

Ecological Assessment

Report

**Twefontein Gauging Weir
Development, Bothaville, Free State**

Province

March 2023

Compiled for:



Compiled by:

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Executive Summary

The project applicant, Free State Department of Water and Sanitation (DWS), proposes to formally construct a new gauging weir within the Vals River, approximately 11.5 km south-east of the town of Bothaville, Free State Province. The proposed new gauging weir will be constructed directly adjacent downstream of an existing old weir. This existing old weir will consequently be demolished after completion of construction and subsequent commissioning of the new weir. A crump weir design will be followed for the proposed new gauging weir.

NSVT Consultants was appointed by the applicant as the independent Environmental Assessment Practitioner (EAP), to conduct the legally required Basic Assessment (BA) process.

Due to the nature of potential ecological impacts posed by the proposed development to the local ecosystem and ecology, an Ecological study is required. This is required in order to determine the potential presence of ecologically/conservationally significant or sensitive species, habitats, wetlands or ecosystems, which may be adversely affected by the proposed development. Any potential ecological impacts associated with the proposed development, must be identified. Impact mitigation and management measures in accordance with the requirements of the National Environmental Management Act (Act 107 of 1998) Mitigation Hierarchy, must subsequently be recommended. This must be done in order to attempt to reduce/alleviate the adverse effects of identified potential ecological impacts.

EcoFocus Consulting was therefore consequently appointed by the EAP as the independent ecological specialist, to conduct the required Ecological study for the proposed development. This report constitutes the Ecological Assessment.

A site assessment of the proposed development area was conducted on 15 March 2023. This date forms part of the growing season and most plant species present could therefore be successfully identified.

Methodology

The assessment area was assessed on foot in a grid formation. Visual observations/identifications were made of habitat conditions, any ecologically sensitive/conservationally significant areas as well as relevant species present. Identified species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998) and Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 as well as the Provincially Protected species of the Free State's Nature Conservation Ordinance (No 8 of 1969). Georeferenced photographs were taken of ecologically sensitive/conservationally significant areas as well as any Red Data Species Listed, nationally- or provincially protected species if encountered, in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

The Site Ecological Importance (SEI), Present Ecological State (PES) & Ecological Importance and Sensitivity (EIS) of the proposed development area were determined and discussed. Potential ecological impacts posed by the proposed development to the local ecosystem and ecology, were identified, evaluated, rated and discussed.

Assessment Area

The physical footprint of the proposed new gauging weir is approximately 6 107 m² in size. The existing old weir situated directly adjacent upstream of the proposed new gauging weir location, will be used as part of a temporary coffer dam during construction. A second temporary coffer dam will also be constructed directly adjacent downstream of the proposed new gauging weir location. The physical footprint of these two temporary coffer dams will be approximately 4 325 m² in total combined size. These two temporary coffer dams (including the existing old weir) will however be demolished after completion of construction and subsequent commissioning of the new gauging weir.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

A temporary LB Site camp of approximately 958 m² in size will be established on the western bank of the Vals River, while a temporary RB Construction site camp approximately 6 969 m² in size will furthermore be established on the eastern bank of the river. These two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

The assessment area is situated approximately 11.5 km south-east of the town of Bothaville, Free State Province. The proposed new gauging weir is situated on the Remaining Extents of the Farms Winkelplaats No. 312 (western river bank) (SG 21 Digit Code: F0050000000031200000) and Bothas Drift No. 286 (eastern river bank) (SG 21 Digit Code: F0050000000028600000). The area forms part of the Nala Local Municipality which in turn, forms part of the Lejweleputswa District Municipality.

The assessment area falls outside the municipal urban edge. Access to the assessment area is obtained by way of the R 30 provincial road, from the west.

Conclusion

The temporary LB Site camp and temporary RB Construction site camp scored a low Site Ecological Importance (SEI) value while the portion of the Vals River associated with the proposed development scored a moderate Ecological Importance and Sensitivity (EIS) value. The assessment area is therefore viewed as being of low to moderate overall conservational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 1, faunal and avifaunal habitat and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Terrestrial and aquatic alien invasive species establishment as well as impeding and contamination of the flow regime of the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area, were identified and addressed as significant potential long-term ecological impacts, associated with the construction phase of the proposed development.

Once the construction phase of the proposed development has been completed, the subsequent operational phase should not result in any significant additional potential ecological impacts, apart from the potential long-term aquatic ecological impacts, as discussed under heading 9.1.

The significant potential long-term ecological impacts identified for the proposed development, could potentially merely add low cumulative impact to the existing negative impacts caused by the extensive existing agricultural cultivation transformation, throughout the majority of the local and broader landscape surrounding the assessment area.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential cumulative ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will add any significant residual cumulative ecological impacts to the surrounding environment, if all recommended mitigation measures as per this ecological report are adequately implemented and managed, for both the construction- and subsequent operational phases of the proposed development.

It is the opinion of the specialist that the proposed development of the assessment area should be considered by the competent authority for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report must however be adequately implemented and managed for both the construction- and subsequent operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

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Abbreviations

BA	Basic Assessment
CARA	Conservation of Agricultural Resources Act (Act 43 of 1983)
CBA	Critical Biodiversity Area
DESTEA	Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
ESA	Ecological Support Area
MAP	Mean Annual Precipitation
NEMBA	National Environmental Management: Biodiversity Act (Act 10 of 2004)
NEMA	National Environmental Management Act (Act 107 of 1998)
NFA	National Forests Act (Act 84 of 1998)
NWA	National Water Act (Act 36 of 1998)
ONA	Other Natural Area
PES	Present Ecological State
SANBI	South African National Biodiversity Institute
SEI	Site Ecological Importance
WTW	Water Treatment Works
WULA	Water Use License Application

Declaration of Independence

I, Adriaan Johannes Hendrikus Lamprecht, declare that I:

- am the Director and Ecological Specialist of EcoFocus Consulting (Pty) Ltd
- act as an independent specialist consultant in the field of botany and ecology
- am assigned as the Ecological Specialist consultant by the Environmental Assessment Practitioner (EAP), NSVT Consultants, for the proposed development
- do not have or will not have any financial interest in the undertaking of the proposed project activity other than remuneration for work as stipulated in the Purchase Order terms of reference
- confirm that remuneration for my services relating to the proposed development is not linked to approval or rejection of the project by the competent authority
- have no interest in secondary or subsequent developments as a result of the authorisation of the proposed project
- have no and will not engage in any conflicting interests in the undertaking of the activity
- undertake to disclose to the applicant and the competent authority any information that has or may have the potential to influence the decision of the competent authority
- will provide the applicant and competent authority with access to all relevant project information in my possession whether favourable or not

AJH Lamprecht



Signature

1. Introduction

The project applicant, Free State Department of Water and Sanitation (DWS), proposes to formally construct a new gauging weir within the Vals River, approximately 11.5 km south-east of the town of Bothaville, Free State Province. The proposed new gauging weir will be constructed directly adjacent downstream of an existing old weir. This existing old weir will consequently be demolished after completion of construction and subsequent commissioning of the new weir. A crump weir design will be followed for the proposed new gauging weir.

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Due to the nature of potential ecological impacts posed by the proposed development to the local ecosystem and ecology, an Ecological study is required. This is required in order to determine the potential presence of ecologically/conservationally significant or sensitive species, habitats, wetlands or ecosystems, which may be adversely affected by the proposed development. Any potential ecological impacts associated with the proposed development, must be identified. Impact mitigation and management measures in accordance with the requirements of the National Environmental Management Act (Act 107 of 1998) Mitigation Hierarchy, must subsequently be recommended. This must be done in order to attempt to reduce/alleviate the adverse effects of identified potential ecological impacts.

EcoFocus Consulting was therefore consequently appointed by the EAP as the independent ecological specialist, to conduct the required Ecological study for the proposed development. This report constitutes the Ecological Assessment.

Preliminary preparations conducted prior to the ecological site assessment, were as follows:

- Georeferenced spatial information was obtained of the proposed development area, in order to determine the direct impact footprint area.
- A desktop study was conducted of the most up-to-date information/data available on the relevant vegetation types and national/provincial conservation significance status, associated with the proposed development area.

2. Date of Ecological Site Assessment

A site assessment of the proposed development area was conducted on 15 March 2023. This date forms part of the growing season and most plant species present could therefore be successfully identified.

3. Assessment Rational

South Africa is a country rich in natural resources and splendour and is rated as having some of the highest biodiversity in the world. Other than the pure aesthetic value which our biodiversity and natural resources provides, it also plays a significant positive role in our national economy. While continuous economic development and progress is a key national focus area, which forms a cornerstone in the socio-economic improvement of society and the livelihoods of communities and individuals, the preservation and management of the integrity and sustainability of our natural resources is also essential in achieving this objective.

Socio-economic development and progress can therefore not be completely inhibited for the sake of ensuring environmental conservation; solutions and compromises rather need to be explored in order to achieve the need for socio-economic development without unreasonably jeopardising the needs of environmental conservation. A sustainable and responsible balance needs to be maintained in order to accommodate the requirements of both.

Adequate, sustainable and responsible utilisation and management of our natural resources is crucial. Finding the required balance between socio-economic development and environmental conservation, should therefore always be a priority focus point during any proposed development process.

Various environmental legislation in South Africa makes provision for the protection of our natural resources and the functionality of ecological systems in order to ensure sustainability. Such acts include the National Environmental Management: Biodiversity Act (Act 10 of 2004), National Forests Act (Act 84 of 1998), Conservation of Agricultural Resources Act (Act 43 of 1983), National Water Act (Act 36 of 1998) and framework legislation such as the National Environmental Management Act (Act 10 of 2004).

An Ecological Assessment of the proposed development area was therefore conducted in order to identify and quantify any potential ecological impacts, associated with the proposed development.

4. Objectives of the Assessment

- Describe the vegetation within the assessment area and identify and list conservationally significant faunal and floral species encountered within the assessment area.
 - List any nationally- and/or provincially protected- and/or Red Data Listed species.
- Identify and discuss any ecologically sensitive/conservationally significant areas, if potentially found to be present within the assessment area.
- Assess and discuss the Site Ecological Importance (SEI) of the assessment area and directly surrounding areas, in order to provide an indication of the overall ecological conservational significance of the assessment area.
- Identify, delineate and discuss any watercourses/wetlands, if potentially found to be present within the assessment area.
- Assess and discuss the Present Ecological State (PES) of aquatic features associated with the assessment area and directly surrounding areas, in order to provide an indication of the current ecological condition as well as the extent and severity of degradation and/or transformation of the assessment area, if applicable.
- Assess and discuss the Ecological Importance and Sensitivity (EIS) of aquatic features associated with the assessment area and directly surrounding areas, in order to provide an indication of the ecological sensitivity/conservational significance of the assessment area.
- Identify, evaluate, rate and discuss any potential ecological impacts associated with the proposed development.
 - Provide recommendations on impact mitigation and management measures in accordance with the requirements of the NEMA (Act 107 of 1998) Mitigation Hierarchy, in order to attempt to reduce/alleviate the adverse effects of identified potential ecological impacts.
- Provide recommendations on the ecological suitability/acceptability of the assessment area for the proposed development.
- A digital report (this document) as well as digital .KML files are also provided to the EAP, of any ecologically sensitive/conservationally significant areas and/or watercourses/wetlands, if potentially identified within the assessment area.

5. Methodology

- The assessment area was assessed on foot in a grid formation.
- Visual observations/identifications were made of habitat conditions, any ecologically sensitive/conservationally significant areas as well as relevant species present.
- Identified species were listed and categorised as per the Red Data Species List; Protected Species List of the National Forests Act (Act 84 of 1998), Invasive Species List of the National Environmental Management: Biodiversity Act (Act 10 of 2004), Alien and Invasive Species Regulations, 2014 as well as the Provincially Protected species of the Free State's Nature Conservation Ordinance (No 8 of 1969).

The **Site Ecological Importance (SEI)** of the assessment area was determined and discussed as per the tables below.

- The SEI of an area is considered to be a function of the Biodiversity Importance (BI) of the receptor (e.g. species of conservation concern, the vegetation/fauna community or habitat type present on the site) and its resilience to impacts, expressed as Receptor Resilience (RR).
 - $SEI = BI + RR$
- BI in turn, is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor
 - $BI = CI + FI$

Table 1: Criteria for CI calculations

Conservation Importance	Fulfilling Criteria
Very High	<p>Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km².</p> <p>Any area of natural habitat of a CR ecosystem type or large area (> 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type.</p> <p>Globally significant populations of congregatory species (> 10% of global population).</p>
High	<p>Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km². IUCN threatened species (CR, EN, VU) must be listed under any criterion other than A. If listed as threatened only under Criterion A, include if there are less than 10 locations or < 10 000 mature individuals remaining.</p> <p>Small area (> 0.01% but < 0.1% of the total ecosystem type extent) of natural habitat of EN ecosystem type or large area (> 0.1%) of natural habitat of VU ecosystem type.</p> <p>Presence of Rare species.</p> <p>Globally significant populations of congregatory species (> 1% but < 10% of global population).</p>
Medium	<p>Confirmed or highly likely occurrence of populations of NT species, threatened species (CR, EN, VU) listed under Criterion A only and which have more than 10 locations or more than 10 000 mature individuals.</p> <p>Any area of natural habitat of threatened ecosystem type with status of VU.</p> <p>Presence of range-restricted species.</p> <p>> 50% of receptor contains natural habitat with potential to support SCC.</p>
Low	<p>No confirmed or highly likely populations of SCC.</p> <p>No confirmed or highly likely populations of range-restricted species.</p> <p>< 50% of receptor contains natural habitat with limited potential to support SCC.</p>
Very Low	<p>No confirmed and highly unlikely populations of SCC.</p> <p>No confirmed and highly unlikely populations of range-restricted species.</p> <p>No natural habitat remaining.</p>

Table 2: Criteria for FI calculations

Functional Integrity	Fulfilling Criteria
Very High	<p>Very large (> 100 ha) intact area for any conservation status of ecosystem type or > 5 ha for CR ecosystem types.</p> <p>High habitat connectivity serving as functional ecological corridors, limited road network between intact habitat patches.</p> <p>No or minimal current negative ecological impacts with no signs of major past disturbance (e.g. ploughing).</p>
High	<p>Large (> 20 ha but < 100 ha) intact area for any conservation status of ecosystem type or > 10 ha for EN ecosystem types.</p> <p>Good habitat connectivity with potentially functional ecological corridors and a regularly used road network between intact habitat patches.</p> <p>Only minor current negative ecological impacts (e.g. few livestock utilising area) with no signs of major past disturbance (e.g. ploughing) and good rehabilitation potential.</p>
Medium	<p>Medium (> 5 ha but < 20 ha) semi-intact area for any conservation status of ecosystem type or > 20 ha for VU ecosystem types.</p> <p>Only narrow corridors of good habitat connectivity or larger areas of poor habitat connectivity and a busy used road network between intact habitat patches.</p> <p>Mostly minor current negative ecological impacts with some major impacts (e.g. established population of alien and invasive flora) and a few signs of minor past disturbance. Moderate rehabilitation potential.</p>
Low	<p>Small (> 1 ha but < 5 ha) area.</p> <p>Almost no habitat connectivity but migrations still possible across some modified or degraded natural habitat and a very busy used road network surrounds the area. Low rehabilitation potential.</p> <p>Several minor and major current negative ecological impacts.</p>
Very Low	<p>Very small (< 1 ha) area.</p> <p>No habitat connectivity except for flying species or flora with wind-dispersed seeds.</p> <p>Several major current negative ecological impacts.</p>

Table 3: Criteria for BI calculations

Biodiversity Importance		Conservation Importance				
		Very High	High	Medium	Low	Very Low
Functional Integrity	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 4: Criteria for RR calculations

Receptor Resilience	Fulfilling Criteria
Very High	Habitat that can recover rapidly (~ less than 5 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a very high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a very high likelihood of returning to a site once the disturbance or impact has been removed.
High	Habitat that can recover relatively quickly (~ 5–10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a high likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a high likelihood of returning to a site once the disturbance or impact has been removed.
Medium	Will recover slowly (~ more than 10 years) to restore > 75% of the original species composition and functionality of the receptor functionality, or species that have a moderate likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a moderate likelihood of returning to a site once the disturbance or impact has been removed.
Low	Habitat that is unlikely to be able to recover fully after a relatively long period: > 15 years required to restore ~ less than 50% of the original species composition and functionality of the receptor functionality, or species that have a low likelihood of remaining at a site even when a disturbance or impact is occurring, or species that have a low likelihood of returning to a site once the disturbance or impact has been removed.
Very Low	Habitat that is unable to recover from major impacts, or species that are unlikely to remain at a site even when a disturbance or impact is occurring, or species that are unlikely to return to a site once the disturbance or impact has been removed.

