2) minimise the risks of erosion; and 3) minimise the contamination of stormwater. 	-	1	1	2	1	Very Low (4)	Negligible
Altered hydrology: Rehabilitation works to the dam outlet has the potential to alter flow patterns downstream of Casteel Dam and can impact aquatic biota negatively down to the confluence with the Tlulandziteka (Sand) River.	-	3	2	2	0	Low (12)	The average monthly ecological Reserve should be released from Casteel Dam.	-	1	2	2	0	Very Low (4)	Negligible
Dam Failure due to gully erosion in spillway channel, termite infestation in dam wall, compromised structural integrity of dam wall due to woody vegetation probable to result in high sediment loads into the watercourse up to the confluence with the Tlulandziteka River. Such an impact if it is to take place is irreversible.	-	2	3	5	4	Moderate (24)	<ul style="list-style-type: none"> Dam Safety Review. The proposed civil works must be reviewed by an independent Dam Safety Engineer(s). The review should pay particular attention to the proposed rehabilitation of the spillway donga, and the risks of the existing termite infestation on the structural stability of the existing wall. Dam Safety Inspections. Periodic inspections must be undertaken by an independent Dam Safety Engineer(s), as required in terms of Dam Safety Regulations. Dam Maintenance Programme. A long-term maintenance programme for the dam must be developed and implemented. Particular attention must be given to 1) the control of erosion in the spillway channel; 2) the control of termites in the wall; and 3) the control of woody vegetation on the wall. 	-	1	2	5	0	Low (7)	Negligible

Aspect, Activity & Potential Impact	SIGNIFICANCE PRE-MITIGATION						PROPOSED MITIGATION MEASURES	SIGNIFICANCE POST MITIGATION						
	Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating		Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating	RESIDUAL RISK
Increased spread of alien invasive species: Clearing of vegetation associated with the rehabilitation works and site establishment is highly likely to cause serious spread of alien plant species (infestation) some distance downstream of Casteel Dam.	-	2	2	5	3	Moderate (20)	<ul style="list-style-type: none"> Control Alien Invasive Species: Declared alien invasive vegetation within all areas disturbed by site preparation and construction should be controlled at the end of construction, and at annual intervals during operation. Personnel tasked to control alien vegetation should receive appropriate training in the following: methods and control measures; equipment and techniques; types of herbicides and dosages applied; mixing techniques; storage of chemicals and equipment; health and safety issues; plant identification; procedures for equipment washing; equipment maintenance; record keeping, inter alia. 	-	1	1	4	1	Low (6)	Low
Increased solid waste: Discard of building material, domestic waste during the construction works may impact the CVB wetland downstream of Casteel Dam.	-	1	2	3	3	Low (8)	<ul style="list-style-type: none"> Housekeeping. Standard good practise for environmental management, including pollution control, solid waste management, and other issues related minimising impacts of construction activities. Work sites should be kept tidy and free of scrap metals, wire, bitumen, excess concrete, and other litter. Litter bins must be present and emptied regularly. No solid waste or bitumen may be burnt on site. Inert rubble and waste rock must be stored in appropriately. Contractors must be responsible for the removal and appropriate disposal of all solid wastes generated during construction. 	-	1	1	3	0	Very Low (4)	Negligible
5. IMPACT ON HERITAGE, CULTURAL, PALAEOLOGICAL RESOURCES														
No heritage, cultural resources were identified on site. It is also highly unlikely to be unearthed since the project site is previously disturbed.							<ul style="list-style-type: none"> Should skeletal remains be exposed during construction works, all activities must be suspended, and the relevant heritage resources authority must be contacted. Should culturally significant material be discovered during the works, all activities must be suspended pending further investigation by a qualified archaeologist. 							N/A
The site has ZERO Palaeontological significance. No further action is required in terms of the DFFE STR.							No mitigation or further action required.							N/A
6. IMPACT ON BACKGROUND TRAFFIC AND LOCAL ROAD NETWORK														
Increased traffic (62 AM and 62 PM vehicle trips) at the R40 / Casteel Dam access intersection and at Wales Road intersection, due to tipper trucks importing construction material from a local quarry (either North or South bound) and public transportation of workers to and from site.	-	3	2	2	0	Low (12)	<ul style="list-style-type: none"> All intersections are operating at an acceptable Level of Service - B and do not require any upgrades. DWS will only realign the intersection with the R40 for better manoeuvrability of vehicles to Casteel Dam. Especially vehicles approaching from the South. 	Neutral	0	1	2	0	Very Low (0)	N/A
Slow turning construction vehicles enter/exiting the R40 at Casteel Dam access road intersection pose a safety risk to road users.	-	3	2	2	3	Moderate (21)	<ul style="list-style-type: none"> Additional safety precautions will be implemented for the duration of the construction period at the R40/Casteel Dam access intersection located north of the dam i.e. <ul style="list-style-type: none"> Temporary flagmen; and Temporary construction signage in accordance with the SA Road Traffic Signs Manual. Reduce speed to 60km/hr at the locality of the access. Safe drop off and collection area at the construction site for daily commuters on public transport. 	-	2	1	2	1	Low (8)	Low

