Appendix G.3 Freshwater Ecological Assessment

Igolide Wind (Pty) Ltd

AQUATIC BIODIVERSITY SPECIALIST ASSESSMENT REPORT - GRID

WETLAND ASSESSMENT

MAY 2024

CONFIDENTIAL

Igolide Wind (Pty) Ltd

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WETLAND ASSESSMENT

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Igolide Wind (Pty) Ltd

AQUATIC BIODIVERSITY SPECIALIST ASSESSMENT REPORT - GRID

WETLAND ASSESSMENT

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1 INTRODUCTION

ENERTRAG South Africa (Pty) Ltd (ENERTRAG) is proposing to develop a 132kV switching station, a 132kV single or double circuit powerline, and termination point upgrade (as may be necessary), including possible expansion, to allow for a proposed new 132kV powerline connection (hereafter the "Project"). The Project is intended to feed the electricity generated by the approved 100MW Igolide Wind Energy Facility (WEF) (DFFE reference number: 14/12/16/3/3/2/2385, EA date 31 January 2024) to the national energy grid, with the point of connection being the existing East Drie Five Substation.

WSP Group Africa (Pty) Ltd (WSP) was appointed by ENERTRAG to undertake the necessary ecological baseline studies and impact assessment, in support of the baseline and impact assessment phases of the environmental regulatory process required to authorise development-related activities.

1.1 PURPOSE OF THE REPORT

This report describes the baseline wetland biodiversity of areas that will be impacted by the proposed Project. It documents the results of the assessment of the potential impacts of the proposed Project on wetland ecosystems. The report also provides recommended measures for the mitigation of any negative impacts, for inclusion in the project's Environmental Management Programme (EMPr).

2 PROJECT LOCATION AND DESCRIPTION

The Project is located approximately 6 km northeast of Fochville, within the Merafong City Local Municipality in the Gauteng Province (Figure 2-1). The entire extent of the Project is located within the Central Corridor of the Strategic Transmission Corridors. The Project includes the following components:

- Construction of 1 x 132kV powerline (either single or double circuit). A corridor of up to 250m in width (125m on either side of the centre line) has been identified for the placement of the up to 132kV single or double circuit power line to allow flexibility in the design of the final powerline route, and for the avoidance of sensitive environmental features (where possible).
- Construction of 1 x 132kV switching station. The switching station assessment site is ~2.5ha as the switching station will be located adjacent to the approved 33/132kV on-site IPP substation (DFFE reference number: 14/12/16/3/3/2/2385, EA date 31 January 2024) which was assessed as part of the Igolide WEF Environmental Authorisation process. A 500m buffer around the switching station has been identified to ensure flexibility in routing the powerline. The switching station will include, but is not limited to:
    - A high voltage substation yard to allow for multiple 132kV feeder bays.
    - Standard substation electrical equipment, including but not limited to, busbars, office area, operation and control room, workshop and storage area, feeder bays, stringer strain beams, insulators, isolators, conductors, circuit breakers, lightning arrestors, relays, capacitor banks, batteries, wave trappers, switchyard, metering and indication instruments, equipment for carrier current, surge protection and outgoing feeders, as may be required.
    - Control building, telecommunication infrastructure, oil dam(s), etc.
    - Workshop and office area within the switching station footprint.
    - Fencing around the switching station.
    - All the access road infrastructure to and within the switching station.
    - Associated infrastructure, including but not limited to, lighting, fencing, and buildings required for operation (ablutions, office, workshop and control room, security fencing and gating, parking area, concrete batching plant (if required), waste storage/disposal and storerooms).
- Upgrading of the East Drie Five Substation to accommodate the powerline from the Igolide WEF (feeder bay and transformer upgrade), including expansion within the yard, where required, with a footprint of up to 4ha. Standard substation infrastructure will include: operation and control room, transformer oil dam, and standard substation electrical equipment (feeder bays, transformers, busbars, stringer strain beams, insulators, isolators, conductors, circuit breakers, lightning arrestors, relays, capacitor banks, batteries, wave/line trappers, switchyard, metering and indication instruments, equipment for carrier current, surge protection and outgoing feeders, as may be required).

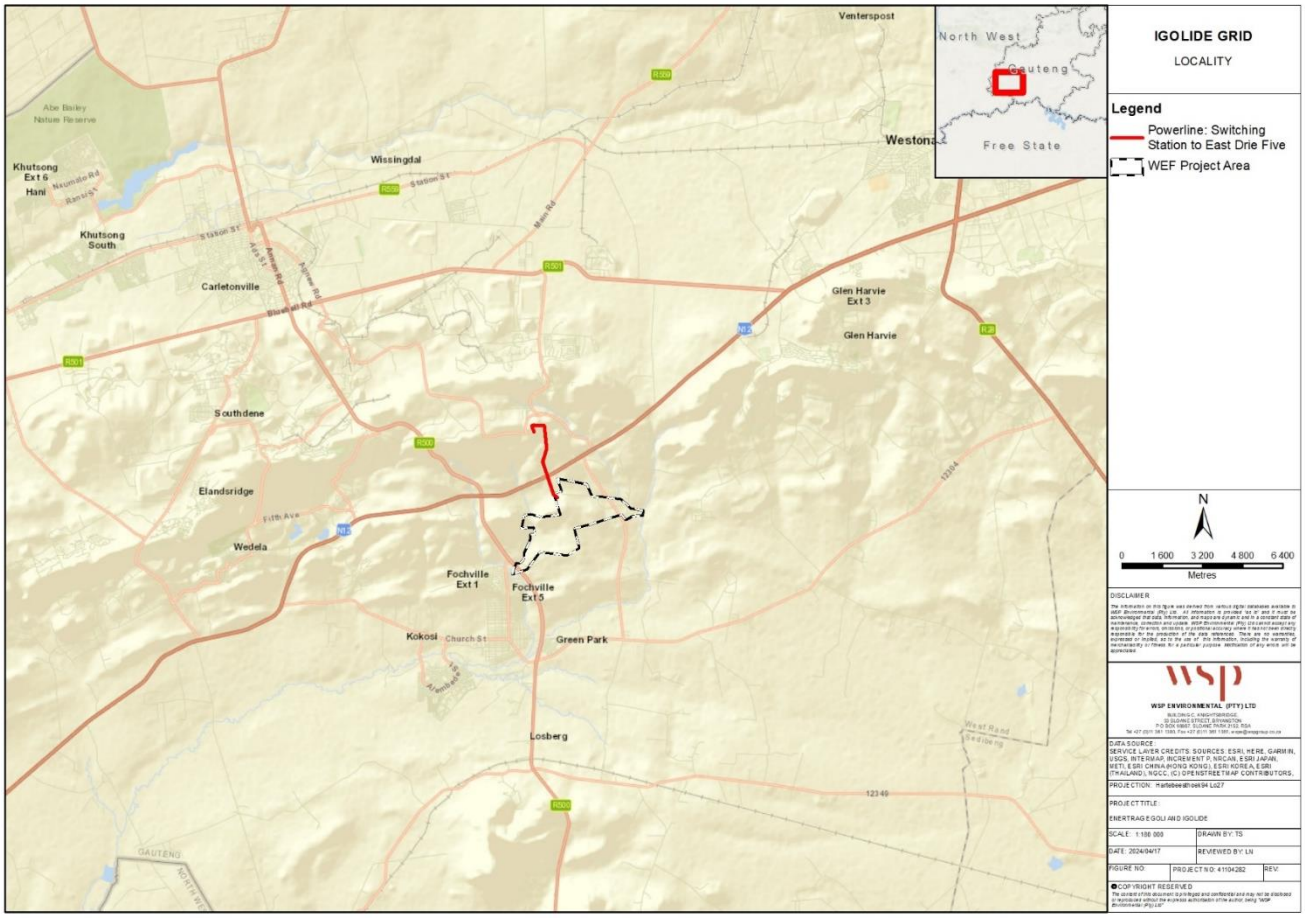


Figure 2-1 - Proposed Project Location

3 APPLICABLE LEGISLATION, POLICY AND STANDARDS

Applicable national and provincial legislation, associated regulations and policies that are pertinent to wetlands, which were used to guide the EIA, include:

- National Environmental Management Act (NEMA) (Act No. 107 of 1998) including Section 24, concerning Procedures for the assessment and minimum criteria for reporting on identified themes in terms of Sections 24(5)(a) and (h) and 44 of the NEMA, when applying for environmental authorisation;
  - Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity.
- National Water Act (Act No. 36 of 1998); particularly Water Use License Application (WULA) requirements for section 21 c) and i) water uses, which states:
  - c) impeding or diverting the flow of water in a watercourse:
  - i) altering the bed, banks. course or characteristics of a watercourse
- Gauteng Biodiversity Sector Plan.
- North-West Biodiversity Sector Plan.