Table 5: Criteria for SEI calculations

Site Ecological Importance		Biodiversity Importance				
		Very High	High	Medium	Low	Very Low
Receptor Resilience	Very High	Very High	Very High	High	Medium	Low
	High	Very High	High	Medium	Medium	Low
	Medium	High	Medium	Medium	Low	Very Low
	Low	Medium	Medium	Low	Low	Very Low
	Very Low	Medium	Low	Very Low	Very Low	Very Low

Table 6: Interpretation of SEI calculation results

Site Ecological Importance	Interpretation in relation to proposed development activities
Very High	Avoidance mitigation – no destructive development activities should be considered. Offset mitigation not acceptable/not possible (i.e. last remaining populations of species, last remaining good condition patches of ecosystems/unique species assemblages). Destructive impacts for species/ecosystems where persistence target remains.
High	Avoidance mitigation wherever possible. Minimisation mitigation – changes to project infrastructure design to limit the amount of habitat impacted; limited development activities of low impact acceptable. Offset mitigation may be required for high impact activities.
Medium	Minimisation and restoration mitigation – development activities of medium impact acceptable followed by appropriate restoration activities.
Low	Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.
Very Low	Minimisation mitigation – development activities of medium to high impact acceptable and restoration activities may not be required.

- Watercourses/wetlands which are potentially present within the assessment area, were identified, delineated and discussed as per the accepted methodology described below:
 - For the purposes of this investigation a wetland was defined according to the definition in the National Water Act (Act 36 of 1998) as: “land which is transitional between terrestrial and aquatic systems, where the water table is usually at or near the surface, or the land is periodically covered with shallow water and which in normal circumstances, supports or would support vegetation typically adapted to life in saturated soil.”
 - In 2005 DWAF published a wetland delineation procedure in a guideline document titled “A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas”. Guidelines for the undertaking of biodiversity assessments exist. These guidelines contain a number of stipulations relating to the protection of wetlands and the undertaking of wetland assessments.
 - The wetland delineation procedure identifies the outer edge of the temporary zone of the wetland, which marks the boundary between the wetland and adjacent terrestrial areas. This constitutes the part of the wetland that might remain flooded or saturated close to the soil surface for only a few weeks in the year, but long enough to develop anaerobic conditions and determine the nature of the plants growing in the soil.
 - The guidelines also state that the locating of the outer edge of the temporary zone must make use of four specific indicators namely:
 - terrain unit indicator
 - soil form indicator
 - soil wetness indicator
 - vegetation indicator
 - In addition, the watercourse/wetland and a protective buffer zone beginning from the outer edge of the wetland temporary zone, was designated as sensitive in a sensitivity map. The guidelines stipulate buffers to be delineated around the boundary of a wetland. An adequate protective buffer zone, beginning from the outer edge of the wetland temporary zone, was implemented and designated as sensitive within which no development must be allowed to occur.
- Georeferenced photographs were taken of any ecologically sensitive/conservationally significant areas, watercourses/wetlands as well as any Red Data Species Listed-, nationally- or provincially protected species if encountered, in order to indicate their specific locations in a Geographic Information System (GIS) mapping format.

The **Present Ecological State (PES)** of aquatic features associated with the assessment area was determined and discussed as per the table below.

- The Present Ecological State (PES) refers to the current state or condition of an area in terms of all its characteristics and reflects the change to the area from its reference condition. The value gives an indication of the alterations that have occurred in the ecosystem.

Table 7: Criteria for PES calculations

Ecological Category	Score	Description
A	> 90-100%	Unmodified , natural and pristine.
B	> 80-90%	Largely natural . A small change in natural habitats and biota may have taken place but the ecosystem functionality has remained essentially unchanged.
C	> 60-80%	Moderately modified . Moderate loss and transformation of natural habitat and biota have occurred, but the basic ecosystem functionality has still remained predominantly unchanged.
D	> 40-60%	Largely modified . A significant loss of natural habitat, biota and subsequent basic ecosystem functionality has occurred.
E	> 20-40%	Seriously modified . The loss of natural habitat, biota and basic ecosystem functionality is extensive.
F	0-20%	Critically/Extremely modified . Transformation has reached a critical level and the ecosystem has been modified completely with a virtually complete loss of natural habitat and biota. The basic ecosystem functionality has virtually been destroyed and the transformation is irreversible.

The **Ecological Importance and Sensitivity (EIS)** of aquatic features associated with the assessment area was determined and discussed as per the table below.

- The Ecological Importance and Sensitivity (EIS) of an area is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. Both abiotic and biotic components of the system are taken into consideration. Sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance, once it has occurred.

Table 8: Criteria for EIS calculations

EIS Categories	Score	Description
Low/Marginal	D	Not ecologically important and/or sensitive on any scale. Biodiversity is ubiquitous and not unique or sensitive to habitat modifications.
Moderate	C	Ecologically important and sensitive on local or possibly provincial scale. Biodiversity is still relatively ubiquitous and not usually sensitive to habitat modifications.
High	B	Ecologically important and sensitive on provincial or possibly national scale. Biodiversity is relatively unique and may be sensitive to habitat modifications.
Very High	A	Ecologically important and sensitive on national and possibly international scale. Biodiversity is very unique and sensitive to habitat modifications.

Potential ecological impacts posed by the proposed development to the local ecosystem and ecology, were identified, evaluated, rated and discussed as per the methodology described below. The tables below indicate and explain the methodology and criteria used for the evaluation of the Environmental Risk Ratings as well as the calculation of the final Environmental Significance Ratings of the identified potential ecological impacts. Each identified potential ecological impact is scored for each of the Evaluation Components, as per the table below.

Table 9: Criteria for Environmental Risk Rating calculations

Evaluation Component	Rating Scale and Description/Criteria
Magnitude of Negative or Positive Impact	<p>10 - Very high: Bio-physical features and/or ecological functionality/processes may be severely impacted upon.</p> <p>8 - High: Bio-physical features and/or ecological functionality/processes may be significantly impacted upon.</p> <p>6 - Medium: Bio-physical features and/or ecological functionality/processes may be moderately impacted upon.</p> <p>4 - Low: Bio-physical features and/or ecological functionality/processes may be slightly impacted upon.</p> <p>2 - Very Low: Bio-physical features and/or ecological functionality/processes may be slightly impacted upon.</p> <p>0 - Zero: Bio-physical features and/or ecological functionality/processes will not be impacted upon.</p>
Duration of Negative or Positive Impact	<p>5 – Permanent: Impact will continue on a permanent basis.</p> <p>4 - Long term: Impact should cease a period (> 40 years) after the operational phase/project life of the activity.</p> <p>3 - Medium term: Impact may occur for the period of the operational phase/project life of the activity.</p> <p>2 - Short term: Impact may only occur during the construction phase of the activity after which it will cease.</p> <p>1 - Immediate: Impact may only occur as a once off during the construction phase of the activity.</p>
Extent of Positive or Negative Impact	<p>5 - International: Impact will extend beyond National boundaries.</p> <p>4 - National: Impact will extend beyond Provincial boundaries but remain within National boundaries.</p> <p>3 - Regional: Impact will extend beyond 5 km of the development footprint but remain within Provincial boundaries.</p> <p>2 - Local: Impact will not extend beyond 5 km of the development footprint.</p> <p>1 - Site-specific: Impact will only occur on or within 200 m of the development footprint.</p> <p>0 – No impact.</p>
Irreplaceability of Natural Resources being impacted upon	<p>5 – Definite loss of irreplaceable natural resources.</p> <p>4 – High potential for loss of irreplaceable natural resources.</p> <p>3 – Moderate potential for loss of irreplaceable natural resources.</p> <p>2 – Low potential for loss of irreplaceable natural resources.</p> <p>1 – Very low potential for loss of irreplaceable natural resources.</p> <p>0 – No impact.</p>

Reversibility of Impact	<p>5 – Impact cannot be reversed.</p> <p>4 – Low potential that impact may be reversed.</p> <p>3 – Moderate potential that impact may be reversed.</p> <p>2 – High potential that impact may be reversed.</p> <p>1 – Impact will be reversible.</p> <p>0 – No impact.</p>
Probability of Impact Occurrence	<p>5 - Definite: Probability of impact occurring is > 95 %.</p> <p>4 - High: Probability of impact occurring is > 75 %.</p> <p>3 - Medium: Probability of impact occurring is between 25 % - 75 %.</p> <p>2 - Low: Probability of impact occurring is between 5 % - 25 %.</p> <p>1 - Improbable: Probability of impact occurring is < 5 %.</p>
Cumulative Impact	<p>High: Numerous similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts.</p> <p>Medium: Few similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts.</p> <p>Low: Virtually no similar historic, present or future development activities in the same geographical area, have taken or are anticipated to take place which may cumulatively contribute and increase the significance of the identified impacts. The development is anticipated to be an isolated occurrence and should therefore have a negligible cumulative impact.</p> <p>None: No cumulative impact.</p>

Once the Environmental Risk Ratings have been evaluated for each identified potential ecological impact, the Significance Score of each impact is calculated by using the following formula:

- **SS (Significance Score) = (magnitude + duration + extent + irreplaceable + reversibility) x probability.**
- **The maximum Significance Score value is 150.**

The Significance Score is then used to rate the Environmental Significance of each identified potential ecological impact, as per Table 4 below. The Environmental Significance rating process is completed for all identified potential ecological impacts for the construction- and subsequent operational phases of the proposed development, both before and after implementation of the recommended mitigation measures.

Table 10: Interpretation of Environmental Significance Rating calculation results

Environmental Significance Score	Environmental Significance Rating	Description/Criteria
125 – 150	Very High	An impact of very high significance after mitigation will mean that the development may not take place. The impact cannot be suitably reduced and mitigated to within acceptable levels.
100 – 124	High	An impact of high significance after mitigation should influence a decision about whether or not to proceed with the development. Additional, impact-specific mitigation measures must be implemented if the continuation of the development is to be considered.
75 – 99	Medium-High	Additional, impact-specific mitigation measures must be implemented for an impact of medium-high significance if the continuation of the development is to be considered.
50 – 74	Medium	An impact of medium significance after mitigation must be adequately managed in accordance with the mitigation measures provided by the specialist.
< 50	Low	If any mitigation measures are provided by the specialist for an impact of low significance after mitigation, the impact must be adequately managed in accordance with these measures.
+	Positive impact	A positive impact is likely to result in a beneficial consequence/effect and should therefore be viewed as a motivation for the development to proceed.

6. Assessment Area

The physical footprint of the proposed new gauging weir is approximately 6 107 m² in size. The existing old weir situated directly adjacent upstream of the proposed new gauging weir location, will be used as part of a temporary coffer dam during construction. A second temporary coffer dam will also be constructed directly adjacent downstream of the proposed new gauging weir location. The physical footprint of these two temporary coffer dams will be approximately 4 325 m² in total combined size. These two temporary coffer dams (including the existing old weir) will however be demolished after completion of construction and subsequent commissioning of the new gauging weir.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

A temporary LB Site camp of approximately 958 m² in size will be established on the western bank of the Vals River, while a temporary RB Construction site camp approximately 6 969 m² in size will furthermore be established on the eastern bank of the river. These two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

The assessment area is situated approximately 11.5 km south-east of the town of Bothaville, Free State Province. The proposed new gauging weir is situated on the Remaining Extents of the Farms Winkelplaats No. 312 (western river bank) (SG 21 Digit Code: F00500000000031200000) and Bothas Drift No. 286 (eastern river bank) (SG 21 Digit Code: F00500000000028600000). The area forms part of the Nala Local Municipality which in turn, forms part of the Lejweleputswa District Municipality.

The assessment area falls outside the municipal urban edge. Access to the assessment area is obtained by way of the R 30 provincial road, from the west.

See locality map below (see A3 sized map in the Appendices).



Figure 1: Locality map illustrating the assessment area

6.1. Climate

The rainfall of the region peaks during the summer months and the Mean Annual Precipitation (MAP) of the area is approximately 565 mm (www.climate-data.org). The maximum average monthly temperature is approximately 23.4°C in the summer months while the minimum average monthly temperature is approximately 10.2°C during the winter (www.climate-data.org). Maximum daily temperatures can reach up to 29.8°C in the summer months and dip to as low as 2.6°C during the winter (www.climate-data.org).

6.2. Geology and Soils

According to Mucina & Rutherford (2006) the geology of the landscape and associated vegetation types can be described as the following:

The assessment area is mainly covered by deep sandy to clayey alluvial soils developed over Quaternary alluvial sediments.

6.3. Vegetation Type and Conservation Status

Vegetation Type

According to SANBI (2006-2019), the entire assessment area falls within the Highveld Alluvial Vegetation vegetation type (Aza 5). This vegetation type mainly consists of a flat topography supporting riparian thickets accompanied by seasonally flooded grasslands. This vegetation type is classified as Least Concerned (SANBI, 2006-2019).

Conservation Status

The entire assessment area is categorised as Ecological Support Area one (ESA 1), according to the Free State Provincial Spatial Biodiversity Plan (Collins, 2018), which sets out biodiversity priority areas in the province. ESA's are areas that must be maintained in at least fair ecological condition (semi-natural/moderately modified state) in order to support the ecological functioning of a Critical Biodiversity Area (CBA) or protected area, or to generate or deliver ecosystem services, or to meet remaining biodiversity targets for ecosystem types or species when it is not possible or not necessary to meet them in natural or near-natural areas (Collins, 2018).

See vegetation type- and conservation status maps below (see A3 sized maps in the Appendices).

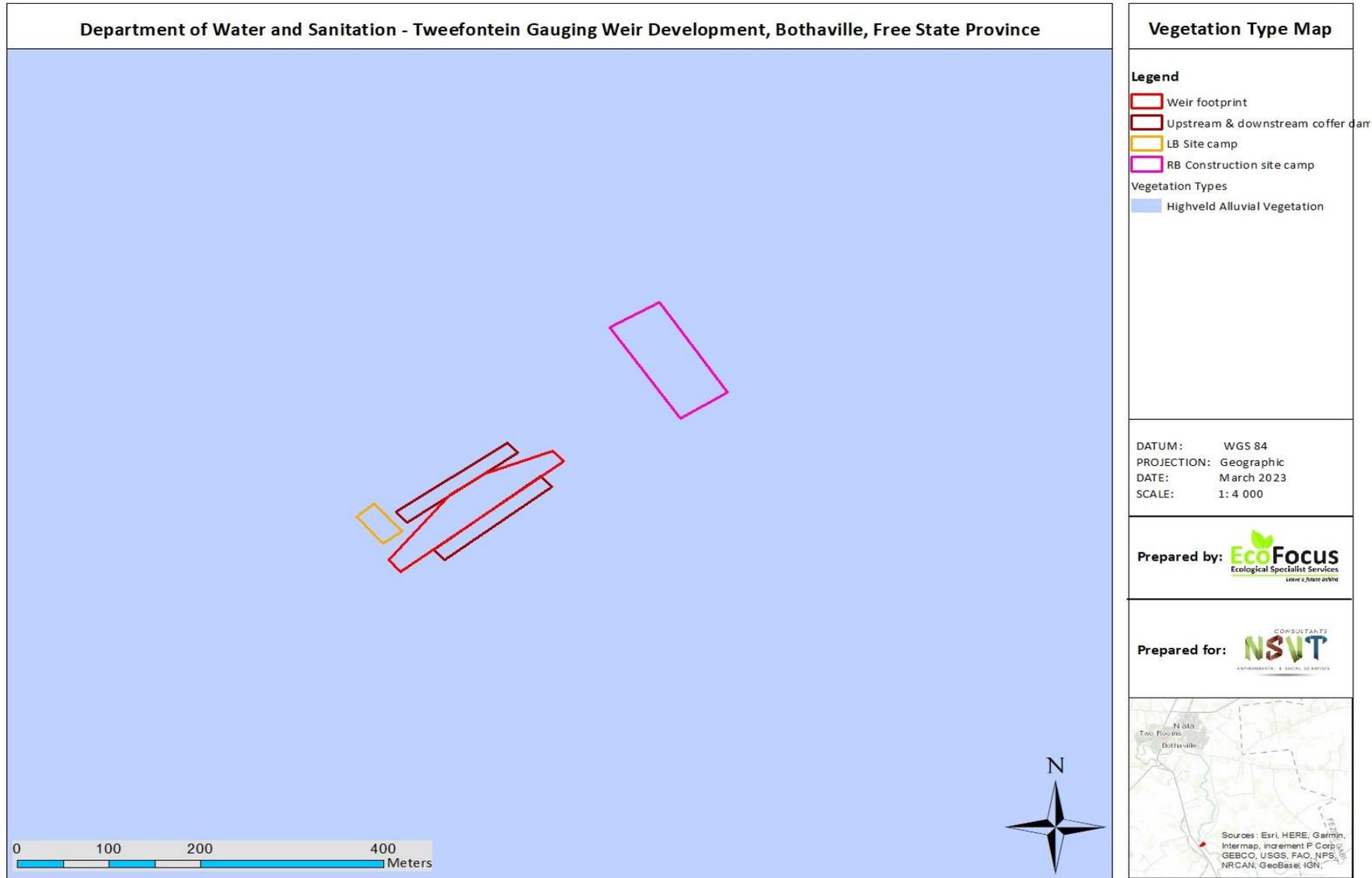


Figure 2: Vegetation type map illustrating the vegetation type associated with the assessment area