Aspect, Activity & Potential Impact	SIGNIFICANCE PRE-MITIGATION						PROPOSED MITIGATION MEASURES	SIGNIFICANCE POST MITIGATION						
	Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating		Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating	RESIDUAL RISK
7. NOISE, AIR QUALITY (DUST FALLOUT) AND VISUAL IMPACT														
Increase in ambient noise levels at nearby residences (40m, directly south of the site) due to movement of construction trucks and machinery onsite (<50dBA). Specifically dumping of rock.	-	3	1	2	2	Moderate (15)	<ul style="list-style-type: none"> Construction works should be carried out between 07h00 – 17h00 on weekdays, and Saturdays from 07h00 – 14h00. No construction work should be carried out on Sundays or public holidays. All equipment on site should be kept in good working condition and all activities must comply with the Noise Control Regulations and SABS standards. A community complaints register must be kept onsite. Respond to complaints about noise generation by taking responsible action to reduce the impact. Notify adjacent landowners (abutting) prior to undertaking activities that may generate high noise levels that may cause a nuisance. Workers' exposure to ambient noise levels exceeding 85dBA must wear appropriate Personal Protective Equipment (PPE). 	-	2	1	2	2	Low (10)	Low
Dust fallout from clearing of vegetation, bulk earthworks, slope erosion protection and movement of construction vehicles and machinery onsite importing construction material may impact nearby residences.	-	2	1	2	2	Low (10)	<ul style="list-style-type: none"> No burning of vegetation cover and waste is permitted during construction. Minimize dust generation activities, especially during strong winds. Apply wet dust suppression where necessary to manage dust emissions from vehicle movement, site clearance and along the alternative access road through Casteel Village, Alternative environmentally friendly dust suppressants can be used (i.e., Dust-A-Side) Control vehicle speeds along the alternative access through passing through Casteel Village to 60km/hour. Construction materials piles (i.e., building sand, rock etc.) must not exceed a height of 2m. 	-	1	1	2	2	Low (5)	Low
The construction works (i.e., clearing of vegetation, bulk earthworks, presence of site laydown area) may create unsightly views for motorists, tourists, and nearby residences. However, it will be temporary and anticipated to be of low significance.	-	3	1	2	1	Low (12)	<ul style="list-style-type: none"> The construction site must be kept free of litter, contained in appropriate bins/containers, and must be removed on a weekly basis to the Casteel Disposal Site. Lighting at the construction site (at night) should be sufficient for security but should not constitute illumination/light pollution to abutting properties. 	-	2	1	2	1	Low (8)	Low
8. SOCIAL AND ECONOMIC IMPACTS														
Creation of job opportunities for unskilled labour from local communities	+	3	3	2	3	Moderate (14)	<ul style="list-style-type: none"> Establish a project steering committee (PSC) with the political principals, traditional councils, local authority to serve as 'a stakeholder committee' responsible to identify local labour for the project. The DWS contractor/construction team will be introduced to the PSC during the procurement phase and will together agree on a 'Social Economic Development (SED) Plan' on the employment of unskilled labour from the communities. Have a dedicated Stakeholder Liaison Officer (perhaps at Thusong Centre) during the construction works to handle any community queries or questions and to communicate project details as and when required. 	Neutral					N/A	
Capital injection into the local economy through the purchase of construction material and goods locally.	+	3	3	2	3	Moderate (14)	<ul style="list-style-type: none"> DWS will source construction material from a local commercial (licensed) quarry. No further mitigation required. 	Neutral					N/A	
Temporary restriction of fishing and grazing in areas of construction works and site establishment area	-	3	1	2	1	Low (12)	<ul style="list-style-type: none"> Local fisherman and livestock will be able utilise the rest of the dam area not occupied by the construction works and site laydown area. There is a lack of access control to the site. 	-	1	1	2	2	Low (5)	Negligible