4 METHODOLOGY

The aquatic biodiversity baseline description and impact assessment took cognisance of Government Notice No. 320, published in 2020 under the National Environmental Management Act (1998) concerning '*Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Theme in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act (1998), when applying for Environmental Authorisation'*.

In line with the assessment and reporting requirements set out in the protocol, the wetland assessment included two main study components; a desktop literature review, supplemented by a wetland delineation and assessment field survey conducted on the 04th April 2024. The objectives and tasks associated with these components are described below.

4.1 STUDY AREA

The study area was defined at two levels:

- Project Area: refers to the total extent of the affected properties, within which the Project infrastructure is planned to be constructed (Figure 4-1) and direct impacts could occur;
- Local Study Area; refers to the Project Area plus a 500 m buffer, so that the Project interaction with any watercourses and their 'regulated zone' as defined by the National Water Act can be identified, since this is the area within which direct impacts on watercourses could occur Figure 4-1)

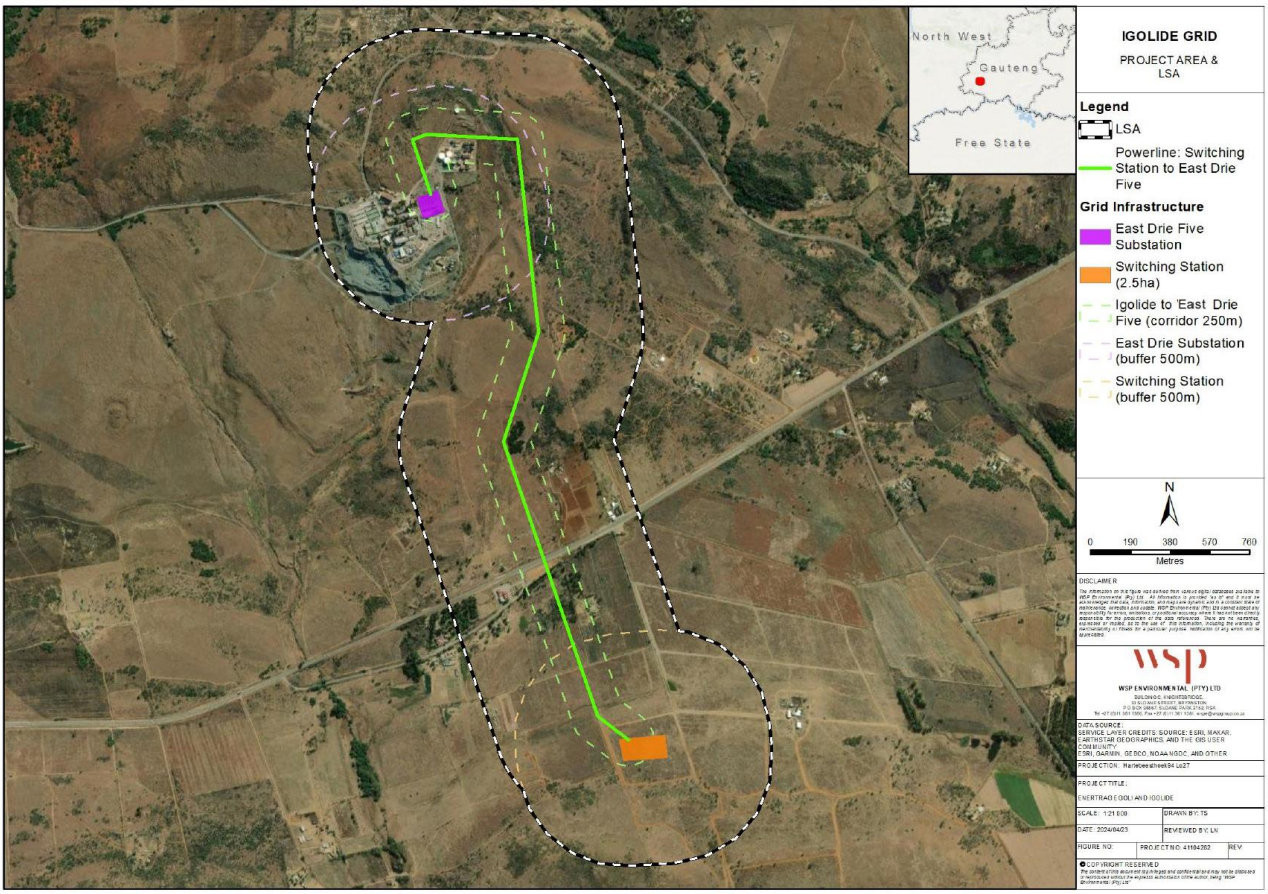


Figure 4-1 - Project Area and Local Study Area

4.2 LITERATURE REVIEW

The aim of the desktop literature review component was to collate and review the extensive available ecological information related to important aquatic biodiversity features in the Project's area of influence, key wetland processes and function, and the likely composition and structure of the wetland communities.

Sources that were used in the description of the regional aquatic resources included:

1. Nationally available datasets which were consulted to inform the site sensitivity verification for wetland habitat include the South African National Wetland Map version 5 (NWM5) (Van Deventer et al., 2019), and the National Freshwater Ecosystem Priority Area database; and
2. National spatial planning datasets, namely the Gauteng Biodiversity Sector Plan (freshwater), National Environmental Management Biodiversity Act (Act No 10 of 2004)) (NEMBA), Threatened Ecosystems, and the Strategic Water Source Area (SAWS), provide a regional/national context for assessing the biodiversity significance of the site.

4.3 WETLAND BASELINE ASSESSMENT

The methods used in the identification, delineation, classification and assessment of wetlands in the study area are described in the sections that follow.

4.4 WETLAND DELINEATION

The delineation procedure originally set out in "A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas", DWAF (2005) and updated by DWAF (2008), describes the following four indicators of wetland presence that can be used to define the boundary of a wetland:

1) The position in the landscape, which helps identify those parts of the landscape where wetlands are more likely to occur;

2) The type of soil form (i.e. the type of soil according to a standard soil classification system), since wetlands are associated with certain soil types;

3) The presence of wetland vegetation species, and

4) The presence of redoxymorphic soil features, which are morphological signatures that appear in soils with prolonged periods of saturation (due to the anaerobic conditions which result).

These indicators were used in the field to delineate the outer boundary of wetland systems encountered within the study area.

4.5 WETLAND CLASSIFICATION

To allow for the differentiation between wetland systems and the prioritisation of systems either for conservation or management purposes, the wetlands were classified in accordance with each hydrogeomorphic (HGM) unit for assessment purposes according to (Kotze et al., 2008). Six major inland HGM types are recognised for the purposes of wetland classification (Table 4-1), and these criteria were applied to the current assessment.

Table 4-1 - Wetland Hydrogeomorphic Units (after Kotze *et al*., 2008)

Wetland Hydro-geomorphic type	Description	Source of water maintaining the wetland1	
		Surface	Sub-surface
Floodplain	Valley bottom areas with a well-defined stream channel, gently sloped and characterised by floodplain features such as oxbow depressions and natural levees and the alluvial (by water) transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*
Channelled valley bottom	Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterised by the net accumulation of alluvial deposits or may have steeper slopes and be characterized by the net loss of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*/***
Unchannelled valley bottom	Valley bottom areas with no clearly defined stream channel, usually gently sloped and characterised by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from channel entering the wetland and also from adjacent slopes.	***	*/***
Hillslope seepage with channelled outflow	Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.	*	***
Hillslope seepage without channelled outflow	Slopes on hillsides, which are characterized by the colluvial movement of materials. Water inputs mainly from sub-surface flow and outflow either very limited or through diffuse sub-surface and/or surface flow but with no direct surface water connection to a stream channel.	*	***
Depression (includes pans)	A basin shaped area with a closed elevation contour that allows for the accumulation of surface water (i.e. it is inward draining). It may also receive sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.	*/***	*/***

4.6 PRESENT ECOLOGICAL STATE (PES)

WET-Health (Macfarlane *et al*., 2020) provides an appropriate framework for undertaking an assessment to indicate the ecological integrity of each of the wetland systems being assessed. The outcome of the assessment also highlights specific impacts, therefore highlighting issues that should be addressed through mitigation and rehabilitation interventions. A level 2 Wet-Health approach was applied for this study, which assesses wetlands using four characteristics, namely hydrology,

geomorphology, vegetation, and water quality. Each of these modules follows a broadly similar approach and is used to evaluate the extent to which anthropogenic changes have an impact on wetland functioning or condition.

The purpose of WET-Health is to aid users in understanding the ecological condition of the wetland and to identify the causes of degradation. The four drivers are assessed by considering the extent, intensity and magnitude of an impact, which then produces a health score. Evaluation scores within each driver are then combined to produce an overall impact of activities on the wetland system which corresponds to a Present State health category that provides an impact score scale of 0-10 and associated health category (ecological state) from A-F (Table 4-2).