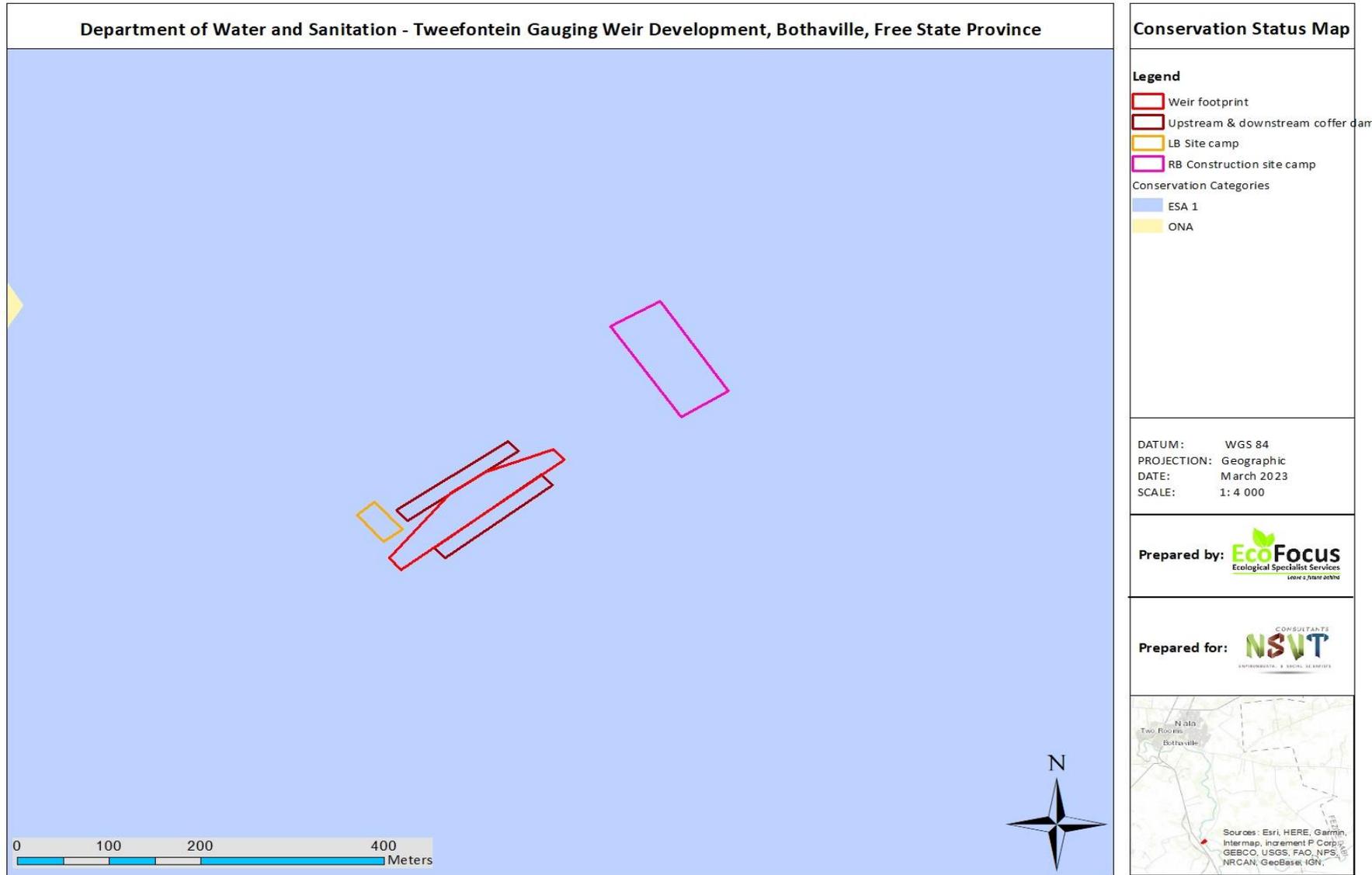


Figure 3: Conservation status map illustrating the conservation status/category associated with the assessment area

7. Assumptions, Uncertainties and Gaps in Knowledge

Various assumptions need to be made during the assessment process, at the hand of the relevant specialist. It is therefore assumed that:

- all relevant project information provided to the ecological specialist by the EAP, was correct and valid at the time that it was provided.
- the proposed development area as provided by the EAP, is correct and will not be significantly deviated from, as this was the only area assessed.
- strategic level investigations undertaken by the applicant prior to the commencement of the Basic Assessment process, determined that the proposed development area represents a potentially suitable and technically acceptable location.
- the public, local communities, relevant organs of state and surrounding landowners will receive a sufficient reoccurring opportunity to participate and comment on the proposed development during the Basic Assessment process, through the provision of adequately facilitated public participation interventions and timeframes as stipulated in the NEMA: EIA Regulations, 2014.
- the need and desirability of the proposed development is based on strategic national, provincial and local plans and policies, which reflect the interests of both statutory and public viewpoints.
- the BA process is a project-level framework and the specialists are limited to assessing the anticipated environmental impacts, associated with the construction- and subsequent operational phases of the proposed development.
- it is assumed that strategic level decision making by the relevant authorities will be conducted through cooperative governance principles, with the consideration of environmentally sustainable and responsible development principles underpinning all decision making.

Given that a BA involves prediction, the uncertainty factor forms part of the assessment process. Two types of uncertainty are associated with the BA process, namely process-related and prediction-related.

- Uncertainty of prediction is critical at the data collection phase as observations, recommendations and conclusions are made, solely based on professional specialist opinion. Final certainty will only be obtained upon actual implementation of the proposed development. Adequate research, specialist experience and expertise should however minimise this uncertainty.
- Uncertainty of relevant decision making relates to the interpretation of provided information by relevant authorities during the BA process. Continual two-way communication and coordination between EAP's and relevant authorities should however decrease the uncertainty of subjective interpretation. The importance of widespread/comprehensive consultation towards minimising the risk/possibility of omitting significant information and impacts is further stressed. The use of quantitative impact significance rating formulas (as utilised in this document) can further standardise the objective interpretation of results and limit the occurrence and scale of uncertainty and subjectivity.
- The principle of human nature provides for uncertainties and unpredictability with regards to the socio-economic impacts of the proposed developments and the subsequent public reaction/opinion, which will be received during the Public Participation Process (PPP).

Gaps in knowledge can be attributed to:

- The ecological assessment process was undertaken prior to the availing of certain information, which would only be derived from the final development design and layout. The design layout for the proposed development, had not been finalised yet at the time of the ecological assessment.
- Extensive existing agricultural cultivation transformation is evident throughout the majority of the local and broader landscape surrounding the assessment area.
- The assessment area however forms part of a limited remaining connected corridor of undeveloped natural grassland habitat, which is present along the length of the Vals River.

- According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.
- The potential for future similar developments in the same geographical area, which could lead to further cumulative impacts, cannot be meaningfully anticipated. It is however highly unlikely that further similar weir development and subsequent transformation will take place within the local and broader area.

EcoFocus Consulting is an independent ecological specialist company. All information and recommendations as per this report are therefore provided in a fair and unbiased/objective manner and are based on qualitative data gathered as well as professional specialist observation and opinion.

8. Results and Discussion

8.1. Proposed Development Area Clearance

The physical footprint of the proposed new gauging weir is approximately 6 107 m² in size. The physical footprint of the two temporary coffer dams will be approximately 4 325 m² in total combined size. These two temporary coffer dams (including the existing old weir) will however be demolished after completion of construction and subsequent commissioning of the new gauging weir.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

The physical footprint of the temporary LB Site camp and temporary RB Construction site camp will be approximately 7 927 m² in total combined size. These two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

The mechanical clearance and excavation for the proposed new gauging weir as well as the two temporary coffer dams and two temporary site camps, will in all probability completely transform the majority of the existing surface vegetation throughout the assessment area.

Extensive existing agricultural cultivation transformation is evident throughout the majority of the local and broader landscape surrounding the assessment area. The assessment area however forms part of a limited remaining connected corridor of undeveloped natural grassland habitat, which is present along the length of the Vals River.

8.2. Water Catchment and Drainage

The proposed new gauging weir location falls within the Middle Vaal Water Management Area (WMA 09) and the associated C60J quaternary surface water catchment- and drainage area. It is furthermore situated in the C60J - 2291 Sub Quaternary Reach (SQR), within the Highveld Ecoregion (11).

8.3. Watercourse Baseline Information

The proposed new gauging weir will be constructed within the Vals River, which flows in a north-westerly direction and eventually discharges into the Vaal River approximately 18 km north-west of the proposed weir location.

The following baseline watercourse information and categorisation is applicable to the specific portion of the Vals River, where the proposed new gauging weir will be constructed, according to the latest South African National Biodiversity Assessment of 2018 (Van Deventer et al., 2019):

- River order = Fourth-order river
- Mainstem = 1 (quaternary mainstem)
- Flow = Permanent/perennial
- Geomorphic zone = Lowland river
- River condition = Moderately Modified
- Present Ecological State (PES), 2018 = Class C (Moderately Modified)
- Ecosystem Threat Status (ETS), 2018 = Critically Endangered (CR)
- Ecosystem Protection Level (EPL), 2018 = Poorly Protected (PP)

It is therefore evident from a hydrological perspective, that the Vals River forms an important part of the local and broader quaternary surface water catchment- and drainage area, towards the north-west. The Vaal River into which the Vals River discharges, is considered a primary national water resource; any potentially significant negative impacts on the ecological functionality and/or -services provided by the river, which could pose a potential threat to national water security, should therefore be avoided as far as practicably/reasonably possible.

According to the Environmental Screening Tool Report, the Aquatic Biodiversity Theme of the portion of the Vals River associated with the proposed development, is rated as being of 'very high sensitivity'. The Aquatic Biodiversity Theme of the local and broader surrounding landscape is however rated as being of 'low sensitivity'. The specialist is in agreement with these ratings.

As stated earlier, it is however expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

It is consequently not anticipated that the proposed development of the new gauging weir and two temporary coffer dams would pose any significant risk to the continued ecological functionality and - integrity of the local and broader quaternary surface water catchment- and drainage area.

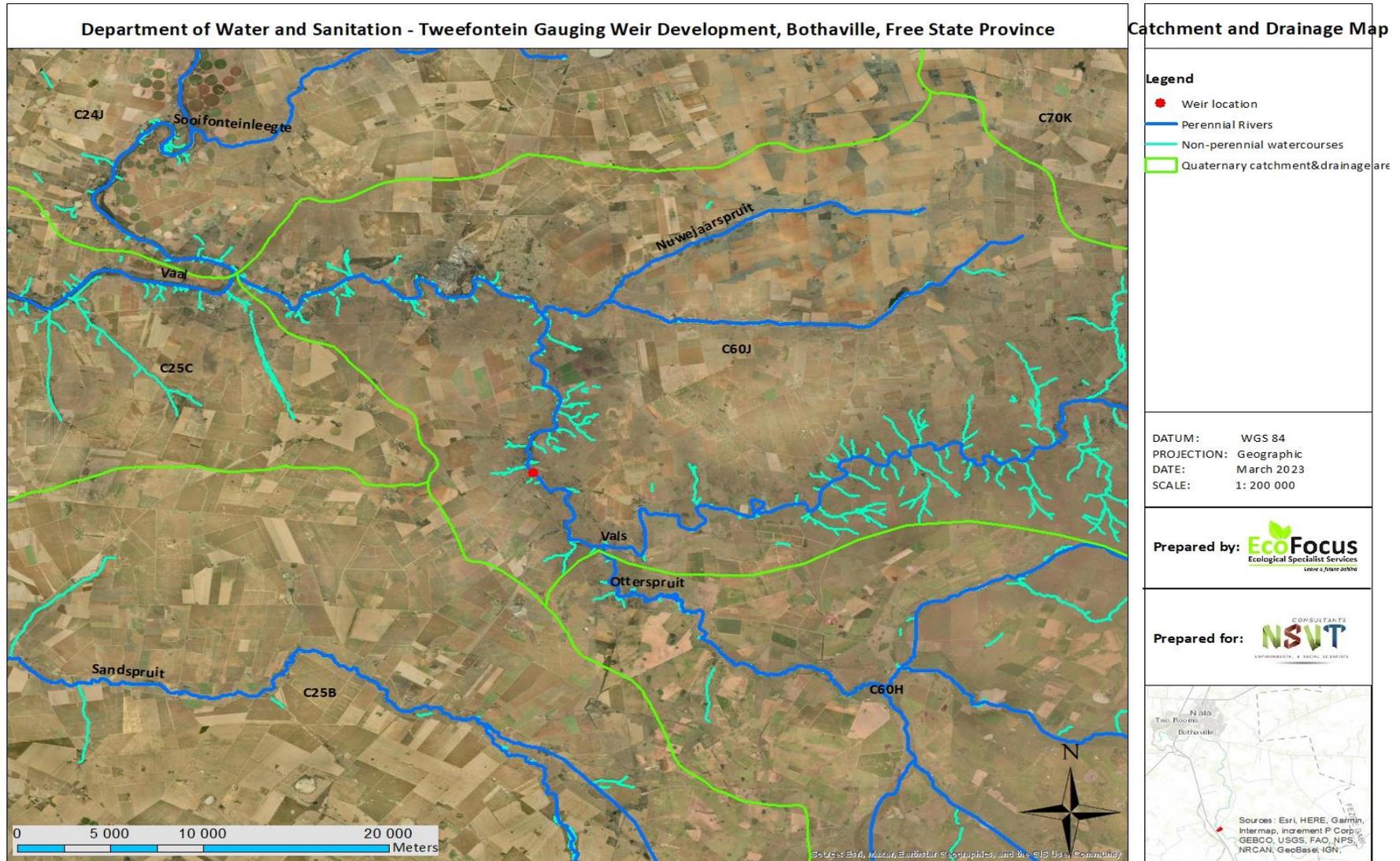


Figure 4: Water catchment and drainage map illustrating the watercourses as well as quaternary surface water catchment- and drainage areas associated with the assessment area

8.4. Gauging Weir and Two Temporary Cofferdams

8.4.1. Current Existing Vegetation and Site Description

The terrestrial landscape surrounding the portion of the Vals River situated directly upstream of the proposed new gauging weir location and existing old weir, moderately slopes towards the river from both sides. The local topography however flattens-out slightly directly adjacent to the river, after which a steep vertical drop into the river of approximately 2 m in height, is present all along the banks of the river.

This directly upstream portion of the Vals River possesses a distinct narrow natural riparian zone, which is mainly associated with the flattened-out area and the vertical drop into the river. The riparian zone constitutes a seasonally/temporarily flooded semi-aquatic grassland habitat with a well-represented woody component, which is relatively representative of the relevant Highveld Alluvial Vegetation vegetation type (Aza 5).

The grassland habitat of the riparian zone is mainly dominated by the hydrophytic grass species *Paspalum dilatatum*, while the grass species *Cynodon dactylon*, *Setaria spp.* and *Eragrostis plana* were also found to be present but to a significantly lesser extent. The reed species *Phragmites australis* and sedge species *Cyperus spp.* are also sparsely present, but confined to the banks of the river situated below the vertical drop.

Medium-sized to large tree- and shrub individuals of the woody species *Salix babylonica* (exotic), *S mucronata*, *Ziziphus mucronata*, *Searsia pyroides* as well as the legally declared alien invasive species *Eucalyptus spp.* (Category 1b in riparian zones) are well-represented along the banks of the river situated above the vertical drop. A single large tree individual of the legally declared alien invasive species tree *Morus alba* (Category 3) was also found to be present.

The riparian zone is however significantly infested by opportunistic pioneer- and exotic weed species such as *Conyza bonariensis*, *Tagetes minuta* and *Bidens bipinnata* as well as the legally declared alien invasive species *Verbena bonariensis* and *Xanthium strumarium* (both Category 1b).

No Red Data Listed-, nationally protected- or provincially protected plant species or any other plant species of conservational significance/value, were found to be present throughout the upstream riparian zone.