Aspect, Activity & Potential Impact	SIGNIFICANCE PRE-MITIGATION						PROPOSED MITIGATION MEASURES	SIGNIFICANCE POST MITIGATION						
	Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating		Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating	RESIDUAL RISK
							<ul style="list-style-type: none"> A community complaints register should be kept onsite and followed up/addressed regularly by the Community Liaison Officer. 							
Potential impact on community rituals and beliefs conducted at Casteel Dam	-	2	2	2	3	Moderate (14)	<ul style="list-style-type: none"> Any rituals or customs by the community will be respected by the DWS Team and logistics around these can be committed to during the PSC sitting during the procurement phase. 	-	1	1	2	0	Very Low (3)	Negligible
CUMULATIVE IMPACT														
IMPACT ON TERRESTRIAL BIODIVERSITY (FAUNA AND FLORA)														
Loss of Habitat of medium to high sensitivity, low number of SCC for fauna and flora	-	3	2	5	4	Moderate (19)	<ul style="list-style-type: none"> Application of the mitigation measures and recommendations for the direct and indirect terrestrial biodiversity impacts (fauna and flora) are likely to reduce the significance of cumulative impacts within the study area to Low-Medium, which would require no further application of the Mitigation hierarchy. 	-	3	2	2	2	Low (10)	Negligible. No further mitigation required
Further Spread of alien invasive species to vegetation communities and adjacent habitat	-	3	2	5	4	Moderate (19)		-	3	2	2	2	Low (10)	Negligible. No further mitigation required
Destruction of protected plants due to the moderate to high density of at least two species within the study area	-	3	2	5	4	Moderate (19)		-	3	2	2	2	Low (10)	Negligible. No further mitigation required

10.4 POTENTIAL RESIDUAL IMPACTS TO BE ADDRESSED DURING THE OPERATION PHASE

Table 35: Potential Residual Impacts during Operation Phase

Aspect, Activity & Potential Impact	SIGNIFICANCE PRE-MITIGATION						PROPOSED MITIGATION MEASURES	SIGNIFICANCE POST MITIGATION						
	Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating		Status (-) / (+)	Probability	Extent	Duration	Intensity	Significance Rating	RESIDUAL RISK
DIRECT AND INDIRECT IMPACT														
1. IMPACT ON TERRESTRIAL BIODIVERSITY														
Additional spread of alien invasive species along rehabilitated areas.	-	2	2	5	3	Moderate (20)	• Mitigation measures as recommended for the construction phase need to be repeated during the operational phase to ensure eradication of declared alien species.	-	1	1	4	1	Low (6)	Low
CUMULATIVE IMPACT														
NONE														

10.5 RECOMMENDED MONITORING REQUIREMENTS FOR RESIDUAL RISKS

Residual impacts are those impacts that remain significant following the application of mitigation measures.

No monitoring actions for terrestrial ecosystems are suggested for this development due to the generally low ecological sensitivity of the area and lack of species of conservation concern.

During the construction works regular inspections by the ECO are recommended to ensure that the control measures detailed in the environmental authorisation are adhered to.

The recommended frequency of such inspections is weekly. Immediate corrective actions must be taken if inspections identify any failures to comply.

During the operation phase of Casteel Dam, Routine Dam Safety Inspections are recommended as required in terms of the Dam Safety Regulations.

Monitoring of aquatic ecosystems is not necessary because the rehabilitation work is not expected to have a measurable long-term negative impact on the aquatic ecosystems if the recommended mitigation measures are adhered to. No wetland rehabilitation plan is required according to the aquatic specialist. The wetland does not require much rehabilitation after construction except for contouring. There would be enough seeds left in the soils for the vegetation to recolonise quickly post construction.

11. CONCLUDING STATEMENT

11.1 SUMMARY OF SPECIALIST FINDINGS

A. Archaeologist

According to the Archaeologist, Mr Tobias Coetzee, the site is not considered sensitive from a heritage perspective and no heritage resources are at risk of being impacted therefore confirms the DFFE STR sensitivity theme as 'Low'. The recommendation is for the project to continue subject to adherence to the recommendations and approval by SAHRA, as contained in this report.