Table 4-2 - Impact scores and categories of Present Ecological State used by WET-Health for describing the integrity of wetlands (Macfarlane *et al.,* 2020)

Impact Category	Description	Impact Score Range	Present Ecological State Category
None	Unmodified, or approximates natural condition	0 – 0.9	A
Small	Largely natural with few modifications, but with some loss of natural habitats	1 – 1.9	B
Moderate	Moderately modified, but with some loss of natural habitats	2 – 3.9	C
Large	Largely modified. A large loss of natural habitat and basic ecosystem function has occurred	4 – 5.9	D
Serious	Seriously modified. The losses of natural habitat and ecosystem functions are extensive	6 – 7.9	E
Critical	Critically modified. Modification has reached a critical level and the system has been modified completely with almost complete loss of natural habitat	8 – 10.0	F

4.7 WETLAND ECOSYSTEM SERVICES

Wetlands are specialised systems that perform ecological functions vital for human welfare and environmental sustainability. The WET – Ecoservices tool (Kotze *et al*., 2020), is a technique for rapidly assessing ecosystem services supplied by wetlands, was used to determine the key ecological services provided by each wetland in the study area. The rapid field assessment (level 2) approach was applied, and the following services were examined and rated:

- Flood attenuation;
- Stream flow regulation;
- Sediment trapping;
- Erosion control;
- Phosphate assimilation;
- Nitrate assimilation;
- Toxicant assimilation;
- Carbon storage;
- Biodiversity maintenance;
- Water supply for human use;
- Harvestable resources;
- Food for livestock;
- Cultivated foods;
- Tourism and recreation;
- Education and research;
- Cultural & spiritual significance.

Each of the above-listed services was scored according to the following general level of service provided.

Table 4-3 - Ecosystem services classes and descriptions (Kotze *et al*., 2020).

Importance Category		Description
Very Low	0-0.79	The importance of services supplied is very low relative to that supplied by other wetlands.
Low	0.8 – 1.29	The importance of services supplied is low relative to that supplied by other wetlands.
Moderately-Low	1.3 – 1.69	The importance of services supplied is moderately-low relative to that supplied by other wetlands.
Moderate	1.7 – 2.29	The importance of services supplied is moderate relative to that supplied by other wetlands.
Moderately-High	2.3 – 2.69	The importance of services supplied is moderately-high relative to that supplied by other wetlands.
High	2.7 – 3.19	The importance of services supplied is high relative to that supplied by other wetlands.
Very High	3.2 - 4.0	The importance of services supplied is very high relative to that supplied by other wetlands.

4.8 ECOLOGICAL IMPORTANCE AND SENSITIVITY

The EIS was determined using the methodology developed by Rountree *et al.* (2013). It is a rapid scoring system to evaluate:

- Ecological Importance and Sensitivity;
- Hydrological Functions; and
- Direct Human Benefits.

The scoring assessment incorporates:

- EIS score derived using aspects of the original Ecological Importance and Sensitivity assessments developed for riverine assessments (DWAF, 1999);
- Hydro-function importance score derived from the WET-EcoServices tool for the assessment of wetland ecosystem services Kotze *et al.* (2020); and
- Direct human benefits score derived from the WET-EcoServices tool for the assessment of wetland ecosystem services Kotze *et al.* (2020).

The highest score of the three derived scores (each with range 0 – 4) was then used to indicate the overall importance category of the wetland (Table 4-4).

Table 4-4 - Ecological importance and sensitivity categories

Ecological Importance and Sensitivity Category Description	Range of EIS score
Very high: Wetlands that are considered ecologically important and sensitive on a national or even international level. The biodiversity of these systems is usually very sensitive to flow and habitat modifications. They play a major role in moderating the quantity and quality of water of major rivers	> 3 and ≤ 4
High: Wetlands that are considered to be ecologically important and sensitive. The biodiversity of these systems may be sensitive to flow and habitat modifications. They play a role in moderating the quantity and quality of water of major rivers.	> 2 and ≤ 3
Moderate: Wetlands that are considered to be ecologically important and sensitive on a provincial or local scale. The biodiversity of these systems is not usually sensitive to flow and habitat modifications. They play a small role in moderating the quantity and quality of water of major rivers	> 1 and ≤ 2
Low/marginal: Wetlands that are not ecologically important and sensitive at any scale. The biodiversity of these systems is ubiquitous and not sensitive to flow and habitat modifications. They play an insignificant role in moderating the quantity and quality of water of major rivers.	> 0 and ≤ 1

4.9 ENVIRONMENTAL IMPACT ASSESSMENT

The significance of identified impacts was determined using the approach outlined below (terminology from the Department of Environmental Affairs and Tourism Guideline document on EIA Regulations, April 1998). This approach looks at five impact criteria as indicated in Table 4-5 below:

Table 4-5 - Impact Criteria Scores used for wetland impact assessment (Based on impact significance criteria determined by DEAT, 1998)

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	**Very low**	**Low**	**Medium**	**High**	**Very high**
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	**Site:** Site only	**Local:** Inside activity area	**Regional:** Outside activity area	**National:** National scope or level	**International:** Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	**Reversible:** Recovery without rehabilitation		**Recoverable:** Recovery with rehabilitation		**Irreversible:** Not possible despite action
Impact Duration (D)	**Immediate:**	**Short term:**	**Medium term:**	**Long term:**	**Permanent:**

The length of permanence of the impact on the environmental receptor	On impact	0-5 years	5-15 years	Project life	Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	**Improbable**	**Low Probability**	**Probable**	**Highly Probably**	**Definite**
ENVIRONMENTAL SIGNIFICANCE = (MAGNITUDE + EXTENT + REVERSIBILITY + DURATION) x PROBABILITY					
TOTAL SCORE	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
ENVIRONMENTAL SIGNIFICANCE RATING	**Very low**	**Low**	**Moderate**	**High**	**Very High**

Table 4-6 - Environmental Significance Rating

Negative	Positive
Very Low	Very Low
Low	Low
Moderate	Moderate
High	High

4.10 STUDY ASSUMPTIONS AND LIMITATIONS

Data used for specialist assessments.

- This ESIA report was prepared on the basis of the site sensitivity verification process undertaken in response to the national web-based screening report. The site sensitivity verification was completed via desktop analysis of the existing baseline knowledge of riparian or wetlands systems in the study area, supplemented by the findings of the field survey conducted in April 2024.
- An area of potential wetland habitat mapped by the NWM5 (2018) database located towards the northern section of the study area within the Sibanye Driefontein Gold 5 Shaft could not be surveyed during the time of the field survey due to access restrictions.

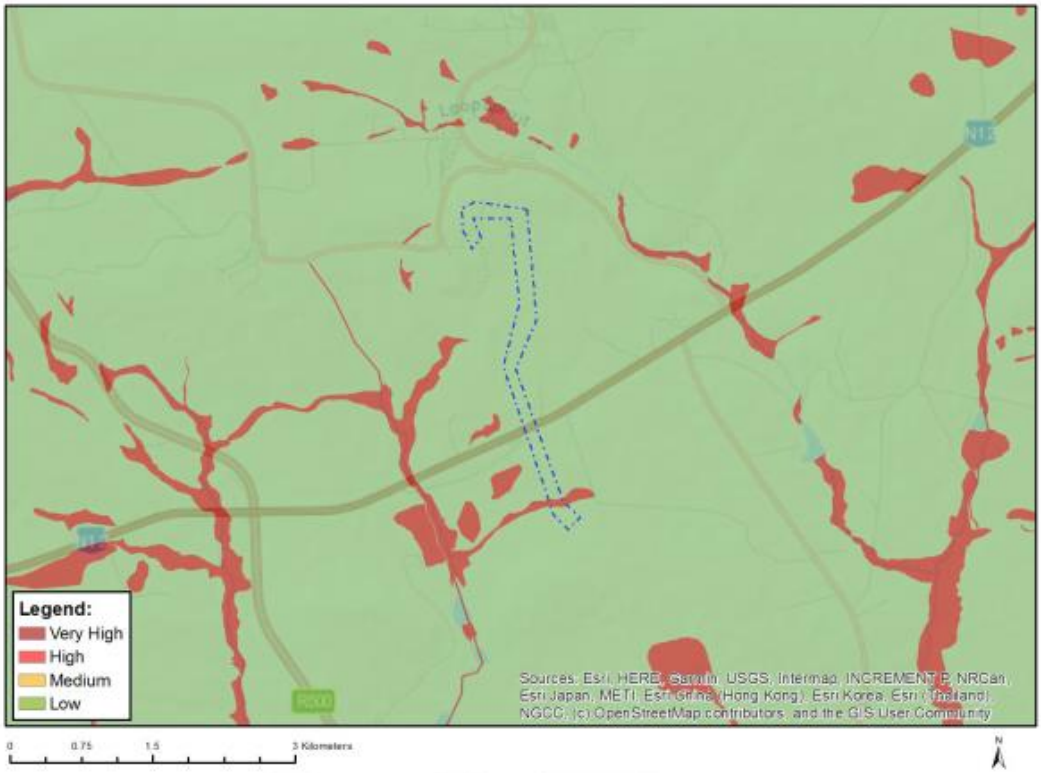
5 BASELINE DESCRIPTION

This section describes the baseline wetland biodiversity of the local study area. It draws upon existing studies, published information and the findings of the field-based site investigation conducted in November 2024.