As stated earlier, it is expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected. This, combined with the steep vertical drop into the river will therefore result in the upstream riparian zone not being directly or significantly impacted upon by the proposed development.



Figure 5: Three images illustrating examples of the distinct narrow natural riparian zone along the banks of Vals River, which is present directly upstream of the proposed new gauging weir location and existing old weir

Leave a future behind

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The proposed new gauging weir and second temporary coffer dam footprints are located within the current tailwater portion of the Vals River, situated directly downstream of the existing old weir. The surrounding terrestrial landscape of this portion of the river, moderately slopes towards the river from both sides. A steep vertical drop of approximately 2 m - 3 m in height, is present all along the downstream banks of the river and evidence of the river banks gradually eroding and cutting away over time, is also present; hence the increased height of this vertical drop relative to that of the upstream portion.

The presence of the existing old weir results in a significant steep vertical water level drop of approximately 2 m in height, from the upstream capacity level of the weir into the downstream tailwater portion of the Vals River. The water depth and -flow velocity through this downstream tailwater portion is consequently significantly reduced by the presence of the weir. The downstream tailwater portion therefore mainly houses a narrow and shallow slow-moving active streamflow channel, which is intertwined with a mosaic of shallow pools as well as extensive exposed surface rockiness and instream riverbed vegetation.

Due to the vertical water level drop into the river caused by the existing old weir, combined with the reduction in water depth and -flow velocity through the downstream tailwater portion, the downstream riparian zone is mostly confined to the instream portion situated below the vertical drop of the eroded riverbanks. The habitat of the riparian zone is overwhelmingly dominated by the sage species *Cyperus spp.* while the reed species *Phragmites australis* is merely sparsely present. Low-growing tree and shrub individuals of the woody species *Salix mucronata* are merely sporadically present. This shallow and slow-moving instream riparian habitat continues for a significant distance downstream of the proposed new gauging weir and second temporary coffer dam locations and remains relatively homogenous throughout. According to the information received from the landowner, extensive completely dried up river portions are often also evident throughout this downstream riparian habitat, especially during the winter season.

No Red Data Listed-, nationally protected- or provincially protected plant species or any other plant species of conservational significance/value, were found to be present throughout the downstream riparian zone.

As stated earlier, it is expected that the downstream water levels and flow regime should remain virtually unchanged. Therefore, although the downstream riparian zone will be directly impacted upon during the construction phase of the proposed development, this will merely be temporary. The riparian zone should not continue to be directly or significantly impacted upon after completion of construction and subsequent commissioning of the new gauging weir.

It is consequently not anticipated that the proposed development of the new gauging weir and two temporary coffer dams would pose any significant risk to achieving and maintaining national and/or provincial conservation- and persistence targets of the area or to the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.



Figure 6: Two images illustrating examples of the instream riparian zone associated with the tailwater portion of the Vals River, which is present within- and directly downstream of the proposed new gauging weir-, second temporary coffer dam and existing old weir locations

8.5. LB Site Camp and RB Construction Site Camp

8.5.1. Current Existing Vegetation and Site Description

The temporary LB Site camp and temporary RB Construction site camp are both situated within the terrestrial landscape surrounding the portion of the Vals River, which is associated with the proposed new gauging weir location and which moderately slopes towards the river from both sides.

The locations of these two temporary site camps form part of an undeveloped medium-height terrestrial grassland habitat, which is in a slight to moderately disturbed ecological state. The reason for the disturbed state can however not be determined/confirmed with certainty.

The terrestrial grassland habitat is mainly dominated by the robust/resilient Increaser 2 type grass species *Eragrostis chloromelas*, *E plana* and *Cynodon dactylon* (Van Oudtshoorn, 2004). The grass species *Eragrostis curvula*, *Aristida congesta*, *Themeda triandra*, *Cymbopogon pospischilii*, *Setaria sp.* and *Sporobolus africanus* were merely found to be sparsely present throughout the locations of the two temporary site camps. This dominance of hardy Increaser 2 type grass species along with a low representation of desired palatable Decreaser type climax grass species (Van Oudtshoorn, 2004), reiterates the ecologically disturbed state of the locations of the two temporary site camps.

A diverse forb- or succulent layer was not evident throughout the locations of the two temporary site camps, during the site assessment. This is likely as a result of the moderately disturbed ecological state of the terrestrial grassland habitat. The locations of the two temporary site camps are significantly infested by opportunistic pioneer- and exotic weed species such as *Conyza bonariensis* and *C podocephala* as well as the legally declared alien invasive species *Verbena bonariensis* (Category 1b). The opportunistic pioneer- and exotic weed species *Tagetes minuta*, *Bidens bipinnata* and *Nidorella anomala* were also found to be well-represented, while the forb species *Berkheya rigida*, *B radula* and *Gomphocarpus fruticosus* were merely found to be sparsely present throughout the locations of the two temporary site camps.

Low-growing shrub individuals of the woody species *Searsia pyroides* and the species *Asparagus spp.* are merely sporadically scattered throughout the locations of the two temporary site camps.

No Red Data Listed-, nationally protected- or provincially protected plant species or any other plant species of conservational significance/value, were found to be present throughout the locations of the two temporary site camps.

The locations of the two temporary site camps are therefore not reminiscent of the natural climactic state of the surrounding Highveld Alluvial Vegetation (Aza 5) or Endangered Vaal-Vet Sandy Grassland (Gh 10) vegetation types, which reduces the conservational significance of the area. The two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir. It is consequently not anticipated that the proposed development of the two temporary site camps would pose any significant risk to achieving and maintaining national and/or provincial conservation- and persistence targets of the area or to the continued ecological functionality and -integrity of the local surrounding landscape.



Figure 7: Image illustrating an example of the undeveloped medium-height terrestrial grassland habitat associated with the locations of the temporary LB Site camp and temporary RB Construction site camp, which is in a moderately disturbed ecological state

According to the Environmental Screening Tool Report, the Plant Species Biodiversity Theme of the assessment area is rated as being of 'low sensitivity'. The specialist is in agreement with this rating.

8.6. Plant Species List for the Assessment Area

Table 5: Plant species list for the assessment area (Legally declared alien invasive species highlighted in purple)

Graminoids	Forbs & Succulents	Woody Shrubs/Trees
<i>Aristida congesta</i>	<i>Berkheya radula</i>	<i>Asparagus spp.</i>
<i>Cymbopogon pospischilii</i>	<i>Berkheya rigida</i>	<i>Eucalyptus spp.</i>
<i>Cynodon dactylon</i>	<i>Bidens bipinnata</i>	<i>Morus alba</i>
<i>Cyperus spp.</i>	<i>Conyza bonariensis</i>	<i>Salix babylonica</i>
<i>Eragrostis chloromelas</i>	<i>Conyza podocephala</i>	<i>Salix mucronata</i>
<i>Eragrostis curvula</i>	<i>Gomphocarpus fruticosus</i>	<i>Searsia pyroides</i>
<i>Eragrostis plana</i>	<i>Nidorella anomala</i>	<i>Ziziphus mucronata</i>
<i>Paspalum dilatatum</i>	<i>Tagetes minuta</i>	-
<i>Phragmites australis</i>	<i>Verbena bonariensis</i>	-
<i>Setaria spp.</i>	<i>Xanthium strumarium</i>	-
<i>Sporobolus africanus</i>	-	-
<i>Themeda triandra</i>	-	-

8.7. Fauna and Avifauna

The assessment area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important bird species/nests were observed throughout the assessment area, during the site assessment. Only common local resident bird species and nests were found to be present throughout the assessment area.

Although this is the case, the directly upstream- and downstream portions of the Vals River together with the associated riparian zone, provide locally distinct avifaunal habitats which are likely utilised by various common and habitat-specific aquatic bird species as refuge and for breeding, foraging and/or persistence purposes. According to the information received from the landowner, individuals and pairs of the large raptor/bird of prey species *Haliaeetus vocifer* (African fish eagle) have been known to nest further upstream of the proposed new gauging weir location. These nesting locations are however located a significant distance away for the new weir location area and will therefore not be impacted upon by the proposed development, in any manner.

The directly upstream- and downstream portions of the Vals River together with the associated riparian zone, also provide locally distinct faunal habitats which are likely utilised by various common and habitat-specific amphibians and other aquatic faunal species as refuge and for breeding, foraging and/or persistence purposes. An individual of the range-restricted semi-aquatic reptilian species *Varanus niloticus* (Water monitor lizard) was encountered within the riparian zone directly upstream of the proposed new gauging weir location. The Globally Near-Threatened Red Listed mammalian species *Hydriectis maculicollis* (Spotted-necked otter) and *Aonyx capensis* (African clawless otter) are furthermore indicated on the IUCN Red List of Threatened Species (<https://www.iucnredlist.org>) as being present throughout the local and broader quaternary surface water catchment- and drainage area. According to the information received from the landowner, otter individuals have been known to frequent the portion of the river located directly upstream of the proposed new gauging weir location.

The following list of amphibians which can potentially occur throughout the square grid into which the assessment area falls, were obtained from the Biodiversity and Development Institute's Virtual Museum (FrogMap; <http://vmus.adu.org.za>) as well as the IUCN Red List of Threatened Species (<https://www.iucnredlist.org>).

Table 11: List of amphibian species which can potentially occur throughout the assessment area

Scientific name	Common name	Red List Categories	Number of Records
<i>Cacosternum boettgeri</i>	Common Caco	Least Concern	1
<i>Kassina senegalensis</i>	Bubbling Kassina	Least Concern	2
<i>Sclerophrys gutturalis</i>	Guttural Toad	Least Concern	2
<i>Sclerophrys poweri</i>	Power's Toad	Least Concern	2
<i>Sclerophrys sp.</i>			1
<i>Tomopterna cryptotis</i>	Tremelo Sand Frog	Least Concern	1
<i>Xenopus laevis</i>	Common Platanna	Least Concern	2

According to the spatial information contained on SANBI's website, the portion of the C60J - 2291 Sub Quaternary Reach (SQR) associated with the assessment area, is not considered a fish support area or fish sanctuary. No populations of Critically Endangered, Endangered, Vulnerable or Near-Threatened fish species have been recorded throughout the local or boarder downstream region or are expected to specifically utilise the assessment area as refuge or for breeding, foraging and/or persistence purposes. The Globally Near-Threatened Red Listed fish species *Labeobarbus kimberleyensis* (Largemouth yellowfish) is however indicated on the IUCN Red List of Threatened Species (<https://www.iucnredlist.org>) as being present throughout the local and broader quaternary surface water catchment- and drainage area.

According to the information received from the landowner, individuals of the legally declared alien invasive fish species *Ctenopharyngodon idella* (Grass carp; Category 3), have recently been observed in and around the mouth of the Vals River where it discharges into the Vaal River approximately 18 km north-west of the proposed new gauging weir location.

Due to the significant steep vertical water level drop caused by the existing old weir, it acts as a significant physical fish movement-restricting/impeding barrier between the upstream- and downstream portions of the Vals River. Fish species and individuals are therefore not provided the opportunity to continuously and freely move upstream, although this can and does occur during significant flood events. This has also been the case for the entire lifespan of the weir, to date.

No other significantly sized weirs or physical fish movement-restricting/impeding barriers are however present between the mouth of the Vals River and the proposed weir location. Therefore, in the event that the legally declared alien invasive fish species *Ctenopharyngodon idella* (Grass carp; Category 3) has not already established itself upstream of the existing old weir location within the Vals River, the weir constitutes the only plausible physical structure that prevents significant upstream movement and spreading of this species. A definite realistic risk/probability therefore exists that the inclusion of a fish-ladder into the proposed new gauging weir design, could allow for such undesired upstream movement and subsequent establishment/even infestation to take place. No relevant data is however available from the Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) regarding the distribution of this legally declared alien invasive fish species within the Vals River.

It is therefore recommended that a fish-ladder not be included into the design of the proposed new gauging weir, at this stage. It is however furthermore recommended that a more detailed assessment be conducted of the potential/likely broader distribution of this legally declared alien invasive fish species upstream- and downstream of the proposed new gauging weir location within the Vals River. Such an assessment must be conducted by a suitably qualified and experienced ichthyologist. This will provide the necessary information to the competent authority and adequately advise them during their decision-making process, regarding the inclusion/exclusion of a fish-ladder.

According to the Environmental Screening Tool Report, the Animal Species Biodiversity Theme of the assessment area is rated as being of 'medium sensitivity' for the potential presence of the conservationally significant bird species *Hydroprogne caspia* (Caspian tern). No individuals or nests of this species were however observed throughout the assessment area, during the site assessment.

Based on the outcomes and results of the site assessment, the specialist is therefore in agreement with the 'medium sensitivity' of the Animal Species Biodiversity Theme of the assessment area.

As stated earlier, it is expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected. This, combined with the steep vertical drop into the river will therefore result in the upstream riparian zone not being directly or significantly impacted upon by the proposed development. It is furthermore expected that the downstream water levels and flow regime should remain virtually unchanged. Therefore, although the downstream riparian zone will be directly impacted upon during the construction phase of the proposed development, this will merely be temporary. The riparian zone should not continue to be directly or significantly impacted upon after completion of construction and subsequent commissioning of the new gauging weir.

The mobility of faunal/avifaunal species allows for individuals to simply leave an area where disturbance is taking place and relocate to surrounding similar, adequate areas. Faunal/avifaunal species often also return once noise and other disturbances cease, after completion of the construction phase. It is consequently not anticipated that the proposed development would pose any significant risk to- or impact on the faunal or avifaunal communities throughout the local or broader surrounding landscape.

8.8. Site Ecological Importance (SEI), Present Ecological State (PES) & Ecological Importance and Sensitivity (EIS)

Site Ecological Importance (SEI)

The Site Ecological Importance (SEI) of the temporary LB Site camp and temporary RB Construction site camp is classified as **low** as they are merely viewed as being ecologically important and/or sensitive on local scale. Minimisation and restoration mitigation – development activities of medium to high impact acceptable followed by appropriate restoration activities.

Reasoning:

The locations of these two temporary site camps form part of an undeveloped medium-height terrestrial grassland habitat, which is in a slight to moderately disturbed ecological state. The locations of the two temporary site camps are therefore not reminiscent of the natural climactic state of the surrounding Highveld Alluvial Vegetation (Aza 5) or Endangered Vaal-Vet Sandy Grassland (Gh 10) vegetation types, which reduces the conservational significance of the area. The two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir. It is consequently not anticipated that the proposed development of the two temporary site camps would pose any significant risk to achieving and maintaining national and/or provincial conservation- and persistence targets of the area or to the continued ecological functionality and -integrity of the local surrounding landscape.

Present Ecological State (PES)

The Present Ecological State (PES) of the portion of the Vals River associated with the proposed development, is classified as **Class C** as it is moderately modified. Moderate loss and transformation of natural habitat and biota have occurred, mainly as a result of the presence of the existing old weir. The basic ecosystem functionality has however remained predominantly unchanged.

Ecological Importance and Sensitivity (EIS)

The Ecological Importance and Sensitivity (EIS) of the portion of the Vals River associated with the proposed development, is classified as **Class C (moderate)** as it is viewed as being ecologically important and sensitive on regional and possibly provincial scale. Biodiversity is however still relatively ubiquitous.

Reasoning:

It is evident from a hydrological perspective, that the Vals River forms an important part of the local and broader quaternary surface water catchment- and drainage area, towards the north-west. The Vaal River into which the Vals River discharges, is considered a primary national water resource; any potentially significant negative impacts on the ecological functionality and/or -services provided by the river, which could pose a potential threat to national water security, should therefore be avoided as far as practicably/reasonably possible.

As stated earlier, it is however expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

It is consequently not anticipated that the proposed development of the new gauging weir and two temporary coffer dams would pose any significant risk to the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

The directly upstream- and downstream portions of the Vals River together with the associated riparian zone, provide locally distinct faunal and avifaunal habitats which are likely utilised by various common and habitat-specific amphibians and other aquatic faunal and -bird species as refuge and for breeding, foraging and/or persistence purposes.

It is however not anticipated that the proposed development would pose any significant risk to- or impact on the faunal or avifaunal communities throughout the local or broader surrounding landscape.

8.9. Recommendations

It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the assessment area, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.

It is recommended that the construction of the proposed new gauging weir as well as the subsequent demolition of the existing old weir, be conducted during the winter season. The flow of the Vals River will be significantly reduced during this time, which should ease the excavation and removal activities.

It is recommended that adequate erosion prevention and management features be included into the design of the proposed new gauging weir.

A Water Use License Application (WULA) must be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed construction within the portion of the Vals River associated with the proposed development, in accordance with the National Water Act (Act 36 of 1998).

Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

It is recommended that a fish-ladder not be included into the design of the proposed new gauging weir, at this stage.