The entire project site has been previously disturbed indicating a lower sensitivity and potential impact to cultural resources. Only one demolished historical enclosure falling outside of the demarcated project areas was noted in 1954 aerial imagery but will not be impacted. No potential heritage sites were observed during the pedestrian survey.

According to the local community some rituals take place at the dam, however no objections were raised by the Moreipuso Traditional Authority and to their knowledge only crocodiles and hippopotamuses are found in the dam. Setlhare Traditional Authority could not be reached at the time of the site visit but are aware of the project.

B. Terrestrial Ecologist

The Ecologist finds the project is to be of 'Low' ecological sensitivity, lacking SCC and high disturbance levels are present therefore the 'Very High' sensitivity theme in the DFFE STR is not justified.

The site is in a degraded state due to impacts from overgrazing, firewood gathering, dumping, littering, soil erosion and modified habitat i.e., dam infrastructure and R40 Casteel Dam access road.

The CBA 2 area associated with the site is degraded and should be excluded from the macro-scale assessment. The 'Protected Area Expansion Strategy Focus Area' overlapping the site was confirmed, however the closest protected area is 10km away, and the site surrounding area is densely populated therefore the categorisation nonsensical.

Three protected plant species have been recorded onsite i.e., Marula (nationally protected), Barberton Aloe and Thick Leaved Gladiolus (provincially protected). Destruction permits from the DFFE Forestry Regulation will be obtained regarding the removal of tree *Sclerocarya birrea* (Marula) prior to construction works. All specimens of *Aloe barbertoniae* within the project footprint should be dug up with their roots intact and transplanted into either adjacent habitat or used in landscaping/re-vegetation around the construction site.

The specialist does not object to the project provided that the DWS complies with the recommended mitigation measures contained in this report.

C. Aquatic / Freshwater Ecologist

The Aquatic Ecologist, Mr Rob Palmer delineated only one natural Channelled Valley Bottom (CVB) Wetland in the direct area of influence, the rest are artificial in nature and not sensitive. The wetland is in a 'C - moderately modified' present ecological state (PES) but has a 'High' functional importance and so too are the ecosystem services derived from it.

The wetlands' main function is flood attenuation, sediment trapping, nutrient and toxicant assimilation and important to control erosion and provides direct human benefit i.e., fishing and water supply. A buffer zone of at least 50 m from the edge of the wetland is recommended for all activities that are not needed within the wetland. By releasing the appropriate flow of water downstream during the construction period the direct negative impact on the Dingley Dale Irrigation Scheme and other downstream water users can be managed/avoided. The project will not impact negatively on ecosystem services.

Casteel Dam has already incurred direct impacts on the aquatic habitats therefore the rehabilitation works will not have a significant further impact. The ecological function of the wetland can easily be restored by rehabilitating the disturbed area and controlling the spread of alien invasive vegetation.

One species of threatened fish was confirmed in the study area i.e., Mozambique Tilapia/Kurper/Bream, and is unlikely to be negatively impacted by the rehabilitation works.

The project is not expected to alter the PES of the wetland.

The Tlulanditeka River is 1.8km downstream of Casteel Dam is the indirect area of influence and has a 'Very High' Ecological Importance and Sensitivity (EIS) and is in a 'C – moderately modified' present hydrological state. The works are likely to have a measurable indirect impact on the ecosystem. The gazetted Ecological Reserve for the Tlulandziteka (Sand) River at EWR S7 for a Category C ecological state is 32.67% of the MAR. The minimum flows to be released from the dam during normal/high rainfall and drought periods are 10-32 litres/second and 8-16 litres/second respectively.

The specialist recommends the proposed rehabilitation works to be authorised provided that all mitigation measures contained in this report are complied with.

D. Traffic Engineer

According to the Traffic Engineer, Mr Hendrikus Swart, traffic analyses, all analysed intersections operate at an acceptable level of service (Level B) based on the existing 2023 background traffic. After adding the expected construction traffic, whether the construction material is imported from a quarry to the north or south of the dam, all analysed intersections are still expected to operate at the same level of service.

The sight distance towards the north and south along the R40 at Casteel Dam access road is acceptable based on a road speed limit of 100km/hr. The required stopping sight distance of 205m is available on site at the access intersections locality.

The engineer highlights that slow construction vehicles enter/exiting the R40 at the access intersection may pose a safety hazard. The DWS will therefore implement additional safety precautions for the construction period to ensure road safety at the R40/Casteel Dam access intersection as recommended in this report. Safe drop off and collection areas at the construction site for daily commuters on public transport will also be provided.