5.1 ENVIRONMENTAL SCREENING TOOL

The Project Area was assessed at desktop level using the National Web-based Environmental Screening Tool. According to the Tool, the Aquatic Biodiversity Theme for the Project Area is rated 'Very High Sensitivity' due to the Project intercepting areas mapped as 'Wetlands of the Central Bushveld Bioregion (Valley bottom)' (Figure 5-1).

MAP OF RELATIVE AQUATIC BIODIVERSITY THEME SENSITIVITY



Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
X			

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity
Very High	Wetlands_Central Bushveld Bioregion (Valley-bottom)

Figure 5-1 - DFFE Screening Tool – Aquatic Biodiversity Sensitivity

5.2 REGIONAL BIODIVERSITY CONTEXT

The Study Area lies within the C23J quaternary catchment of the primary drainage region C within the Vaal Water Management Area (WMA). The Kraalkopspruit Sub-Quaternary Reach (SQR) C23J-01507 drains the Study Area to the west, while the perennial Loopspruit SQR C23J-01487 drains the Study Area on the east (Figure 5-2)

The Kraalkopspruit SQR is a first order stream which flows for approximately 10 km in a southward direction before joining the Loopspruit. The Loopspruit SQR is also a first order stream which flows for approximately 17 km in the southwest direction.

5.3 STRATEGIC WATER RESOURCES AREAS

The Study Area is located downstream of the Far West Karst Region Strategic Water Source Area (SWSA) (Figure 5-3). According to Le Maitre *et al.* (2019), SWSAs are defined as land that either supply large volume of mean annual surface water runoff in relation to their size or have relatively high groundwater recharge, and so are considered nationally important. A SWSA is one where the water that is supplied is considered to be of national or sub-national importance for water security (Le Maitre *et al.* 2019).

5.4 FRESHWATER ECOSYSTEM PRIORITY AREAS (FEPA) SUB-CATCHMENTS

The Study Area in relation to FEPA sub-catchments and mapped National Freshwater Ecosystem Priority Areas (NFEPA) wetlands is illustrated on Figure 5-4 and Figure 5-5, respectively. FEPA sub-catchment areas provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. Areas mapped as FEPA sub-catchments provide direction on which watercourses should remain in a natural or near natural condition to support the water resource protection goals of the National Water Act.

5.5 NATIONAL WETLAND MAP 5 WETLANDS

The South African National Wetland Map version 5 (NWM5) portrays the most up-to-date spatial data for the extent and types of estuarine and inland aquatic (freshwater) ecosystems of South Africa (Van Deventer et al., 2019). The proposed development footprint in relation to wetlands mapped as part of the National Wetland Map 5 project is illustrated on Figure 5-6. Based on NWM5, the Project intercepts an unchanneled valley bottom wetland towards the south of the Project area, and another unchanneled valley bottom wetland in the northern section of the Project area within the Sibanye Driefontein Gold 5 Shaft Complex.