It is however furthermore recommended that a more detailed assessment be conducted of the potential/likely broader distribution of the legally declared alien invasive fish species *Ctenopharyngodon idella* (Grass carp; Category 3) upstream- and downstream of the proposed new gauging weir location within the Vals River. Such an assessment must be conducted by a suitably qualified and experienced ichthyologist. This will provide the necessary information to the competent authority and adequately advise them during their decision-making process, regarding the inclusion/exclusion of a fish-ladder.

The assessment area is viewed as being of low to moderate overall conservational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 1, faunal and avifaunal habitat and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

It is the opinion of the specialist that the proposed development of the assessment area should be considered by the competent authority for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report must however be adequately implemented and managed for both the construction- and subsequent operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

8.10. Ecological Site Sensitivity Map

The site sensitivity map below (see A3 sized map in the Appendices) illustrates the delineated riparian zone of the portion of the Vals River, which is associated with the proposed development of the new gauging weir.

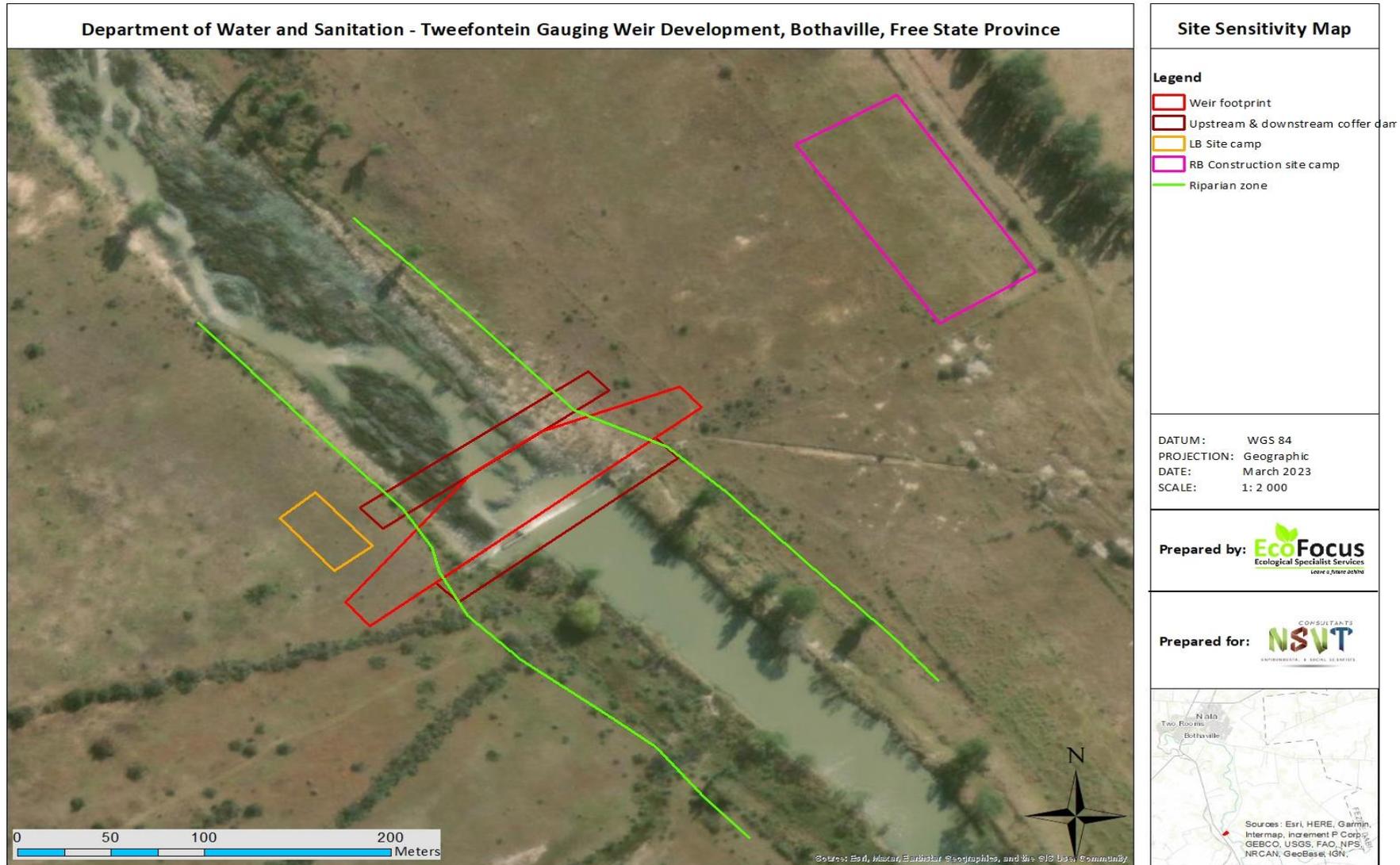


Figure 8: Site sensitivity map illustrating the delineated riparian zone of the portion of the Vals River, which is associated with the proposed development of the new gauging weir

9. Ecological Impact Assessment

The following section identifies the potential ecological impacts (both positive and negative), which the proposed development will have on the surrounding environment.

Once the potential ecological impacts are identified, they are assessed by rating their Environmental Risk after which the final Environmental Significance is calculated and rated for each identified ecological impact.

The same Environmental Risk rating process is then followed for each ecological impact to determine the Environmental Significance, if the recommended mitigation measures were to be implemented.

The objective of this section is therefore firstly to identify all the potential ecological impacts associated with the proposed development and secondly to determine the significance of the impacts and how effective the recommended mitigation measures will be able to reduce their significance. The potential ecological impacts which are still rated as highly significant, even after implementation of mitigations, can then be identified in order to specifically focus on implementation of effective management strategies for them.

9.1. Construction Phase

Transformation of vegetation within the assessment area associated with the Highveld Alluvial Vegetation vegetation type (Aza 5)

According to SANBI (2006-2019), the entire assessment area falls within the Highveld Alluvial Vegetation vegetation type (Aza 5). This vegetation type mainly consists of a flat topography supporting riparian thickets accompanied by seasonally flooded grasslands. This vegetation type is classified as Least Concerned (SANBI, 2006-2019).

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

The physical footprint of the temporary LB Site camp and temporary RB Construction site camp will be approximately 7 927 m² in total combined size. These two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

The mechanical clearance and excavation for the proposed new gauging weir as well as the two temporary coffer dams and two temporary site camps, will in all probability completely transform the majority of the existing surface vegetation throughout the assessment area.

Extensive existing agricultural cultivation transformation is evident throughout the majority of the local and broader landscape surrounding the assessment area. The assessment area however forms part of a limited remaining connected corridor of undeveloped natural grassland habitat, which is present along the length of the Vals River.

The locations of the temporary LB Site camp and temporary RB Construction site camp form part of an undeveloped medium-height terrestrial grassland habitat, which is in a slight to moderately disturbed ecological state. The locations of the two temporary site camps are therefore not reminiscent of the natural climactic state of the surrounding Highveld Alluvial Vegetation (Aza 5) or Endangered Vaal-Vet Sandy Grassland (Gh 10) vegetation types, which reduces the conservational significance of the area. The two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir. It is consequently not anticipated that the proposed development of the two temporary site camps would pose any significant risk to achieving and maintaining national and/or provincial conservation- and persistence targets of the area or to the continued ecological functionality and -integrity of the local surrounding landscape.

The significance of this potential impact will be **low** prior to- and after implementation of recommended mitigation measures.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Transformation of an Ecological Support Area one (ESA 1) associated with the assessment area

The entire assessment area is categorised as Ecological Support Area one (ESA 1), according to the Free State Provincial Spatial Biodiversity Plan (Collins, 2018), which sets out biodiversity priority areas in the province.

The physical footprint of the proposed new gauging weir is approximately 6 107 m² in size. The physical footprint of the two temporary coffer dams will be approximately 4 325 m² in total combined size. These two temporary coffer dams (including the existing old weir) will however be demolished after completion of construction and subsequent commissioning of the new gauging weir.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

The physical footprint of the temporary LB Site camp and temporary RB Construction site camp will be approximately 7 927 m² in total combined size. These two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

The mechanical clearance and excavation for the proposed new gauging weir as well as the two temporary coffer dams and two temporary site camps, will in all probability completely transform the majority of the existing surface vegetation throughout the assessment area.

Extensive existing agricultural cultivation transformation is evident throughout the majority of the local and broader landscape surrounding the assessment area. The assessment area however forms part of a limited remaining connected corridor of undeveloped natural grassland habitat, which is present along the length of the Vals River.

The temporary LB Site camp and temporary RB Construction site camp scored a low Site Ecological Importance (SEI) value while the portion of the Vals River associated with the proposed development scored a moderate Ecological Importance and Sensitivity (EIS) value. The assessment area is therefore viewed as being of low to moderate overall conservational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 1, faunal and avifaunal habitat and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

The locations of the temporary LB Site camp and temporary RB Construction site camp form part of an undeveloped medium-height terrestrial grassland habitat, which is in a slight to moderately disturbed ecological state. The locations of the two temporary site camps are therefore not reminiscent of the natural climactic state of the surrounding Highveld Alluvial Vegetation (Aza 5) or Endangered Vaal-Vet Sandy Grassland (Gh 10) vegetation types, which reduces the conservational significance of the area. The two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

As stated earlier, it is expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected. This, combined with the steep vertical drop into the river will therefore result in the upstream riparian zone not being directly or significantly impacted upon by the proposed development. It is furthermore expected that the downstream water levels and flow regime should remain virtually unchanged. Therefore, although the downstream riparian zone will be directly impacted upon during the construction phase of the proposed development, this will merely be temporary. The riparian zone should not continue to be directly or significantly impacted upon after completion of construction and subsequent commissioning of the new gauging weir.

It is consequently not anticipated that the proposed development of the two temporary site camps or the new gauging weir and two temporary coffer dams would pose any significant risk to achieving and maintaining national and/or provincial conservation- and persistence targets of the area or to the continued ecological functionality and -integrity of the local surrounding landscape or the local and broader quaternary surface water catchment- and drainage area.

The significance of this potential impact will be **medium** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Destruction of-/damage to Red Data Listed, nationally- and/or provincially protected species individuals/habitats associated with the assessment area

The physical footprint of the proposed new gauging weir is approximately 6 107 m² in size. The physical footprint of the two temporary coffer dams will be approximately 4 325 m² in total combined size. These two temporary coffer dams (including the existing old weir) will however be demolished after completion of construction and subsequent commissioning of the new gauging weir.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

The physical footprint of the temporary LB Site camp and temporary RB Construction site camp will be approximately 7 927 m² in total combined size. These two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

The mechanical clearance and excavation for the proposed new gauging weir as well as the two temporary coffer dams and two temporary site camps, will in all probability completely transform the majority of the existing surface vegetation throughout the assessment area.

Extensive existing agricultural cultivation transformation is evident throughout the majority of the local and broader landscape surrounding the assessment area. The assessment area however forms part of a limited remaining connected corridor of undeveloped natural grassland habitat, which is present along the length of the Vals River.

No Red Data Listed-, nationally protected- or provincially protected plant species or any other plant species of conservational significance/value, were found to be present throughout the upstream- or downstream riparian zones or the locations of the two temporary site camps.

According to the Environmental Screening Tool Report, the Plant Species Biodiversity Theme of the assessment area is rated as being of 'low sensitivity'. The specialist is in agreement with this rating.

The construction activities associated with the proposed development will in all probability result in significant noise generation and emissions into the local surrounding landscape. Such generation and emission of loud noise could potentially have a negative impact on faunal and avifaunal activities throughout the local surrounding landscape.

The assessment area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important bird species/nests were observed throughout the assessment area, during the site assessment. Only common local resident bird species and nests were found to be present throughout the assessment area.

Although this is the case, the directly upstream- and downstream portions of the Vals River together with the associated riparian zone, provide locally distinct avifaunal habitats which are likely utilised by various common and habitat-specific aquatic bird species as refuge and for breeding, foraging and/or persistence purposes. According to the information received from the landowner, individuals and pairs of the large raptor/bird of prey species *Haliaeetus vocifer* (African fish eagle) have been known to nest further upstream of the proposed new gauging weir location. These nesting locations are however located a significant distance away for the new weir location area and will therefore not be impacted upon by the proposed development, in any manner.

The directly upstream- and downstream portions of the Vals River together with the associated riparian zone, also provide locally distinct faunal habitats which are likely utilised by various common and habitat-specific amphibians and other aquatic faunal species as refuge and for breeding, foraging and/or persistence purposes. An individual of the range-restricted semi-aquatic reptilian species *Varanus niloticus* (Water monitor lizard) was encountered within the riparian zone directly upstream of the proposed new gauging weir location. The Globally Near-Threatened Red Listed mammalian species *Hydrictis maculicollis* (Spotted-necked otter) and *Aonyx capensis* (African clawless otter) are furthermore indicated on the IUCN Red List of Threatened Species (<https://www.iucnredlist.org>) as being present throughout the local and broader quaternary surface water catchment- and drainage area. According to the information received from the landowner, otter individuals have been known to frequent the portion of the river located directly upstream of the proposed new gauging weir location.

According to the spatial information contained on SANBI's website, the portion of the C60J - 2291 Sub Quaternary Reach (SQR) associated with the assessment area, is not considered a fish support area or fish sanctuary. No populations of Critically Endangered, Endangered, Vulnerable or Near-Threatened fish species have been recorded throughout the local or boarder downstream region or are expected to specifically utilise the assessment area as refuge or for breeding, foraging and/or persistence purposes. The Globally Near-Threatened Red Listed fish species *Labeobarbus kimberleyensis* (Largemouth yellowfish) is however indicated on the IUCN Red List of Threatened Species (<https://www.iucnredlist.org>) as being present throughout the local and broader quaternary surface water catchment- and drainage area.

Due to the significant steep vertical water level drop caused by the existing old weir, it acts as a significant physical fish movement-restricting/impeding barrier between the upstream- and downstream portions of the Vals River. Fish species and individuals are therefore not provided the opportunity to continuously and freely move upstream, although this can and does occur during significant flood events. This has also been the case for the entire lifespan of the weir, to date.

According to the Environmental Screening Tool Report, the Animal Species Biodiversity Theme of the assessment area is rated as being of 'medium sensitivity' for the potential presence of the conservationally significant bird species *Hydroprogne caspia* (Caspian tern). No individuals or nests of this species were however observed throughout the assessment area, during the site assessment.

Based on the outcomes and results of the site assessment, the specialist is therefore in agreement with the 'medium sensitivity' of the Animal Species Biodiversity Theme of the assessment area.

As stated earlier, it is expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected. This, combined with the steep vertical drop into the river will therefore result in the upstream riparian zone not being directly or significantly impacted upon by the proposed development. It is furthermore expected that the downstream water levels and flow regime should remain virtually unchanged. Therefore, although the downstream riparian zone will be directly impacted upon during the construction phase of the proposed development, this will merely be temporary. The riparian zone should not continue to be directly or significantly impacted upon after completion of construction and subsequent commissioning of the new gauging weir.

The mobility of faunal/avifaunal species allows for individuals to simply leave an area where disturbance is taking place and relocate to surrounding similar, adequate areas. Faunal/avifaunal species often also return once noise and other disturbances cease, after completion of the construction phase. It is consequently not anticipated that the proposed development would pose any significant risk to- or impact on the faunal or avifaunal communities throughout the local or broader surrounding landscape.

The significance of this potential impact will be **medium** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Terrestrial and aquatic alien invasive species establishment

Medium-sized to large tree- and shrub individuals of the legally declared alien invasive species *Eucalyptus spp.* (Category 1b in riparian zones) are well-represented along the banks of the river situated above the vertical drop. A single large tree individual of the legally declared alien invasive species tree *Morus alba* (Category 3) was also found to be present.

The riparian zone is however significantly infested by opportunistic pioneer- and exotic weed species such as *Conyza bonariensis*, *Tagetes minuta* and *Bidens bipinnata* as well as the legally declared alien invasive species *Verbena bonariensis* and *Xanthium strumarium* (both Category 1b).

The locations of the two temporary site camps are significantly infested by opportunistic pioneer- and exotic weed species such as *Conyza bonariensis* and *C. podocephala* as well as the legally declared alien invasive species *Verbena bonariensis* (Category 1b).

The assessment area could therefore potentially be prone to further significant alien invasive species establishment, due to surface disturbance and vegetation clearance caused by construction activities. The presence of the Vals River could further also potentially act as a significant transport/distribution vector for numerous terrestrial and aquatic alien invasive species into the broader region.

According to the information received from the landowner, individuals of the legally declared alien invasive fish species *Ctenopharyngodon idella* (Grass carp; Category 3), have recently been observed in and around the mouth of the Vals River where it discharges into the Vaal River approximately 18 km north-west of the proposed new gauging weir location.