11.2 ENVIRONMENTAL IMPACT STATEMENT

11.2.1 Preferred Alternative

A summary of the impacts including significance pre and post mitigation is provided below in Table 36.

Table 36: Summary of Impacts for the proposed Casteel DSRP

Impact	Significance (pre-mitigation)	Significance (post mitigation)
Planning Phase		
Potential impact on community rituals conducted at Casteel Dam	Moderate (-)	Very Low (-)
Potential impact on SANRAL R40 road upgrade logistics	Moderate (-)	Very Low (-)
Stakeholder expectations regarding job creation may create social tension between communities and tribal authorities.	Moderate (-)	Low (-)
Construction Phase		
DIRECT AND INDIRECT IMPACTS		
Loss of habitat with Very High Terrestrial Biodiversity Theme and wetland vegetation with 'High' SEL.	Moderate (-)	Low (-)
Additional invasion of natural habitat by alien invasive species	Moderate (-)	Low (-)
Destruction of Protected Plants	Moderate (-)	Low (-)
Destruction of Habitat for Faunal SCC	Moderate (-)	Low (-)
Increase in poaching activities	Low (-)	Low (-)
Potential for soil erosion and sedimentation of downstream CVB and Tlulandziteka River.	Moderate (-)	Low (-)
Destruction of wetland habitat	Moderate	Moderate (-)
Water quality deterioration	Low (-)	Very Low (-)
Altered Hydrology	Low (-)	Very Low (-)
Dam failure result in high sediment loads into the watercourse up to confluence with Tlulandziteka River.	Moderate (-)	Low (-)
Increased solid waste may impact CVB wetland downstream of Casteel Dam	Low (-)	Very Low (-)
Increased traffic (62AM and 62 PM trips) at the R40 Casteel Dam access intersection and at Wales Road intersection. (All intersections operating at acceptable level of service).	Low (-)	Very Low (-)
Slow turning construction vehicles entering/exiting the R40 at Casteel Dam access road intersection pose a safety risk to road users.	Moderate (-)	Low (-)

Impact	Significance (pre-mitigation)	Significance (post mitigation)
Increased noise at nearby residences (40m from site) due to movement of construction trucks and machine onsite, specifically dumping of rock. (Loading and offloading)	Moderate (-)	Low (-)
Dust fall out from clearing of vegetation, bulk earthworks, movement of construction vehicles and machinery on site may impact nearby residences.	Low (-)	Low (-)
Creation of job opportunities for unskilled labour from local communities.	Moderate (+)	-
Capital injection into the local economy through the purchase of construction material and goods locally.	Moderate (+)	
Temporary restriction of fishing and grazing in works area at Casteel Dam.	Low (-)	Low (-)
CUMULATIVE IMPACTS		
Loss of habitat of medium to high sensitivity, low number of SCC for fauna and flora	Moderate (-)	Low (-)
Further spread of alien invasive species to vegetation communities and adjacent habitat.	Moderate (-)	Low (-)
Destruction of protected plants due to moderate to high density of at least two species within the study area.	Moderate (-)	Low (-)
Operational Phase		
Additional spread of alien invasive species along rehabilitated areas.	Moderate (-)	Low (-)

Several negative impacts of moderate and low significance ratings have been identified for the planning, construction, and operational phase of the project of which the majority can be reduced/controlled or remedied to a low /minor / negligible significance rating. No impacts of high negative significance ratings have been identified for the project given the ‘Low’ ecological sensitivity, lack of SCC and high disturbance levels of the site and the limited scale of the rehabilitation works. No heritage resources are present onsite except for potential cultural customs by the community that can be catered for before / during the construction works.

Casteel Dam has already incurred direct impacts on the aquatic habitats therefore the rehabilitation works will not have a significant further impact. The ecological function of the wetland can easily be restored by rehabilitating the disturbed area and controlling the spread of alien invasive vegetation. The DWS will also release water downstream during the construction works ensuring continued supply to the downstream water users and aquatic biota.

The predicted construction traffic importing construction material will have moderate to low impact on the R40. According to the Traffic Engineer the identified intersections operation at an acceptable level of service after adding the predicted traffic to the 2023 background traffic. Additional safety precautions and construction signage along the R40 is proposed to reduce any potential safety hazard of slow turning construction vehicles.