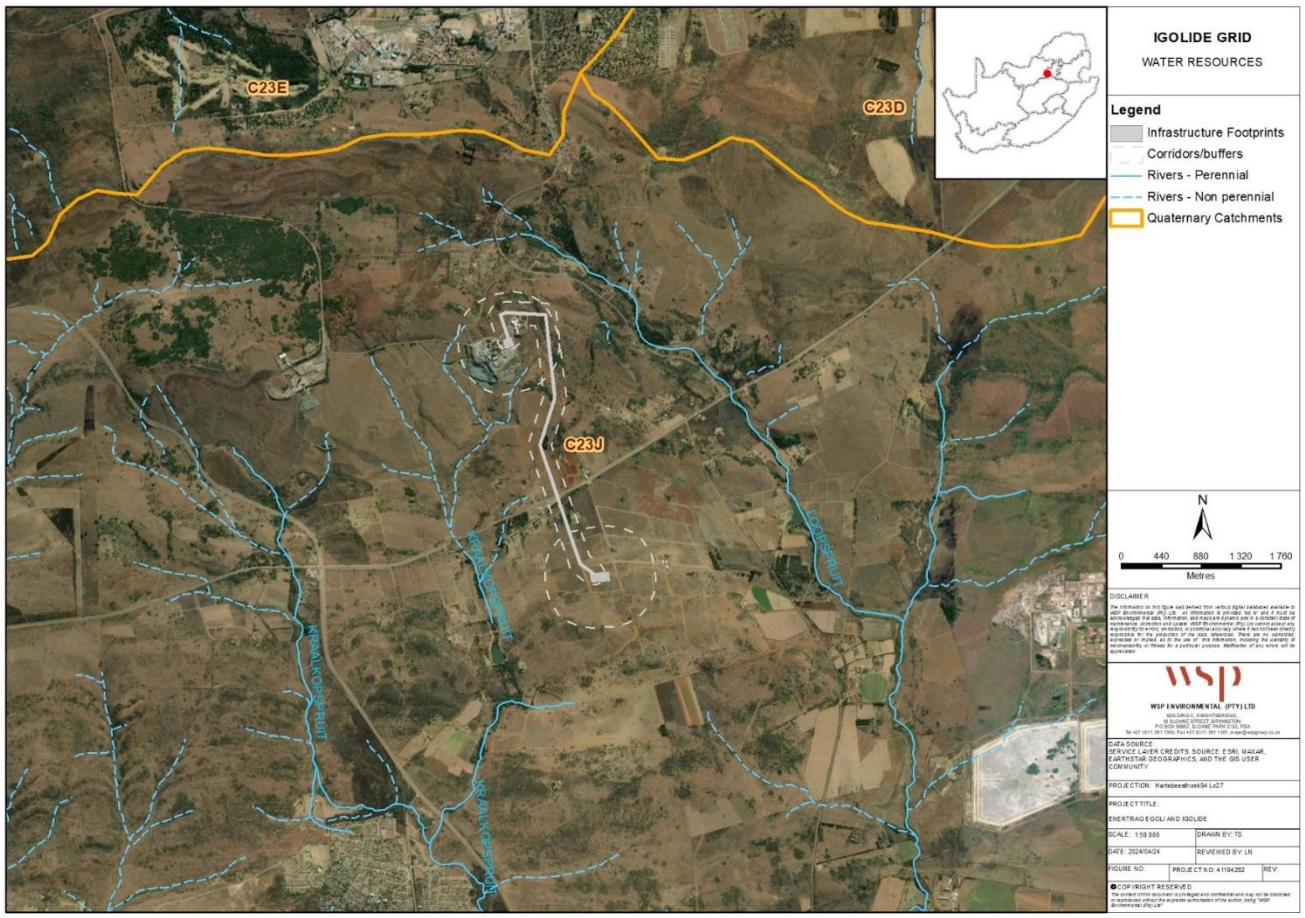


Figure 5-2 - Water Resources in the Study Area

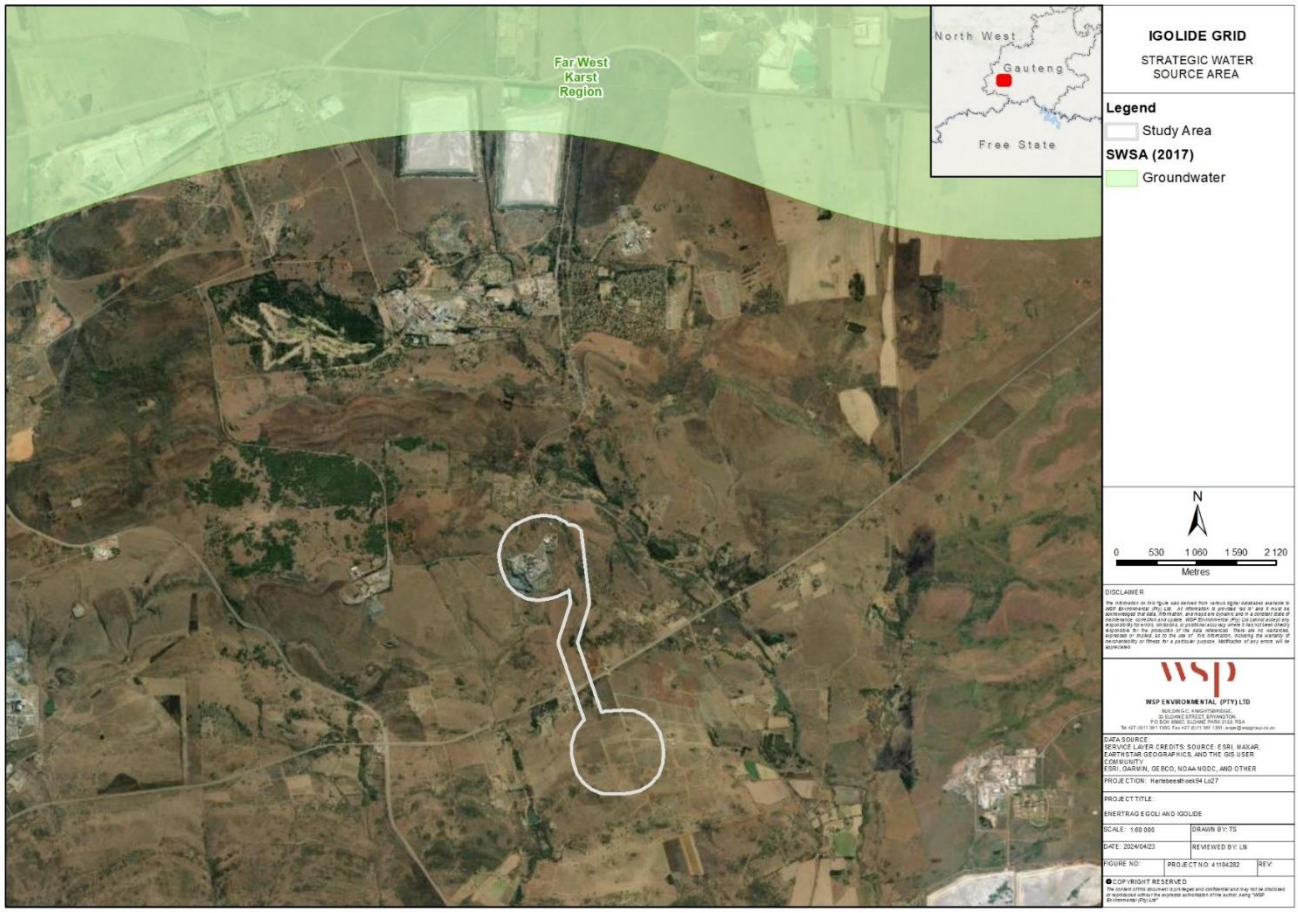


Figure 5-3 - Study Area in relation to SWSA

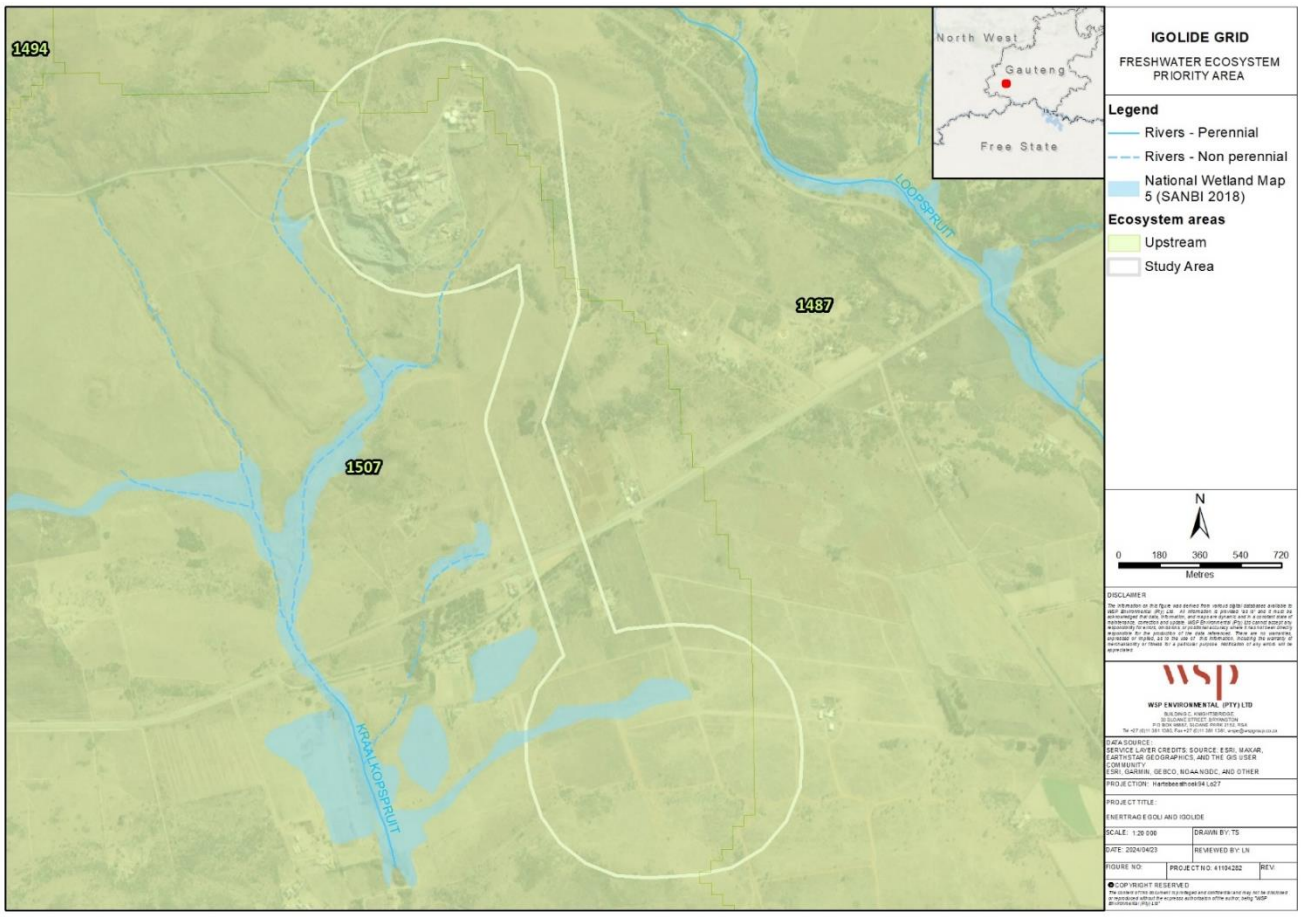


Figure 5-4 - FEPA Sub-Catchments in relation to the Study Area

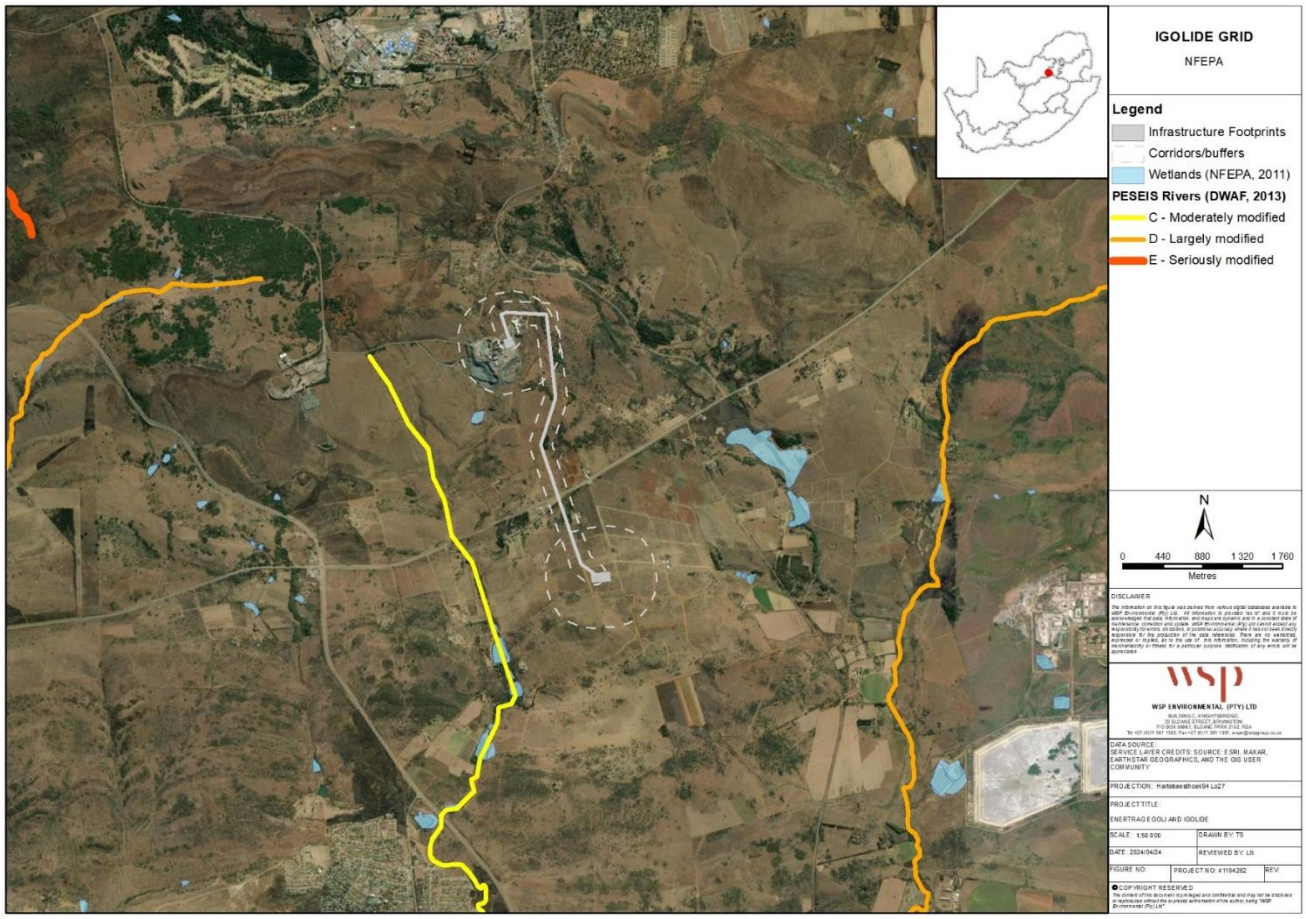


Figure 5-5 - NFEPA Wetlands and Rivers within the Study Area

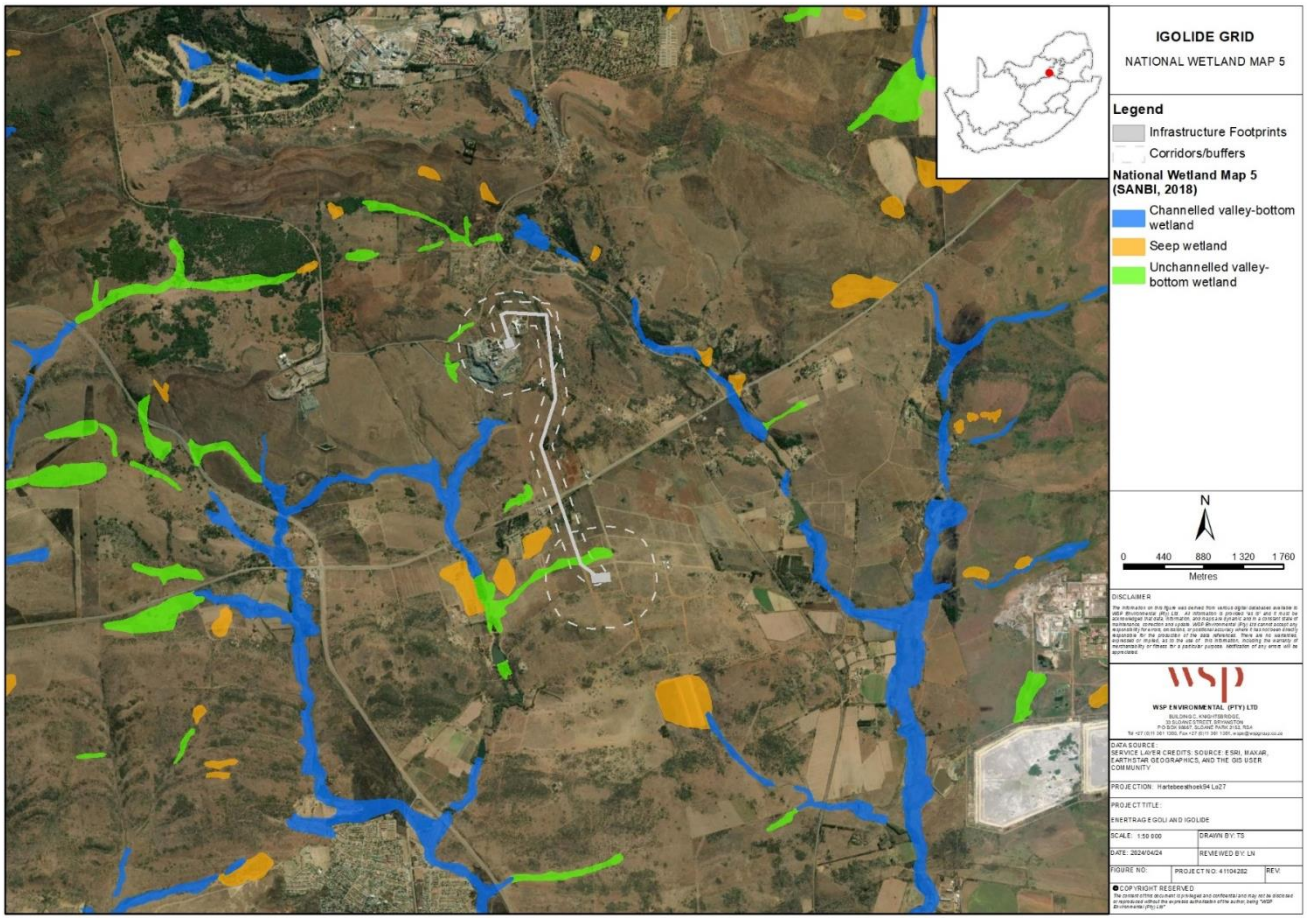


Figure 5-6 - National Wetland Map 5 Wetlands within the Study Area

5.6 WETLAND CLASSIFICATION AND ASSESSMENT

The proposed powerline traverses a Hillslope seepage (Seep) wetland in the south of the study area (Figure 5-8). Hillslope seepage wetlands are created and maintained by infiltration processes that occur in the surrounding non-wetland areas within the catchment. This type of system typically contributes to flow in the watercourses, even if this contribution is only on a seasonal basis. The hillslope seepage wetlands were dominated by hygrophilous grasses, such as *Eragrostis plana* with some wetter areas characterised by wetland plant species such as *Juncus effesus* and *Cyperus marginatus (*Figure 5-7*).*

Figure 5-7 - Characteristics of the Seep wetland on site

Figure 5-8 - Hillslope seepage wetland identified within the study area

5.7 WETLAND ASSESSMENT

PRESENT ECOLOGICAL STATE