Due to the significant steep vertical water level drop caused by the existing old weir, it acts as a significant physical fish movement-restricting/impeding barrier between the upstream- and downstream portions of the Vals River. Fish species and individuals are therefore not provided the opportunity to continuously and freely move upstream, although this can and does occur during significant flood events. This has also been the case for the entire lifespan of the weir, to date.

No other significantly sized weirs or physical fish movement-restricting/impeding barriers are however present between the mouth of the Vals River and the proposed weir location. Therefore, in the event that the legally declared alien invasive fish species *Ctenopharyngodon idella* (Grass carp; Category 3) has not already established itself upstream of the existing old weir location within the Vals River, the weir constitutes the only plausible physical structure that prevents significant upstream movement and spreading of this species. A definite realistic risk/probability therefore exists that the inclusion of a fish-ladder into the proposed new gauging weir design, could allow for such undesired upstream movement and subsequent establishment/even infestation to take place. No relevant data is however available from the Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) regarding the distribution of this legally declared alien invasive fish species within the Vals River.

The significance of this potential impact will be **medium** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Surface material erosion

The proposed new gauging weir and second temporary coffer dam footprints are located within the current tailwater portion of the Vals River, situated directly downstream of the existing old weir. The surrounding terrestrial landscape of this portion of the river, moderately slopes towards the river from both sides. A steep vertical drop of approximately 2 m - 3 m in height, is present all along the downstream banks of the river and evidence of the river banks gradually eroding and cutting away over time, is also present; hence the increased height of this vertical drop relative to that of the upstream portion.

The temporary LB Site camp and temporary RB Construction site camp are both situated within the terrestrial landscape surrounding the portion of the Vals River, which is associated with the proposed new gauging weir location and which moderately slopes towards the river from both sides.

The mechanical clearance and excavation for the proposed new gauging weir as well as the two temporary coffer dams and two temporary site camps, will in all probability completely transform the majority of the existing surface vegetation throughout the assessment area.

The assessment areas could therefore potentially be prone to slight to moderate surface soil erosion, due to the sloping topography of the landscape along with loosening of materials and clearance of vegetation and excavation caused by construction activities, which usually binds surface material.

The significance of this potential impact will be **medium** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Dust generation and emissions

The mechanical clearance and excavation for the proposed new gauging weir as well as the two temporary coffer dams and two temporary site camps, will in all probability completely transform the majority of the existing surface vegetation throughout the assessment area.

The construction activities associated with the proposed development, could potentially result in slight fugitive dust emissions, due to vegetation clearance and excavation as well as movement of machinery and equipment. Generated dust could potentially spread into the surrounding undeveloped landscape and slightly contaminate the Vals River.

The significance of this potential impact will be **low** prior to- and after implementation of recommended mitigation measures.

Mitigation measures to reduce impacts are recommended under heading 9.4.

Impeding and contamination of the flow regime of the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area

The proposed new gauging weir location falls within the Middle Vaal Water Management Area (WMA 09) and the associated C60J quaternary surface water catchment- and drainage area. It is furthermore situated in the C60J - 2291 Sub Quaternary Reach (SQR), within the Highveld Ecoregion (11).

The proposed new gauging weir will be constructed within the Vals River, which flows in a north-westerly direction and eventually discharges into the Vaal River approximately 18 km north-west of the proposed weir location.

It is evident from a hydrological perspective, that the Vals River forms an important part of the local and broader quaternary surface water catchment- and drainage area, towards the north-west. The Vaal River into which the Vals River discharges, is considered a primary national water resource; any potentially significant negative impacts on the ecological functionality and/or -services provided by the river, which could pose a potential threat to national water security, should therefore be avoided as far as practicably/reasonably possible.

The physical footprint of the proposed new gauging weir is approximately 6 107 m² in size. The physical footprint of the two temporary coffer dams will be approximately 4 325 m² in total combined size. These two temporary coffer dams (including the existing old weir) will however be demolished after completion of construction and subsequent commissioning of the new gauging weir.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

The construction activities associated with the proposed development, will result in significant temporary impeding of natural surface water flow within the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area, due to artificial obstruction of flow.

The construction phase could potentially also result in slight contamination of natural surface water flow within the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area, due to hydrocarbon and/or other chemical spills by construction machinery and equipment.

The significance of this potential impact will be **medium** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 9.4.

9.2. Operational Phase

Terrestrial and aquatic alien invasive species establishment as well as impeding and contamination of the flow regime of the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area, were identified and addressed as significant potential long-term ecological impacts, associated with the construction phase of the proposed development.

Once the construction phase of the proposed development has been completed, the subsequent operational phase should not result in any significant additional potential ecological impacts, apart from the potential long-term ecological impacts, as discussed under heading 9.1. The following already discussed potential ecological impact could however change in nature (duration and severity) during the operational phase and could continue throughout the entire operational phase and lifespan of the proposed development:

Continued impeding of the flow regime of the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area

The established weir will continuously impede on the natural surface water flow within the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area, due to continued artificial obstruction of flow.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

It is consequently not anticipated that the proposed development of the new gauging weir and two temporary coffer dams would pose any significant risk to the continued ecological functionality and - integrity of the local and broader quaternary surface water catchment- and drainage area.

The significance of this potential impact will be **medium** prior to implementation of recommended mitigation measures, but will be reduced to **low** by the implementation.

Mitigation measures to reduce impacts are recommended under heading 9.4.

9.3. Cumulative Impacts

The physical footprint of the proposed new gauging weir is approximately 6 107 m² in size. The physical footprint of the two temporary coffer dams will be approximately 4 325 m² in total combined size. These two temporary coffer dams (including the existing old weir) will however be demolished after completion of construction and subsequent commissioning of the new gauging weir.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

The physical footprint of the temporary LB Site camp and temporary RB Construction site camp will be approximately 7 927 m² in total combined size. These two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

The mechanical clearance and excavation for the proposed new gauging weir as well as the two temporary coffer dams and two temporary site camps, will in all probability completely transform the majority of the existing surface vegetation throughout the assessment area.

Extensive existing agricultural cultivation transformation is evident throughout the majority of the local and broader landscape surrounding the assessment area. The assessment area however forms part of a limited remaining connected corridor of undeveloped natural grassland habitat, which is present along the length of the Vals River.

The temporary LB Site camp and temporary RB Construction site camp scored a low Site Ecological Importance (SEI) value while the portion of the Vals River associated with the proposed development scored a moderate Ecological Importance and Sensitivity (EIS) value. The assessment area is therefore viewed as being of low to moderate overall conservational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 1, faunal and avifaunal habitat and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Terrestrial and aquatic alien invasive species establishment as well as impeding and contamination of the flow regime of the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area, were identified and addressed as significant potential long-term ecological impacts, associated with the construction phase of the proposed development.

Once the construction phase of the proposed development has been completed, the subsequent operational phase should not result in any significant additional potential ecological impacts, apart from the potential long-term aquatic ecological impacts, as discussed under heading 9.1.

The significant potential long-term ecological impacts identified for the proposed development, could potentially merely add low cumulative impact to the existing negative impacts caused by the extensive existing agricultural cultivation transformation, throughout the majority of the local and broader landscape surrounding the assessment area.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential cumulative ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will add any significant residual cumulative ecological impacts to the surrounding environment, if all recommended mitigation measures as per this ecological report are adequately implemented and managed, for both the construction- and subsequent operational phases of the proposed development.

It is the opinion of the specialist that the proposed development of the assessment area should be considered by the competent authority for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report must however be adequately implemented and managed for both the construction- and subsequent operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

9.4. Risk Ratings of Potential Ecological Impacts

The following section provides the Environmental Risk as well as the Environmental Significance Ratings for the potential ecological impacts associated with the proposed development, both before and after implementation of the recommended mitigation measures.

9.4.1. Construction Phase

Table 12: Environmental Risk and Significance Ratings

	Proposed new gauging weir and two temporary coffer dams	Temporary LB Site camp and temporary RB Construction site camp
Identified Environmental Impact	Transformation of vegetation within the assessment area associated with the Highveld Alluvial Vegetation vegetation type (Aza 5)	
Magnitude of Negative or Positive Impact	-	Very low (2)
Duration of Negative or Positive Impact	-	Long term (4)
Extent of Positive or Negative Impact	-	Local (2)
Irreplaceability of Natural Resources being impacted upon	-	Low (2)
Reversibility of Impact	-	Low (4)
Probability of Impact Occurrence	-	Medium (3)
Cumulative Impact Rating prior to mitigation	-	Low
Environmental Significance Score and Rating prior to mitigation	-	Low (42)

Mitigation Measures to be implemented

The proposed development construction footprints must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the surrounding undeveloped landscape may take place.

No site construction basecamps may be established within the surrounding undeveloped landscape.

Adequately cordon off the development construction footprint areas and ensure that no construction activities, machinery or equipment operate or impact within the surrounding undeveloped landscape outside the cordoned off areas.

Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed development construction footprint areas and to ensure environmentally responsible construction practices and activities.

Existing roads and farm tracks in close proximity to the proposed development construction footprint areas, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented through the surrounding undeveloped landscape.

Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

Cumulative Impact Rating after mitigation implementation	-	Low
Environmental Significance Score and Rating after mitigation implementation	-	Low (26)
	Proposed new gauging weir and two temporary coffer dams	Temporary LB Site camp and temporary RB Construction site camp
Identified Environmental Impact	Transformation of an Ecological Support Area one (ESA 1) associated with the assessment area	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Long term (4)	Long term (4)
Extent of Positive or Negative Impact	Local (2)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Low (2)
Reversibility of Impact	Low (4)	Low (4)
Probability of Impact Occurrence	Medium (3)	Low (2)

Cumulative Impact Rating prior to mitigation	Medium	Low
Environmental Significance Score and Rating prior to mitigation	Medium (51)	Low (28)
Mitigation Measures to be implemented	<p>The proposed development construction footprints must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the surrounding undeveloped landscape may take place.</p> <p>No site construction basecamps may be established within the surrounding undeveloped landscape.</p> <p>Adequately cordon off the development construction footprint areas and ensure that no construction activities, machinery or equipment operate or impact within the surrounding undeveloped landscape outside the cordoned off areas.</p> <p>Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed development construction footprint areas and to ensure environmentally responsible construction practices and activities.</p> <p>Existing roads and farm tracks in close proximity to the proposed development construction footprint areas, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented through the surrounding undeveloped landscape.</p>	

	Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (14)	Low (13)
	Proposed new gauging weir and two temporary coffer dams	Temporary LB Site camp and temporary RB Construction site camp
Identified Environmental Impact	Destruction of-/damage to Red Data Listed, nationally- and/or provincially protected species individuals/habitats associated with the assessment area	
Magnitude of Negative or Positive Impact	Low (4)	-
Duration of Negative or Positive Impact	Long term (4)	-
Extent of Positive or Negative Impact	Regional (3)	-

Irreplaceability of Natural Resources being impacted upon	Moderate (3)	-
Reversibility of Impact	Low (4)	-
Probability of Impact Occurrence	Medium (3)	-
Cumulative Impact Rating prior to mitigation	Medium	-
Environmental Significance Score and Rating prior to mitigation	Medium (54)	-
Mitigation Measures to be implemented	<p>The proposed development construction footprints must be kept as small as practicably possible to reduce the surface impact on surrounding vegetation and no unnecessary/unauthorised footprint expansion into the surrounding undeveloped landscape may take place.</p> <p>No site construction basecamps may be established within the surrounding undeveloped landscape.</p> <p>Adequately cordon off the development construction footprint areas and ensure that no construction activities, machinery or equipment operate or impact within the surrounding undeveloped landscape outside the cordoned off areas.</p> <p>Adequate operational procedures for construction machinery and equipment must be developed in order to strictly govern and restrict movement of machinery only within the proposed development construction footprint areas and to ensure environmentally responsible construction practices and activities.</p>	

	<p>Existing roads and farm tracks in close proximity to the proposed development construction footprint areas, must be used during the construction phase. No new temporary roads or tracks may be constructed or implemented through the surrounding undeveloped landscape.</p> <p>Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	
Cumulative Impact Rating after mitigation implementation	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (14)	-
	Proposed new gauging weir and two temporary coffer dams	Temporary LB Site camp and temporary RB Construction site camp
Identified Environmental Impact	Terrestrial and aquatic alien invasive species establishment	
Magnitude of Negative or Positive Impact	Medium (6)	Low (4)
Duration of Negative or Positive Impact	Long term (4)	Long term (4)

Extent of Positive or Negative Impact	Regional (3)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Low (2)
Reversibility of Impact	Low (4)	Moderate (3)
Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Medium	Low
Environmental Significance Score and Rating prior to mitigation	Medium (60)	Low (14)
Mitigation Measures to be implemented	<p>It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the assessment area, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.</p> <p>It is recommended that a fish-ladder not be included into the design of the proposed new gauging weir, at this stage.</p> <p>It is however furthermore recommended that a more detailed assessment be conducted of the potential/likely broader distribution of the legally declared alien invasive fish species <i>Ctenopharyngodon idella</i> (Grass carp; Category 3) upstream- and downstream of the proposed new gauging weir location within the Vals River. Such an assessment must be conducted by a suitably qualified and experienced ichthyologist. This will provide the necessary information to the competent authority and adequately advise them during their decision-making process, regarding the inclusion/exclusion of a fish-ladder.</p>	

	<p>Implement an adequate Alien Invasive Species Management and Prevention Plan during the construction- and subsequent operational phases of the proposed development. Such a Management Plan must be compiled by a suitably qualified and experienced ecologist.</p> <p>Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	
Cumulative Impact Rating after mitigation implementation	Low	Low
Environmental Significance Score and Rating after mitigation implementation	Low (34)	Low (12)

	Proposed new gauging weir and two temporary coffer dams	Temporary LB Site camp and temporary RB Construction site camp
Identified Environmental Impact	Surface material erosion	
Magnitude of Negative or Positive Impact	Low (4)	Very low (2)
Duration of Negative or Positive Impact	Long term (4)	Long term (4)
Extent of Positive or Negative Impact	Regional (3)	Local (2)
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Low (2)
Reversibility of Impact	Moderate (3)	High (2)
Probability of Impact Occurrence	Medium (3)	Medium (3)
Cumulative Impact Rating prior to mitigation	Medium	Low
Environmental Significance Score and Rating prior to mitigation	Medium (51)	Low (36)

<p style="text-align: center;">Mitigation Measures to be implemented</p>	<p>Implement an adequate Stormwater and Erosion Management Plan during the construction- and subsequent operational phases of the proposed development. This must be done to sufficiently manage storm water runoff and clean/dirty water separation, in order to prevent any significant soil erosion from occurring within and around the assessment area.</p> <p>It is recommended that adequate erosion prevention and management features be included into the design of the proposed new gauging weir.</p> <p>Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	
<p style="text-align: center;">Cumulative Impact Rating after mitigation implementation</p>	Low	Low
<p style="text-align: center;">Environmental Significance Score and Rating after mitigation implementation</p>	Low (26)	Low (11)

	Proposed new gauging weir and two temporary coffer dams	Temporary LB Site camp and temporary RB Construction site camp
Identified Environmental Impact	Dust generation and emissions	
Magnitude of Negative or Positive Impact	Very low (2)	Very low (2)
Duration of Negative or Positive Impact	Short term (2)	Short term (2)
Extent of Positive or Negative Impact	Regional (3)	Regional (3)
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	Moderate (3)
Reversibility of Impact	Moderate (3)	Moderate (3)
Probability of Impact Occurrence	Low (2)	Low (2)
Cumulative Impact Rating prior to mitigation	Low	Low
Environmental Significance Score and Rating prior to mitigation	Low (26)	Low (26)

<p style="text-align: center;">Mitigation Measures to be implemented</p>	<p>Implement suitable dust management and prevention measures during the construction phase of the proposed development.</p> <p>Construction areas and –roads to be sufficiently wetted down during the construction phase in order to prevent significant fugitive dust emissions.</p> <p>Adequate operational procedures for machinery and equipment must be developed to strictly govern and restrict movement of machinery, in order to avoid unnecessary fugitive dust emissions and ensure environmentally responsible operational practices and activities.</p> <p>Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.</p>	
<p style="text-align: center;">Cumulative Impact Rating after mitigation implementation</p>	Low	Low
<p style="text-align: center;">Environmental Significance Score and Rating after mitigation implementation</p>	Low (11)	Low (11)

	Proposed new gauging weir and two temporary coffer dams	Temporary LB Site camp and temporary RB Construction site camp
Identified Environmental Impact	Impeding and contamination of the flow regime of the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area	
Magnitude of Negative or Positive Impact	Medium (6)	-
Duration of Negative or Positive Impact	Short term (2)	-
Extent of Positive or Negative Impact	Regional (3)	-
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	-
Reversibility of Impact	Low (4)	-
Probability of Impact Occurrence	High (4)	-
Cumulative Impact Rating prior to mitigation	Medium	-
Environmental Significance Score and Rating prior to mitigation	Medium (72)	-

Mitigation Measures to be implemented

Implement an adequate Stormwater and Erosion Management Plan during the construction- and subsequent operational phases of the proposed development. This must be done to sufficiently manage storm water runoff and clean/dirty water separation, in order to attempt to maintain the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

It is recommended that the construction of the proposed new gauging weir as well as the subsequent demolition of the existing old weir, be conducted during the winter season. The flow of the Vals River will be significantly reduced during this time, which should ease the excavation and removal activities.