The project will in general have a positive socio-economic impact. It will create employment opportunities for the local community and result in expenditure in the area through the purchase of construction material and goods in the local area. Further, by improving the safety of the dam it will ensure continued supply of water to downstream farmers and communities.

11.2.2 No-go Alternative

As mentioned under 7.2, if the status quo is maintained there is a risk of dam failure because the dam wall is unstable, infested with termites and a large gully is working its way towards the spillway. The ecological implications of dam failure would be catastrophic and irreversible, and its intensity Critical (Nepid, 2022). The spatial extent of dam failure will extend at least to the confluence with the Tlulandziteka (Sand) River. By implementing the repair works the probability of dam failure is drastically reduced and will prolong the lifespan of the dam i.e., the best environmental option. Thus, the no-go alternative is not preferred.

11.3 RECOMMENDATION BY EAP

Based on the specialist recommendations, environmental impact statement findings and the overall benefit of the project there are no fatal flaws associated with the rehabilitation works.

The objective of the project is to improve the safety of Casteel Dam to ensure compliance with the Dam Safety Regulations (GNR 132, 24 February 2012) as published under Chapter 12 (Safety of Dams) under the NWA and will ensure the continued supply of water to downstream farmers and communities.

The DWS did consider design and the no-go alternative. The design alternatives were considered on how to improve flood handling capacity of the dam to stabilise its downstream slope and approach to repair the outlet works. The preferred options were to raise the dam wall using a parapet wall (most cost effective) and using a box cage design for the outlet works (recommended for diver safety). None of which influence the overall impact considerations or ratings of the project.

The no-go option was not considered further due to the potential environmental cost. If the rehabilitation works are not executed at the dam wall there is a risk of dam failure which holds ecological implications that would be catastrophic and irreversible that would extend to the confluence of the Tlulandziteka (Sand) River; also scarring the landscape permanently and leaving the downstream farmers and communities without water supply.

Naledzi Environmental Consultant Pty Ltd is of the opinion that the proposed rehabilitation works should be approved based on specialist findings and strict implementation of management measures. The content of this BAR and EMPR is considered sufficient for DFFE to reach an informed decision and it's recommended that the environmental authorisation is issued containing the conditions as specified under section 11.4 below.

The environmental authorisation should be issued for a period of 5 years.

11.4 RECOMMENDED CONDITIONS FOR INCLUSION IN THE ENVIRONMENTAL AUTHORISATION

It is recommended that the project be approved subject to the following conditions:

- **Heritage, Cultural Resources**
 - Should skeletal remains be exposed during construction works, all activities must be suspended, and the relevant heritage resources authority must be contacted.
 - Should culturally significant material be discovered during the works, all activities must be suspended pending further investigation by a qualified archaeologist.
- **Noise**
 - The EMPr is to include controls to restrict construction activities to working hours from 08h00 to 17h00 during weekdays, and 07h00 – 14h00 on Saturdays.
 - No construction activities are permitted on Sundays or public holidays. Construction noise must not exceed 85 decibels (dBA) as stipulated in the Occupation Health and Safety Act (Act No. 85 of 1993).
 - A community complaints register must be kept onsite. The applicant/contractor must respond to the complaints regarding noise generation taking responsible action to reduce the impact.
- **Waste Management**
 - All waste generated during the construction phase must be disposed of on a weekly basis at the Casteel Waste Disposal Site. No domestic waste may be kept/stored for longer than 10-days.
- **Terrestrial Biodiversity**
 - Clearing of vegetation should be conducted in the dry months between April and September prior to onset of rains.
 - All specimens of Aloe barbertoniae within the proposed development footprints should be carefully dug up with their roots intact and transplanted into either adjacent habitat or used in landscaping / re-vegetation around the construction site.
 - Where removal of Marula trees is required, a permit for Removal of Protected Trees in terms of Section 15(1) of the National Forest Act must be submitted and obtained from to DFFE: Forestry Regulation and Support.