The Seep wetland was considered to be in a Moderately Modified PES category (Table 5-1). This was largely attributed to the current impacts identified on site such as impoundment of flow at the upstream dam, alien invasive species, animal and vehicle tracks cutting through the wetland.

Based on the PES assessment, the hydrology and geomorphological impacts on the wetland are the main contributing factor to the Moderately modified state. This is due to the presence of dams which interrupt the surface hydrology and impound surface flow, as well as access roads that cut through the wetland. The PES score for the wetlands in the study area is presented in Table 5-1.

Table 5-1 - Summary of Impact Scores and PES Class

Wetland Unit	Size (ha)	Hydrology Impact Category	Geomorphology Impact Category	Water Quality Impact Category	Vegetation Impact Category	Overall PES Category
Seep wetland	6.51	C	C	A	B	C-Moderately Modified

ECOSERVICES

The importance scores for the ecosystem services provided by the seep wetland within the study area are illustrated in the spider diagram presented in Figure 5-9.

The majority of the ecosystem services were rated as very low in terms of demand. The supply of regulating and supporting services such as sediment trapping, phosphate assimilation and toxicant assimilation was considered to be at a moderate level for the wetland. The wetlands also supply ecosystem services such as harvestable wood and occurrence of game for tourism and recreation opporutunities to a moderate extent, as the wetland is located within a game farm.