A Water Use License Application (WULA) must be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed construction within the portion of the Vals River associated with the proposed development, in accordance with the National Water Act (Act 36 of 1998).

Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

If hydrocarbons or other chemicals are to be stored on site during the construction phase, the storage areas must be situated as far away as practicably/feasibly possible from the Vals River.

Hydrocarbon and other chemical storage areas must be adequately banded in order to be able to contain a minimum of 150 % of the capacity of storage tanks/units.

	<p>Adequate hydrocarbon and other chemical storage, handling, usage and spillage clean-up procedures must be developed and all relevant construction personnel must be sufficiently trained on- and apply these procedures during the entire construction phase.</p> <p>Spill kits must be readily available on the construction site. All employees must be adequately trained on the correct procedure and use of the spill kits.</p>	
Cumulative Impact Rating after mitigation implementation	<p>Low</p>	<p>-</p>
Environmental Significance Score and Rating after mitigation implementation	<p>Low (30)</p>	<p>-</p>

9.4.2. Operational Phase

Table 13: Environmental Risk and Significance Ratings

	Proposed new gauging weir and two temporary coffer dams	Temporary LB Site camp and temporary RB Construction site camp
Identified Environmental Impact	Continued impeding of the flow regime of the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area	
Magnitude of Negative or Positive Impact	Low (4)	-
Duration of Negative or Positive Impact	Medium term (3)	-
Extent of Positive or Negative Impact	Regional (3)	-
Irreplaceability of Natural Resources being impacted upon	Moderate (3)	-
Reversibility of Impact	Low (4)	-
Probability of Impact Occurrence	Medium (3)	-
Cumulative Impact Rating prior to mitigation	Medium	-
Environmental Significance Score and Rating prior to mitigation	Medium (51)	-

Mitigation Measures to be implemented	Implement an adequate Stormwater and Erosion Management Plan during the construction- and subsequent operational phases of the proposed development. This must be done to sufficiently manage storm water runoff and clean/dirty water separation, in order to attempt to maintain the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.	
Cumulative Impact Rating after mitigation implementation	Low	-
Environmental Significance Score and Rating after mitigation implementation	Low (14)	-

10. Summary and Conclusion

Proposed Development Area Clearance

The physical footprint of the proposed new gauging weir is approximately 6 107 m² in size. The physical footprint of the two temporary coffer dams will be approximately 4 325 m² in total combined size. These two temporary coffer dams (including the existing old weir) will however be demolished after completion of construction and subsequent commissioning of the new gauging weir.

According to the DWS Preliminary Design Report for the proposed new gauging weir, the new weir will be constructed at the same height as that the existing old weir. It is therefore expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

The physical footprint of the temporary LB Site camp and temporary RB Construction site camp will be approximately 7 927 m² in total combined size. These two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir.

The mechanical clearance and excavation for the proposed new gauging weir as well as the two temporary coffer dams and two temporary site camps, will in all probability completely transform the majority of the existing surface vegetation throughout the assessment area.

Extensive existing agricultural cultivation transformation is evident throughout the majority of the local and broader landscape surrounding the assessment area. The assessment area however forms part of a limited remaining connected corridor of undeveloped natural grassland habitat, which is present along the length of the Vals River.

Vegetation Type and Conservation Status

According to SANBI (2006-2019), the entire assessment area falls within the Highveld Alluvial Vegetation vegetation type (Aza 5). This vegetation type mainly consists of a flat topography supporting riparian thickets accompanied by seasonally flooded grasslands. This vegetation type is classified as Least Concerned (SANBI, 2006-2019).

The entire assessment area is categorised as Ecological Support Area one (ESA 1), according to the Free State Provincial Spatial Biodiversity Plan (Collins, 2018), which sets out biodiversity priority areas in the province.

Water Catchment and Drainage

The proposed new gauging weir location falls within the Middle Vaal Water Management Area (WMA 09) and the associated C60J quaternary surface water catchment- and drainage area. It is furthermore situated in the C60J - 2291 Sub Quaternary Reach (SQR), within the Highveld Ecoregion (11).

Watercourse Baseline Information

The proposed new gauging weir will be constructed within the Vals River, which flows in a north-westerly direction and eventually discharges into the Vaal River approximately 18 km north-west of the proposed weir location.

It is evident from a hydrological perspective, that the Vals River forms an important part of the local and broader quaternary surface water catchment- and drainage area, towards the north-west. The Vaal River into which the Vals River discharges, is considered a primary national water resource; any potentially significant negative impacts on the ecological functionality and/or -services provided by the river, which could pose a potential threat to national water security, should therefore be avoided as far as practicably/reasonably possible.

As stated earlier, it is however expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected, as per the Report findings. It is furthermore expected that the downstream water levels and flow regime should also remain virtually unchanged.

It is consequently not anticipated that the proposed development of the new gauging weir and two temporary coffer dams would pose any significant risk to the continued ecological functionality and - integrity of the local and broader quaternary surface water catchment- and drainage area.

Gauging Weir and Two Temporary Cofferdams

The terrestrial landscape surrounding the portion of the Vals River situated directly upstream of the proposed new gauging weir location and existing old weir, moderately slopes towards the river from both sides. The local topography however flattens-out slightly directly adjacent to the river, after which a steep vertical drop into the river of approximately 2 m in height, is present all along the banks of the river.

This directly upstream portion of the Vals River possesses a distinct narrow natural riparian zone, which is mainly associated with the flattened-out area and the vertical drop into the river. The riparian zone constitutes a seasonally/temporarily flooded semi-aquatic grassland habitat with a well-represented woody component, which is relatively representative of the relevant Highveld Alluvial Vegetation vegetation type (Aza 5).

The proposed new gauging weir and second temporary coffer dam footprints are located within the current tailwater portion of the Vals River, situated directly downstream of the existing old weir. The surrounding terrestrial landscape of this portion of the river, moderately slopes towards the river from both sides. A steep vertical drop of approximately 2 m - 3 m in height, is present all along the downstream banks of the river and evidence of the river banks gradually eroding and cutting away over time, is also present; hence the increased height of this vertical drop relative to that of the upstream portion.

The presence of the existing old weir results in a significant steep vertical water level drop of approximately 2 m in height, from the upstream capacity level of the weir into the downstream tailwater portion of the Vals River. The water depth and -flow velocity through this downstream tailwater portion is consequently significantly reduced by the presence of the weir. The downstream tailwater portion therefore mainly houses a narrow and shallow slow-moving active streamflow channel, which is intertwined with a mosaic of shallow pools as well as extensive exposed surface rockiness and instream riverbed vegetation.

Due to the vertical water level drop into the river caused by the existing old weir, combined with the reduction in water depth and -flow velocity through the downstream tailwater portion, the downstream riparian zone is mostly confined to the instream portion situated below the vertical drop of the eroded riverbanks. This shallow and slow-moving instream riparian habitat continues for a significant distance downstream of the proposed new gauging weir and second temporary coffer dam locations and remains relatively homogenous throughout. According to the information received from the landowner, extensive completely dried up river portions are often also evident throughout this downstream riparian habitat, especially during the winter season.

As stated earlier, it is expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected. This, combined with the steep vertical drop into the river will therefore result in the upstream riparian zone not being directly or significantly impacted upon by the proposed development. It is furthermore expected that the downstream water levels and flow regime should remain virtually unchanged. Therefore, although the downstream riparian zone will be directly impacted upon during the construction phase of the proposed development, this will merely be temporary. The riparian zone should not continue to be directly or significantly impacted upon after completion of construction and subsequent commissioning of the new gauging weir.

It is consequently not anticipated that the proposed development of the new gauging weir and two temporary coffer dams would pose any significant risk to achieving and maintaining national and/or provincial conservation- and persistence targets of the area or to the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

LB Site Camp and RB Construction Site Camp

The locations of the temporary LB Site camp and temporary RB Construction site camp form part of an undeveloped medium-height terrestrial grassland habitat, which is in a slight to moderately disturbed ecological state. The locations of the two temporary site camps are therefore not reminiscent of the natural climactic state of the surrounding Highveld Alluvial Vegetation (Aza 5) or Endangered Vaal-Vet Sandy Grassland (Gh 10) vegetation types, which reduces the conservational significance of the area. The two temporary site camps will also be demolished after completion of construction and subsequent commissioning of the new gauging weir. It is consequently not anticipated that the proposed development of the two temporary site camps would pose any significant risk to achieving and maintaining national and/or provincial conservation- and persistence targets of the area or to the continued ecological functionality and -integrity of the local surrounding landscape.

No Red Data Listed-, nationally protected- or provincially protected plant species or any other plant species of conservational significance/value, were found to be present throughout the upstream- or downstream riparian zones or the locations of the two temporary site camps.

Fauna and Avifauna

The assessment area does not fall within any Important Bird Areas (IBA) as per the latest IBA map obtained from the Birdlife SA website (<https://www.birdlife.org.za/what-we-do/important-bird-and-biodiversity-areas/media-and-resources/#1553597171790-6f83422a-a731>). No conservationally significant or important bird species/nests were observed throughout the assessment area, during the site assessment. Only common local resident bird species and nests were found to be present throughout the assessment area.

Although this is the case, the directly upstream- and downstream portions of the Vals River together with the associated riparian zone, provide locally distinct avifaunal habitats which are likely utilised by various common and habitat-specific aquatic bird species as refuge and for breeding, foraging and/or persistence purposes. According to the information received from the landowner, individuals and pairs of the large raptor/bird of prey species *Haliaeetus vocifer* (African fish eagle) have been known to nest further upstream of the proposed new gauging weir location. These nesting locations are however located a significant distance away for the new weir location area and will therefore not be impacted upon by the proposed development, in any manner.

The directly upstream- and downstream portions of the Vals River together with the associated riparian zone, also provide locally distinct faunal habitats which are likely utilised by various common and habitat-specific amphibians and other aquatic faunal species as refuge and for breeding, foraging and/or persistence purposes. An individual of the range-restricted semi-aquatic reptilian species *Varanus niloticus* (Water monitor lizard) was encountered within the riparian zone directly upstream of the proposed new gauging weir location. The Globally Near-Threatened Red Listed mammalian species *Hydriectis maculicollis* (Spotted-necked otter) and *Aonyx capensis* (African clawless otter) are furthermore indicated on the IUCN Red List of Threatened Species (<https://www.iucnredlist.org>) as being present throughout the local and broader quaternary surface water catchment- and drainage area. According to the information received from the landowner, otter individuals have been known to frequent the portion of the river located directly upstream of the proposed new gauging weir location.

According to the spatial information contained on SANBI's website, the portion of the C60J - 2291 Sub Quaternary Reach (SQR) associated with the assessment area, is not considered a fish support area or fish sanctuary. No populations of Critically Endangered, Endangered, Vulnerable or Near-Threatened fish species have been recorded throughout the local or boarder downstream region or are expected to specifically utilise the assessment area as refuge or for breeding, foraging and/or persistence purposes. The Globally Near-Threatened Red Listed fish species *Labeobarbus kimberleyensis* (Largemouth yellowfish) is however indicated on the IUCN Red List of Threatened Species (<https://www.iucnredlist.org>) as being present throughout the local and broader quaternary surface water catchment- and drainage area.

According to the information received from the landowner, individuals of the legally declared alien invasive fish species *Ctenopharyngodon idella* (Grass carp; Category 3), have recently been observed in and around the mouth of the Vals River where it discharges into the Vaal River approximately 18 km north-west of the proposed new gauging weir location.

Due to the significant steep vertical water level drop caused by the existing old weir, it acts as a significant physical fish movement-restricting/impeding barrier between the upstream- and downstream portions of the Vals River. Fish species and individuals are therefore not provided the opportunity to continuously and freely move upstream, although this can and does occur during significant flood events. This has also been the case for the entire lifespan of the weir, to date.

No other significantly sized weirs or physical fish movement-restricting/impeding barriers are however present between the mouth of the Vals River and the proposed weir location. Therefore, in the event that the legally declared alien invasive fish species *Ctenopharyngodon idella* (Grass carp; Category 3) has not already established itself upstream of the existing old weir location within the Vals River, the weir constitutes the only plausible physical structure that prevents significant upstream movement and spreading of this species. A definite realistic risk/probability therefore exists that the inclusion of a fish-ladder into the proposed new gauging weir design, could allow for such undesired upstream movement and subsequent establishment/even infestation to take place. No relevant data is however available from the Free State Department: Economic, Small Business Development, Tourism and Environmental Affairs (DESTEA) regarding the distribution of this legally declared alien invasive fish species within the Vals River.

According to the Environmental Screening Tool Report, the Animal Species Biodiversity Theme of the assessment area is rated as being of 'medium sensitivity' for the potential presence of the conservationally significant bird species *Hydroprogne caspia* (Caspian tern). No individuals or nests of this species were however observed throughout the assessment area, during the site assessment.

As stated earlier, it is expected that the upstream water levels should remain as close as possible to the current levels and that no significant increase of the current upstream surface inundation is expected. This, combined with the steep vertical drop into the river will therefore result in the upstream riparian zone not being directly or significantly impacted upon by the proposed development. It is furthermore expected that the downstream water levels and flow regime should remain virtually unchanged. Therefore, although the downstream riparian zone will be directly impacted upon during the construction phase of the proposed development, this will merely be temporary. The riparian zone should not continue to be directly or significantly impacted upon after completion of construction and subsequent commissioning of the new gauging weir.

The mobility of faunal/avifaunal species allows for individuals to simply leave an area where disturbance is taking place and relocate to surrounding similar, adequate areas. Faunal/avifaunal species often also return once noise and other disturbances cease, after completion of the construction phase. It is consequently not anticipated that the proposed development would pose any significant risk to- or impact on the faunal or avifaunal communities throughout the local or broader surrounding landscape.

Main Recommendations

It is recommended that all individuals of the identified alien invasive species must be actively eradicated from the assessment area, in accordance with the requirements of the National Environmental Management: Biodiversity Act (Act 10 of 2004); Alien and Invasive Species Regulations, 2014. Removed materials must also be adequately and lawfully disposed of, in order to prevent potential further spreading/dispersal.

It is recommended that the construction of the proposed new gauging weir as well as the subsequent demolition of the existing old weir, be conducted during the winter season. The flow of the Vals River will be significantly reduced during this time, which should ease the excavation and removal activities.

It is recommended that adequate erosion prevention and management features be included into the design of the proposed new gauging weir.

A Water Use License Application (WULA) must be submitted to the Department of Water and Sanitation (DWS), to request authorisation for the proposed construction within the portion of the Vals River associated with the proposed development, in accordance with the National Water Act (Act 36 of 1998).

Disturbed areas within and immediately surrounding the weir clearance and excavation site associated with the assessment area, must be adequately rehabilitated concurrently with the construction processes. This must be done in order to ensure continued surface water flow within the Vals River and ensure the continued ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area. A Rehabilitation Management Plan must be compiled by a suitably qualified and experienced ecologist.

It is recommended that a fish-ladder not be included into the design of the proposed new gauging weir, at this stage.

It is however furthermore recommended that a more detailed assessment be conducted of the potential/likely broader distribution of the legally declared alien invasive fish species *Ctenopharyngodon idella* (Grass carp; Category 3) upstream- and downstream of the proposed new gauging weir location within the Vals River. Such an assessment must be conducted by a suitably qualified and experienced ichthyologist. This will provide the necessary information to the competent authority and adequately advise them during their decision-making process, regarding the inclusion/exclusion of a fish-ladder.

Conclusion

The temporary LB Site camp and temporary RB Construction site camp scored a low Site Ecological Importance (SEI) value while the portion of the Vals River associated with the proposed development scored a moderate Ecological Importance and Sensitivity (EIS) value. The assessment area is therefore viewed as being of low to moderate overall conservational significance/value for habitat preservation and ecological functionality persistence in support of the surrounding ecosystem, broader vegetation type, ESA 1, faunal and avifaunal habitat and the ecological functionality and -integrity of the local and broader quaternary surface water catchment- and drainage area.