- All declared alien plants within a 100 m buffer around the proposed development must be eliminated according to the DEA's published guidelines (DEA, 2015). These are species that have been listed under the National Environmental Management: Biodiversity Act (Act No. 10 OF 2004).
- Weed control, involving herbicides, must be managed correctly to reduce the impact on the adjacent natural vegetation.
- **Aquatic Ecosystems**
 - The average monthly ecological Reserve should be released from Casteel Dam during the proposed rehabilitation works.
 - Construction activities in the CVB Wetland must be minimized. All support operations should be done outside the wetland. A buffer zone of at least 50 m from the edge of the wetland is recommended for all activities that are not needed within the wetland.
 - All portions of the CVB Wetland downstream of Casteel Dam that are disturbed during construction but not covered by fill for the extended wall must be rehabilitated. The aim of the rehabilitation must be to recreate the same mix of habitats, including natural topography and substrates that were present prior to disturbance.
 - A Stormwater Management Plan must be developed and implemented. The aims of this plan should be: 1) to minimise the transport of sediments from the proposed work area; 2) minimise the risks of erosion; and 3) minimise the contamination of stormwater.
- **Surface water**
 - Proper stormwater management must be implemented during construction.
 - The contractor shall be in possession of an emergency spill kit that must always be complete and available onsite.
 - Clean small oil or fuel spills with an approved absorbent material (e.g. Sawdust, "Drizit" or "Spill-sorb")
 - Immediately clean any accidental oil or fuel spillages or leakages.
 - Carefully control all on-site operations that involve the use of cement and concrete.
 - Chemical sanitation facilities or systems such as 'toilets' must be provided at a ratio of one for every 15 workers. These must be placed such that spills and leaks to the environment are prevented and must be maintained according to operating instructions and the content thereof must be disposed at the nearest available Wastewater Treatment Works.
- **Traffic Impact**
 - DWS must obtain approval from SANRAL for the adding of a gravel shoulder to the R40 at the R40/Casteel Dam access intersection.
 - DWS must obtain permission from SANRAL for the temporary construction safety signage and measures to be implemented along the R40 at Casteel Dam to reduce any potential safety hazards from slow moving construction vehicles entering/existing the site.
- Additional safety precautions must be implemented for the duration of the construction period at the R40/Casteel Dam access intersection located north of the dam i.e.
 - Temporary flagmen; and
 - Temporary construction signage in accordance with the SA Road Traffic Signs Manual.
 - Reduce speed to 60km/hr at the locality of the access.

- Safe drop off and collection area at the construction site for daily commuters on public transport.
- **Project Steering Committee (PSC)**
 - A project steering committee is to be established with the local authority and traditional councils responsible to identify and agree on the employment of local unskilled labour from the communities for the project.
- **Dam Failure**
 - **Dam Safety Review.** The proposed civil works must be reviewed by an independent Dam Safety Engineer(s). The review should pay particular attention to the proposed rehabilitation of the spillway donga, and the risks of the existing termite infestation on the structural stability of the existing wall.
 - **Dam Safety Inspections.** Periodic inspections must be undertaken by an independent Dam Safety Engineer(s), as required in terms of Dam Safety Regulations.
 - **Dam Maintenance Programme.** A long-term maintenance programme for the dam must be developed and implemented. Particular attention must be given to 1) the control of erosion in the spillway channel; 2) the control of termites in the wall; and 3) the control of woody vegetation on the wall.
- **Major Incidences:**
 - In the event of a major incident (e.g., fire causing damage to property and environment, major spill, or leak of contaminants), the relevant authorities should be notified as per the notification of emergencies/ incidents, as per the requirements of Section 30(3) of NEMA.
- **Monitoring and Reporting Requirements**
 - A qualified ECO must be appointed to conduct regular inspections to ensure that the control measures detailed in the environmental authorisation and EMPR are adhered to.
 - The frequency of such inspections is weekly with monthly reporting.
 - During the operation phase of the Casteel Dam, Routine Dam Safety Inspections are recommended as required in terms of the Dam Safety Regulations.
- **Management of the Activity**
 - A copy of the environmental authorisation must be kept at the onsite office/property where the rehabilitation works will be undertaken. The must be produced to any authorized official of DFFE / MDARDLEA requesting to see it and must be available for inspection by any employee/contractor of the holder of the EA who undertakes work on the property.
- A copy of the EMPR must be available onsite and its content and objectives must be known by contractors, subcontractors, agents, and other people working onsite.
- All relevant legislation and requirements of other government departments (National, Provincial), of Section 28 (duty of care) of NEMA, must be complied with.
- Compliance with all legal requirements in relation to environmental management and conditions of the authorisation issued by DFFE.

12. REFERENCES

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- Municipal Demarcation Board – www.demarcation.org.za, Ward Delimitation 2021.
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- The Vegetation of South Africa, Lesotho, and Swaziland, 2006 (Mucina and Rutherford).

13.APPENDICES