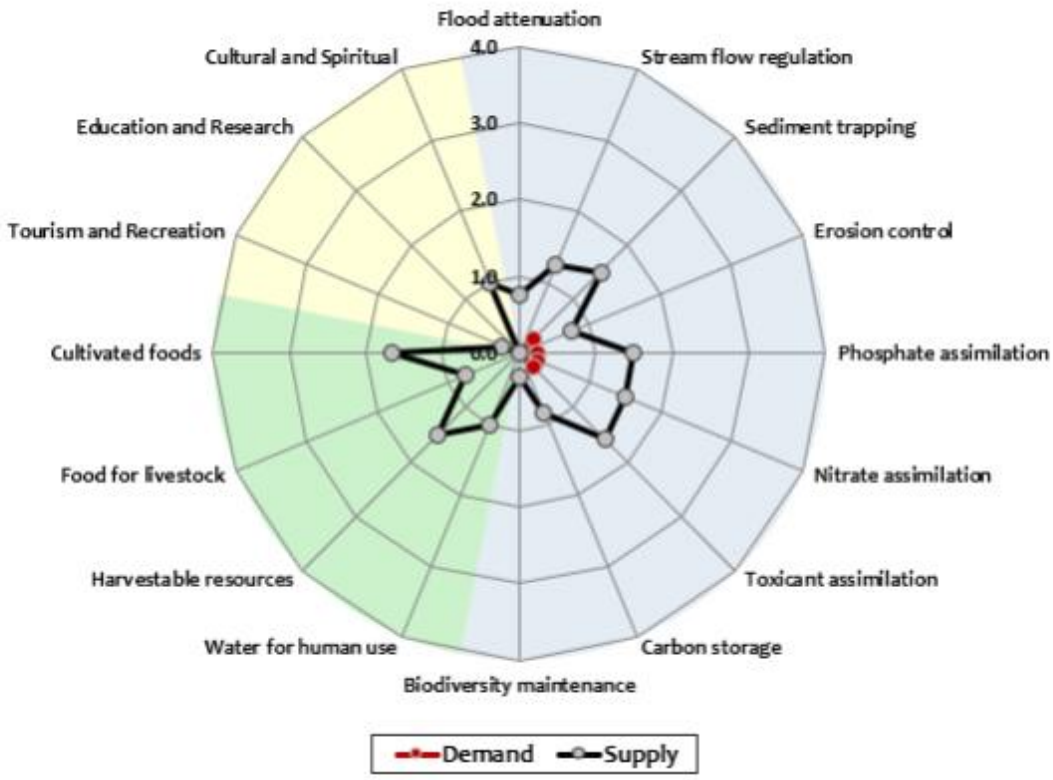


Figure 5-9 - Ecosystem Services supplied by/demanded from the seep wetland

ECOLOGICAL IMPORTANCE AND SENSITIVITY

The ecological importance and sensitivity (EIS) of the wetland was Low/Marginal (Table 5-2). Although considered to be of Low/Marginal EIS, the wetland delivers water-based ecosystem services (hydrological functions) such as sediment trapping, phosphate assimilation, and erosion control, as well as some direct human benefits such as tourism and recreation, and associated livelihoods provided by the game farm.

Table 5-2 - Summary of wetland EIS scores and ratings.

Wetland Unit	Size (ha)	Ecological Importance and Sensitivity Score	Hydrological Functions Score	Direct Human Benefit Score	Integrated EIS Score	Overall EIS Class
Seep wetland	6.51	0.6	0.6	0.5	0.6	Low/Marginal

6 SITE SENSITIVITY VERIFICATION OUTCOME

The Environmental Screening Tool rates the aquatic biodiversity theme as 'Very High Sensitivity' due to the presence of wetland features and areas mapped as wetland CBA and FEPA sub-catchment in the study area. Based on the findings of this study, the Project area was considered as having 'High Sensitivity' instead of 'Very High Sensitivity' due to the size and moderately modified present ecological state of the wetland as well as the Low/Marginal ecological importance and sensitivity of the wetland.

7 ASSESSMENT OF THE NO-GO ALTERNATIVE

In the no-go scenario, the Project would not be developed and the existing status quo would likely be maintained, that being that the Moderately Modified PES (Table 5-1) ascribed to all assessed wetlands would persist, with long-term habitat degradation as a result of existing impacts, including impoundment of water at dams, alien invasive species colonisation at road crossings and development of preferential flow paths along animal tracks, likely to take place at the current rate of degradation.

8 IMPACT ASSESSMENT

Scenarios considered for impact assessment included the construction, operation and decommissioning phases of the Project as proposed (see Section 2). Since no Project-specific impacts will occur in the no-go scenario, an impact assessment was not performed for this scenario.

The construction and operation of the proposed Project will result in the disturbance and/or loss of wetland habitat due to vegetation and topsoil removal near wetlands. Additional impacts include interruption in hydrology, sediment deposit into wetlands, and wetland soil erosion as well as the establishment and spread of alien invasive species that could last through to the operational phase and decommissioning phase of the Project (Table 8-1).

The following sections discuss the potential impacts of the construction, operation, and decommissioning of the proposed WEF development on wetlands that are situated within 500 m of the planned infrastructure and activities.

8.1 CONSTRUCTION PHASE

Construction phase impacts on wetland systems largely arise as a result of direct impacts on the receiving environment due to the clearing of land within wetlands or their immediate catchments in advance of Project development, and the resultant loss of biodiversity. The earthworks and activities involved during the construction phase of the Project can potentially exert negative impacts on sensitive ecosystems including loss of wetland habitat, catchment landcover changes resulting in increased sediment entry to downstream systems, and contamination of water bodies by construction materials/vehicles (hydrocarbons etc).

The preliminary list of predicted construction phase impacts is outlined in the sections that follow and summarised on Table 8-1.

LOSS OF WETLAND HABITAT

Site establishment and construction of the proposed Project infrastructure, such as the 132kV powerline which will require a 250m wide corridor, a switching station, access roads, and temporary laydown infrastructure.

Placement of pylons associated with the proposed powerline in the seep wetland could constitute an impact of high magnitude due to the loss of wetland habitat to the pylon footprint as well as disturbance of adjacent areas during construction. The impact would have a local extent and a permanent duration prior to mitigation, resulting in a High significance. With the application of recommended mitigation measures, such as placing all infrastructure outside of wetland areas, including pylons, and avoiding or limiting the removal of wetland vegetation, the extent of the impact will be localised, with a medium magnitude and a short-term duration (ceasing with operation). A Low impact significance can be achieved post-mitigation.

CHANGES IN WETLAND HEALTH AND FUNCTIONING

Bulk earthworks involved with site development in the immediate catchment of wetlands can cause indirect impacts on wetland habitat through compaction/removal of recharge or interflow soils, as well as increased sediment deposition to downslope wetland ecosystems as a result of stormwater runoff. If not carefully managed, this impact can result in a medium impact magnitude, having a local impact

scale and lasting for the duration of the construction phase, resulting in a Moderate impact significance prior to mitigation.

With the implementation of recommended mitigation measures to address reduced wetland functioning, such as separation of clean and dirty water runoff, and diffuse distribution of clean stormwater runoff around the Project infrastructure and any road crossings to affected downslope wetland systems, the residual impact can be reduced to a Low significance.

SOIL EROSION

The removal of wetland vegetation for the construction of the proposed powerline and associated infrastructure will reduce surface roughness in and around the wetland, which may create soil conditions susceptible to erosion. The increased likelihood of soil erosion is considered to be a medium magnitude, with a local impact extent and a long-term impact duration, resulting in a Moderate impact significance pre-mitigation. With mitigation, such as limiting vegetation removal to the Project footprint and re-vegetating exposed soils immediately post-construction, the impact can be reduced to a Low impact significance.

ESTABLISHMENT AND SPREAD OF ALIEN INVASIVE SPECIES

Disturbances caused by vegetation clearing and earthworks during construction will exacerbate the establishment and spread of alien invasive vegetation in the area. Alien plant infestations can spread exponentially, suppressing, or replacing indigenous vegetation. This may result in a breakdown of ecosystem functioning and a loss of wetland biodiversity. Consequently, this impact is considered to have a medium impact severity, with a local impact extent and a long-term impact duration, resulting in a Moderate impact significance prior to mitigation. With the development of an auditable Alien and Invasive Species (AIS) Management Plan for the Project, and the strict implementation of the recommended active control and monitoring measures throughout the construction phase, the impact significance can be reduced to Very Low.

8.2 OPERATIONAL PHASE

Operational phase impacts relate to the possible exacerbation of the construction-phase impacts, including soil erosion and ongoing risk of spread of the alien and invasive plant species that may have colonised new areas during the construction phase.

SOIL EROSION

The increased presence of hardened surfaces in the study area can exacerbate soil erosion, through increased and concentrated surface runoff. This impact could have a medium magnitude, with a long-term impact duration and a high probability of occurrence. Without mitigation this impact has the potential to have a Moderate impact significance on wetland soils, and with mitigation, the potential impact magnitude can be reduced, resulting in a residual impact of Low significance.

SPREAD OF ALIEN INVASIVE SPECIES

The potential establishment of alien invasive species in, and immediately adjacent to wetlands in the vicinity of the proposed development footprint will continue to be an impact of concern during the operational phase. Without mitigation, the impact significance is considered Moderate. With the development of an auditable AIS Management Plan for the Project, and the strict implementation of the recommended active control and monitoring measures throughout the operational phase, the residual impact significance can be reduced to a Very Low impact.