Terrestrial and aquatic alien invasive species establishment as well as impeding and contamination of the flow regime of the Vals River, within the associated local and broader quaternary surface water catchment- and drainage area, were identified and addressed as significant potential long-term ecological impacts, associated with the construction phase of the proposed development.

Once the construction phase of the proposed development has been completed, the subsequent operational phase should not result in any significant additional potential ecological impacts, apart from the potential long-term aquatic ecological impacts, as discussed under heading 9.1.

The significant potential long-term ecological impacts identified for the proposed development, could potentially merely add low cumulative impact to the existing negative impacts caused by the extensive existing agricultural cultivation transformation, throughout the majority of the local and broader landscape surrounding the assessment area.

It is however the opinion of the specialist, by application of the NEMA Mitigation Hierarchy, that all the identified potential cumulative ecological impacts associated with the proposed development, can be suitably reduced and mitigated to within acceptable residual levels, by implementation of the recommended mitigation measures. It is therefore not anticipated that the proposed development will add any significant residual cumulative ecological impacts to the surrounding environment, if all recommended mitigation measures as per this ecological report are adequately implemented and managed, for both the construction- and subsequent operational phases of the proposed development.

It is the opinion of the specialist that the proposed development of the assessment area should be considered by the competent authority for Environmental Authorisation and approval. All recommended mitigation measures as per this ecological report must however be adequately implemented and managed for both the construction- and subsequent operational phases of the proposed development. All necessary authorisations, permits and licenses must also be obtained prior to the commencement of any construction.

11. References

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12. Details of the Specialist

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M.Env.Sci. Ecological remediation and sustainable utilisation (NWU: Potchefstroom)

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Abbreviated Curriculum Vitae

Qualifications

- M.Env.Sci Ecological Remediation and Sustainable Utilisation/Vegetation Ecology
 - 2010 - North West University Potchefstroom
- B.Sc Botany and Zoology (Cum Laude)
 - 2008 - North West University Potchefstroom

Accredited courses completed

- Implementing Environmental Management Systems ISO 14001
 - 2011 - North West University Potchefstroom
- Environmental Law for Environmental Managers
 - 2011 - North West University Potchefstroom
- SASS 5 Aquatic Biomonitoring Training Course
 - 2017 – GroundTruth Consulting

Professional registrations

- South African Council for Natural Scientific Professions (**SACNASP**)
 - Professional Ecological Scientist Registration number 115601
- International Association for Impact Assessment (**IAIA**)
 - Registration number 5232
- South African Green Industries Council (**SAGIC**) Invasive Species training
 - Registration number 2405/2459
- South African Wetland Society (**SAWS**)
 - Membership number 220958

Employment and Experience Background

Upon completion of his studies, Rikus started his career in 2011 as an **Environmental Professional in Training (PIT) at Anglo American Thermal Coal: Environmental Services**. He received environmental training and practical implementation experience in all environmental facets of the mining industry with the focus on: Environmental rehabilitation, land management (biodiversity and invasive species eradication), waste & water-, air quality-, game reserve-, environmental management and legislation, as well as corporate reporting. He was also appointed as the Biodiversity management custodian at Anglo American Thermal Coal collieries.

He was subsequently employed by **Fraser Alexander Tailings from October 2011 to the end of November 2015 as an Environmental Contracts Manager**, where he was responsible for the technical and operational management of all Fraser Alexander Tailings' mining environmental rehabilitation work. He was responsible for all facets of project management, as well as implementation of rehabilitation and environmental strategies, by planning activities, organising physical, financial and human resources, delegating task responsibilities, leading people, controlling risks and providing technical support.

He conducted a significant amount of quantitative and qualitative ecological vegetation monitoring during his employment period with the company. Such monitoring mainly included environmentally rehabilitated mining areas in the open-cast coal-, gold-, platinum- and chrome mining industries situated in the Free State, Gauteng, Mpumalanga, North West and Limpopo Provinces. He was involved with analysis, processing and interpretation of environmental monitoring data and compilation of high quality technical/scientific environmental monitoring reports for clients.

He was subsequently further involved with providing adequate ecological management and maintenance recommendations for rehabilitated areas. He also provided technical/scientific environmental rehabilitation support to mining clients, with regards to sufficient soil preparation and amelioration, grassing processes, as well as grass species mixtures and ratios.

He was then employed by **Envioworks Consulting from January 2016 to the end of May 2017 as a Senior Ecological Specialist** where he was responsible for virtually all Ecological, Aquatic and Wetland specialist assessments and reporting related to Environmental Impact Assessment (EIA) and Basic Assessment (BA) projects. He also completed numerous EIA and BA projects as the main project Environmental Assessment Practitioner (EAP).

Rikus then subsequently established the company EcoFocus Consulting (Pty) Ltd at the end of May 2017, which provides high quality professional environmental and ecological specialist services and solutions to the industrial development-, construction-, mining-, agricultural and other sectors.

He possesses significant qualifications, vast knowledge, skills and practical experience in the specialist field of ecological and environmental management. This, coupled with his disciplined, determined and goal-driven approach, as well as his high level of personal standards, ensure high quality, timely and outcomes-based outputs and service delivery relating to any project.

Ecological & Wetland Specialist Assessment & Report Completion for the last two years

2023

- Proposed 1 500 m² Setsoto Local Municipality Water Treatment Works Expansion and Sludge Dam Development, Clocolan, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 1 500 m² Setsoto Local Municipality Water Treatment Works Expansion and Sludge Dam Development, Clocolan, Free State Province.
- Aquatic Ecological Assessment for the proposed 9.6 km Camel Thorn Solar 132 kV Transmission Line Development, Prieska, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 9.6 km Camel Thorn Solar 132 kV Transmission Line Development, Prieska, Northern Cape Province.
- Proposed 24.2 ha Virginia-Kroonstad Six (6) Borrow Pit Developments, Free State Province.
- Proposed 10.75 ha Kroonstad-Steynsrus NEMA Section 24G Two (2) Borrow Pit Developments, Free State Province.
- Ecological Compliance Statement for the proposed 11.1 ha Jacksonville Residential Development, Kimberley, Northern Cape Province.
- Proposed 52.8 km Bethlehem-Fouriesburg Pipeline Development, Free State Province.
- Ecological Rehabilitation and Alien Invasive Species Management Plan for the Konsantas Sand dam-wall decommissioning and removal, Kestell, Free State Province.

- Proposed 6.32 ha Syngenta Stilgewaght Dam Development, Bethlehem, Free State Province.
- Aquatic Ecological Assessment for the proposed 14 km Khauta Solar Photovoltaic Cluster 132 kV Everest Transmission Line Development, Riebeeckstad, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 14 km Khauta Solar Photovoltaic Cluster 132 kV Everest Transmission Line Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 13 km Khauta Solar Photovoltaic Cluster 132 kV Leander Transmission Line Development, Riebeeckstad, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 13 km Khauta Solar Photovoltaic Cluster 132 kV Leander Transmission Line Development, Riebeeckstad, Free State Province.

2022

- Aquatic Ecological Assessment for the proposed 178 ha A1 Groblershoop 50 MW PV Solar Plant Development, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 178 ha A1 Groblershoop 50 MW PV Solar Plant Development, Northern Cape Province.
- Proposed 14.3 ha North West Department of Education Ga-Maloka Primary School Expansion project in Ga-Maloka, North West Province.
- Aquatic Ecological Site Verification Report for the proposed 661 ha Khauta Solar PV Cluster Development, Riebeeckstad, Free State Province.
- Grazing and Invasive Species Assessment for the Farm Fourina No. 362 outside Fouriesburg, Free State Province.
- Desktop ecological assessment for the proposed 2.7 ha Muller Composting Abattoir and Composting Facility Development near Frankfort, Free State Province.
- Proposed 5.22 ha Equity Properties Midway Guesthouse Development in Bloemfontein, Free State Province.
- Proposed 1.5 ha Reeco Holdings (Pty) Ltd 15 Eco-villa Units Development near Ritchie, Northern Cape Province.
- Proposed 63.4 ha Kareeberg Local Municipality Carnarvon Residential Development, Northern Cape Province.
- Legal comments and responses for the Grazing and Invasive Species Assessment for the Farms Liebenbergsvlei No. 148 & Aasvogelkrans No. 96, outside Bethlehem, Free State Province.

- Legal comments and responses for the Grazing and Invasive Species Assessment for the Farm Erfenis No. 1014, outside Bethlehem, Free State Province.
- Proposed 16.8 ha Mafube Local Municipality Strasburg Mixed Land Use Development, Frankfort, Free State Province.
- Revision of the Basic Assessment process for a poultry broiler facility on the Farm Dwarsfontein 1 IQ, near Derby, North West Province.
- Aquatic Ecological Assessment for the proposed 101 ha 80 MW Khauta West Solar PV Facility Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 87 ha 50 MW Khauta e Nyane Solar PV Facility Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 168 ha 110 MW Khauta South Solar PV Facility Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 273 ha 165 MW Khauta North Solar PV Facility Development, Riebeeckstad, Free State Province.
- Proposed 224.4 MW Prieska Power Reserve Wind Power Facility Development outside Prieska, Northern Cape Province.
- Proposed 17.4 ha Dikgatlong Local Municipality Residential Development, Delportshoop, Northern Cape Province.
- Proposed 7.91 ha Dikgatlong Local Municipality Residential Development, Delportshoop, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 101 ha 80 MW Khauta West Solar PV Facility Development, Riebeeckstad, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 87 ha 50 MW Khauta e Nyane Solar PV Facility Development, Riebeeckstad, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 168 ha 110 MW Khauta South Solar PV Facility Development, Riebeeckstad, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 273 ha 165 MW Khauta North Solar PV Facility Development, Riebeeckstad, Free State Province.
- Aquatic Ecological Assessment for the proposed 3000 m² Olympic Flame Filling Station Development, Welkom, Free State Province.
- Proposed 45.6 ha Farm Reliance No. 347 Agricultural Development, Griekwastad, Northern Cape Province.
- Aquatic Ecological Assessment for the proposed 3.9 km Groblershoop 132 kV Transmission Line Development, Northern Cape Province.

- Water Use License Application (WULA) Risk Assessment for the proposed 3.9 km Groblershoop 132 kV Transmission Line Development, Northern Cape Province.
- Proposed 18.6 ha BFW Precast Concrete Towers Manufacturing Facility Development, Beaufort West, Western Cape Province.
- Proposed 4.5 ha Botshabelo Leisure Resort Development, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 4.5 ha Botshabelo Leisure Resort Development, Free State Province.
- Grazing and Invasive Species Assessment for the Farm Klafervley No. 133 outside Volksrust, Mpumalanga Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 18.6 ha BFW Precast Concrete Towers Manufacturing Facility Development, Beaufort West, Western Cape Province.
- Ecological Rehabilitation and Alien Invasive Species Management Plan for a proposed 4.5 ha Botshabelo Leisure Resort Development, Free State Province.
- Protected Plant Species Management Plan for a proposed 4.5 ha Botshabelo Leisure Resort Development, Free State Province.
- Appeal submission against the Environmental Authorisation for a poultry broiler facility on the Farm Dwarsfontein 1 IQ, near Derby, North West Province.
- Proposed 4.18 ha Itau Milling NEMA Section 24G Plot 39 Commercial Development project in Bloemfontein, Free State Province.

2021

- Proposed 126.77 ha Orania Residential development project in Orania, Northern Cape Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Tweefontein no 3344, outside Newcastle, KwaZulu-Natal Province.
- Proposed 245.5 ha Kgatelopele Local Municipality Residential development project in Danielskuil, Northern Cape Province.
- Relocation of provincially protected plant species individuals for the proposed 30 ha Portion 30 of the Farm Lilyvale no 2313 Residential development project in Bloemfontein, Free State Province.
- Proposed 0.5 ha Mduwelanga Projects Agricultural development project outside Paul Roux, Free State Province.

- Proposed Moledi Gorge Watercourse Weir NEMA Section 24G development outside Derby, North West Province.
- Revision of a proposed 135 ha Farm Zulani no 167 agricultural development project outside Douglas, Northern Cape Province.
- Grazing and Invasive Species Assessment for the Farm Kuilenburg no 241, outside Reitz, Free State Province.
- Revision of the Biodiversity Offset Feasibility Report for a proposed 385 ha Idstone Farming agricultural development projects outside Douglas, Northern Cape Province.
- Erosion and Invasive Species Assessment for the Farms Nebo A no 957, Tevrede no 1088, Sarona no 1089 & Uitkyk no 1119, outside Reitz, Free State Province.
- Proposed 267.2 ha Tswaing Local Municipality residential development project in Ottosdal, North West Province.
- Proposed 10.2 ha PepsiCo Inc residential development project in Marchand, Northern Cape Province.
- Proposed 182 ha Farm Seloshesha no 900 mixed land use development project in Thaba Nchu, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 182 ha Farm Seloshesha no 900 mixed land use development project in Thaba Nchu, Free State Province.
- Proposed 3.5 ha Itau Milling NEMA Section 24G Solar Power Development project in Bloemfontein, Free State Province.
- Grazing and Invasive Species Assessment for the Farm Brakfontein no 244, outside Verkykerskop, Free State Province.
- Wetland/watercourse Assessment for the proposed 250 ha Subsolar Energy Serurubele Solar Development project near Bloemfontein, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 250 ha Subsolar Energy Serurubele Solar Development project near Bloemfontein, Free State Province.
- Wetland/watercourse Assessment for the proposed 171 ha Subsolar Energy Sonneblom Solar Development project near Bloemfontein, Free State Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 171 ha Subsolar Energy Sonneblom Solar Development project near Bloemfontein, Free State Province.
- Proposed 13.6 ha Haldon Estate development project in Bloemfontein, Free State Province.
- Wetland/watercourse Assessment for the proposed 200 ha Subsolar Energy Delta Solar Development project near Bloemhof, North West Province.

- Water Use License Application (WULA) Risk Assessment for a proposed 200 ha Subsolar Energy Delta Solar Development project near Bloemhof, North West Province.
- Water Use License Application (WULA) Specialist Opinion and Recommendation Letter for the proposed three Subsolar Energy Solar Development projects.
- Grazing and Invasive Species Follow-up Assessment for the Farm Waterval West no 653, outside Steynsrus, Free State Province.
- Proposed 25 ha Letsemeng Local Municipality landfill site development project in Luckhof, Free State Province.
- *Vachellia erioloba* Counting Report for the proposed 286 ha Subsolar Energy Gamma Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 243 ha Subsolar Energy Khubu Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 224 ha Subsolar Energy Protea Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 262 ha Subsolar Energy Impala Solar Development project near Vryburg, North West Province.
- *Vachellia erioloba* Counting Report for the proposed 265 ha Subsolar Energy Sonbesie Solar Development project near Vryburg, North West Province.
- Ecological site suitability assessments for three potential 583 ha, 300 ha and 227 ha Alt-e Developments Herbert Phase 2 Solar Power Facility development projects near Douglas, Northern Cape Province.
- Proposed 113 ha Danrika Boerdery Edms BPK Vineyard Development project near Prieska, Northern Cape Province.
- Water Use License Application (WULA) Risk Assessment for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Ecological Rehabilitation and Alien Invasive Species Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Protected Plant Species Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Ecological Stormwater and Erosion Management Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.

- GIS Master Layout Plan for a proposed 120 ha Northern Cape Department Agriculture Agricultural Development outside Hopetown, Northern Cape Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Klipfontein No 71 outside Lindley, Free State Province.
- Proposed 384.3 ha Prieska Power Reserve Solar Power Facility Development outside Prieska, Northern Cape Province.
- Aquatic Ecological Assessment for the proposed Farm Bullhoek Chicken Layer Houses and Evaporation Ponds Expansion near Swartruggens, North West Province.
- Water Use License Application (WULA) Risk Assessment for the proposed Farm Bullhoek Chicken Layer Houses and Evaporation Ponds Expansion near Swartruggens, North West Province.
- Grazing and Invasive Species Assessment for the Farm Kleine Fontein No 1160 outside Bergville, KwaZulu-Natal Province.
- Proposed 1.37 km Mantsopa Local Municipality Water Pipeline Development in Ladybrand, Free State Province.
- Water Use License Application (WULA) Risk Assessment for the proposed 1.37 km Mantsopa Local Municipality Water Pipeline Development in Ladybrand, Free State Province.
- Grazing and Invasive Species Assessment for the Farm Elizabeth No 220 outside Bethlehem, Free State Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Retiefs Nek No 123 outside Bethlehem, Free State Province.
- Grazing and Invasive Species Follow-up Assessment for the Farm Brakfontein No 244, outside Verkykerskop, Free State Province.
- Proposed 107.8 ha Danrika Boerdery Edms BPK NEMA Section 24G Development project near Prieska, Northern Cape Province.