8.3 DECOMMISSIONING

ESTABLISHMENT AND SPREAD OF ALIEN INVASIVE SPECIES

Disturbances caused by demolishing of project infrastructure and earthworks during decommissioning will exacerbate the establishment and spread of alien invasive vegetation in the area if not addressed during construction and operation. The magnitude of this impact is medium, with a local extent and a permanent impact duration, resulting in a Moderate impact significance prior to mitigation. With mitigation, that is the ongoing implementation of the AIS management plan, the residual impact can be reduced to a Very Low significance.

SOIL EROSION

The removal of project infrastructure during the decommissioning phase of the project may lead to increased bare surfaces, which without mitigation may lead to the erosion of wetland soils, particularly during periods of high rainfall. Prior to mitigation, this impact will have a medium magnitude, local extent, permanent duration and medium probability, resulting in a Moderate significance. With mitigation the impact significance can be reduced to Very Low significance.

8.4 CUMULATIVE IMPACTS

The landscape within which the proposed project is located consists of a mosaic of agricultural areas and grasslands, fragmented as a consequence of the existing surrounding land uses (i.e. the Sibanye Driefontein's mine shaft complexes, agricultural lands, residential areas, and informal settlement). The planned Igolide WEF, which is associated with this proposed Electrical Grid Infrastructure Project, but is part of a separate authorisation process, is also located within the immediate landscape surrounding the study area.

Changes in land uses have occurred within the wetland and its catchment, which has resulted in the moderately modified PES category of the wetland. Cumulatively, the presence of the Igolide WEF and the Igolide Grid infrastructure as well as existing land uses will have a negative impact on wetland health and functioning, which could potentially lead to a change in the PES score. However, assuming that the recommended mitigation measures are strictly applied, the residual impacts of the proposed development on wetlands have been determined to be Low or Very Low, thus the Project is not expected to contribute to cumulative impacts on wetlands at a landscape level.

The effective implementation of the recommended mitigation measures will be key in ensuring that the Project's contribution to cumulative effects on wetlands (together with the existing drivers of change) are minimised. This may be achieved through protecting and conserving currently unprotected wetland habitat in the study area throughout the construction and operation phases of the Project and rehabilitating targeted wetlands in the Project area to improve their condition and thus enhance their level of functioning; thereby addressing low-level residual impacts on wetlands as a result of the proposed project.

Table 8-1 – Project Impact Summary

CONSTRUCTION																		
Impact number	**Aspect**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**					
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**	**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**
Impact 1:	Wetland habitat	Loss and disturbance of wetland habitat	Construction	Negative	Moderate	4	2	5	4	5	**75**	**N4**	3	1	3	2	3	**27**	**N2**
					Significance	**N4 - High**							**N2 - Low**						
Impact 2:	Wetland hydrology	Changes in wetland health/functioning	Construction	Negative	Moderate	3	2	3	3	4	**44**	**N3**	2	1	3	2	3	**24**	**N2**
					Significance	**N3 - Moderate**							**N2 - Low**						
Impact 3:	Soil Erosion	Wetland soil erosion	Construction	Negative	Moderate	3	1	5	4	4	**52**	**N3**	2	1	3	2	3	**24**	**N2**
					Significance	**N3 - Moderate**							**N2 - Low**						
Impact 4:	Alien invasive species	Spread of AIS	Construction	Negative	Moderate	3	2	3	4	4	**48**	**N3**	2	1	1	2	2	**12**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						
OPERATIONAL																		
Impact number	**Receptor**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**					
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**		**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	
Impact 1:	Alien Invasive Species	Spread of AIS	Operational	Negative	Moderate	3	2	3	4	4	**48**	**N3**	2	1	1	1	2	**10**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						
Impact 2:	Soil Erosion	Wetland soil erosion	Operational	Negative	Moderate	3	1	3	4	5	**55**	**N3**	2	1	3	1	3	**21**	**N2**
					Significance	**N3 - Moderate**							**N2 - Low**						
DECOMMISSIONING																		
Impact number	**Receptor**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**					
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**		**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	

Impact 1:	Alien invasive species	Spread of AIS	Decommissioning	Negative	Moderate	3	2	3	5	4	**52**	**N3**	2	1	1	2	2	**12**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						
Impact 2:	Soil Erosion	Wetland soil erosion	Decommissioning	Negative	Moderate	3	2	3	5	3	**39**	**N3**	2	1	1	2	2	**12**	**N1**
					Significance	**N3 - Moderate**							**N1 - Very Low**						

9 MITIGATION MEASURES

Mitigation measures that are designed to avoid and minimise the loss and degradation of the wetland habitat and functioning of the wetland habitat are summarised in the sections that follow.

IDENTIFICATION OF AREAS TO BE AVOIDED (INCLUDING BUFFERS)

- Areas of undisturbed, natural grassland and wetland habitat should be avoided. Areas of direct loss that cannot be avoided must be addressed via additional conservation actions/offsets as required.
- A loss/disturbance buffer zone of at least 100 m should be maintained between the maximum extent of construction works and the outer boundary of the wetland.

MINIMISATION

- To prevent loss of natural habitat in wetlands beyond the direct disturbance footprint, prior to any vegetation clearing, the development footprints should be clearly marked out with flagging tape/posts in the field.
- Vegetation clearing should be restricted to the proposed project footprints only, with no clearing permitted outside of these areas.
- The extent of disturbance should be limited by restricting all construction activities to the servitude as far as practically possible.
- Locate all laydown areas and temporary construction infrastructure at least 100 m from the edge of the delineated wetland.
- Wetland crossings should be constructed utilizing designs that ensure that hydrological integrity of the affected wetland is preserved, and natural flow regimes are maintained (i.e. no impoundment upstream of crossings, or flow concentration downstream of crossings.
- Ideally construction activities should take place in winter (during the dry season). Where summer construction is unavoidable, temporary diversions of the streams and stormwater management interventions might be required.
- Install erosion prevention measures as part of the stormwater management plan, prior to the onset of construction activities. Measures should include energy dissipating measures such as sandbags, Ecologs, or low berms on approach and departure slopes to crossings to prevent flow concentration. Sediment barriers such as silt fences or the placement of hay bales around the lower edge of bare soil areas, and active re-vegetation of disturbed areas as soon as possible, should form part of standard site management procedures, particularly during construction.

ALIEN AND INVASIVE SPECIES MANAGEMENT

An alien and invasive species management plan should be developed for the Project, which includes details of strategies and procedures that must be implemented on site to control the spread of alien and invasive species. A combined approach using both chemical and mechanical control methods, with periodic follow-up treatments informed by regular monitoring, is recommended.

10 MONITORING REQUIREMENTS

The following monitoring requirements are anticipated:

- Monitoring of wetland health to be conducted within one year of completion of construction, to measure any changes to the baseline status and ensure that recommended mitigation measures are sufficient to address any significant impacts.

11 CONCLUSION

The proposed Project powerline traverses a seep wetland of approximately 6.51 ha in size. The seep wetland was considered to be in a Moderately modified (PES C) state, as a result of existing impacts such as access roads cutting through the wetland, impoundment of flow at a dam upstream, and alien invasive plant species colonising the edges of the wetland, particularly along road crossings. The wetland was also assessed as having a Low/Marginal ecological importance and sensitivity, performing some functions such as hydrological importance (i.e., sediment trapping, phosphate assimilation, and erosion control), as well as some direct human benefits including tourism and recreation activities practiced in the game farm. Similarly, the ecosystem services supplied by or demanded from the seep wetlands were considered Low.

The Environmental Screening Tool rates the aquatic biodiversity theme as 'Very High Sensitivity' due to the presence of wetland features and areas mapped as wetland CBA and FEPA sub-catchment in the study area. Based on the findings of this study, the Project area was considered as having 'High Sensitivity' instead of 'Very High Sensitivity' due to the size and moderately modified present ecological state of the wetland as well as the Low/Marginal ecological importance and sensitivity of the wetland – the main reason for retaining the High sensitivity rating is the conservation status of the wetlands, i.e. wetland CBA, located within a FEPA sub-catchment.

The earthworks and activities involved during the construction phase of the Project can exert negative impacts on sensitive ecosystems including loss and disturbance of wetland habitat, changes in wetland health/functioning, formation of soil erosion and establishment and spread of alien invasive species. Without mitigation, these impacts could be of moderate-high significance on wetlands; however, with the application of recommended mitigation measures such as limiting disturbance to the Project footprint and keeping out of wetland habitat as far as possible, these impacts can be reduced to a low/very low impact significance. If not successfully mitigated, these impacts can progress into the operation and decommissioning phase of the project, which could lead to a change in the wetlands PES score. Avoidance of placement of pylons within wetlands is recommended to ensure that no significant impacts on wetland habitat are sustained as a result of the proposed Project.

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