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24 January 2023

NALA ENVIRONMENTAL CONSULTING FIRM
Arlene Singh: arlene@veersgroup.com

To whom it may concern:

AQUATIC ECOLOGICAL SPECIALIST INPUT FOR THE PART 2 AMENDMENT OF THE ENVIRONMENTAL AUTHORISATION (EA) FOR THE PROPOSED CONSTRUCTION OF THE 765 KV GAMMA SUBSTATION ON THE FARMS UIT VLUGT FONTEIN NO.265 AND SCHIETKUIL NO.3 IN THE PIXLEY KA SEMA AND CENTRAL KAROO DISTRICT MUNICIPALITIES; WESTERN CAPE PROVINCE AND NORTHERN CAPE PROVINCE (DFFE REF: 12/12/20/873).

1 The aquatic ecology assessment completed in 2007 as part of the Environmental Impact Assessment (EIA) undertaken by ACER for the proposed Construction of the 765 KV Gamma Substation on the farms Uit Vlugt Fontein and Schietkuil in the Western Cape and Northern Cape (DEA REF. No. 12/12/20/873), was **not available for review and consideration for this amendment** as it could not be located.

2 The abovementioned study as part of the Environmental Authorisation (EA) process (DEA REF. NO. 12/12/20/873) could not be reviewed by The Biodiversity Company (TBC) who conducted a site assessment in April 2022, followed by a Sensitivity Verification in October 2022. Associated site visits were conducted in March 2022, April 2022 and August 2022. The site assessments and site verifications undertaken in 2022 by TBC will therefore be used as the most recent source of information for the purposes of this amendment.

3 The construction date for the additional infrastructure for the Gamma Substation is not yet finalised. However, to optimize the proposed project, the following amendments are applied for in terms of the EIA Regulations, 2014, as amended:

3.1. Addition of Conditions to the EA regarding the Updated Layout (April 2023);

3.2. Amendment to the project description on Page 3 of the Environmental authorisation related to the updated layout and co-ordinates of the 765 kV Gamma Substation;

3.3. Amendment to the Title of the Environmental Authorisation; and

3.4. Change the name of the contact person and contact details for the Holder of the Environmental Authorisation.

4 This change in layout, although within the scope of the current EA, requires that the respective specialist studies hitherto undertaken as part of the original EA process must be reviewed by respective specialists in order to ascertain whether conditions on site have changed since the original EIA (ACER, 2007). This letter serves this purpose. Nala Environmental has requested confirmation regarding the assessed impacts in terms of the following:

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- An assessment of all impacts (including cumulative impacts) related to the proposed changes
- Discussion on the change in impact or any new impacts, if any
- Additional mitigation measures, if any
- Any disadvantages and advantages that may result due to the amendment.

5 Findings from the Site Ecological Importance description from the 2022 Freshwater Ecology Assessment Report (M Ryan and A Husted, 2022) presented the following:

5.1. Two habitat units were identified and delineated for the project, including both perennial and ephemeral watercourses.

5.2. The aquatic theme sensitivity was determined to be 'medium' for both units.

6 Impact Assessment from the 2022 Freshwater Ecology Assessment Report (M Ryan and A Husted, 2022) included impact assessment tables for the full grid line, associated access roads, switching stations and the Gamma Substation.

6.1. Impact tables are summarised below:

Impact	Rating after mitigation
Construction Phase	
Small scale drainage patterns change	Low
Isolated removal of embankment vegetation areas for select roads	Low
Operation of equipment and machinery outside riparian areas	Low
Soil and building material stockpile management	Low
Domestic and industrial waste	Low
Storage of chemicals, mixes, and fuel	Low
Final landscaping and post-construction rehabilitation	Low
Operational Phase	
Alteration of surface drainage and runoff	Low
Storm water management	Low
Operation of transmission line and substation	Low
Establishment of alien plants on disturbed areas	Low
Conducting maintenance	Low
Alteration of surface drainage and runoff	Low

7 A cumulative impact assessment was undertaken for the site assessed in context of the extent of the proposed project area; other developments in the area; and general habitat loss and transformation resulting from other activities in the area (all activities, as required for assessment of cumulative impacts including surrounding wind energy facilities, powerlines and associated infrastructure in the region). The impact table is reproduced below:

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Table1: Cumulative Impacts to biodiversity associated with the proposed project.

The development of the proposed infrastructure will contribute to cumulative habitat loss, habitat fragmentation at crossing points thereby impacting ecological processes in the region. Increases surface runoff from has the potential to increase water quality perturbations within the catchment.		
	Overall impact of the proposed project considered in isolation	**Cumulative impact of the project and other projects in the area**
Extent	Low (2)	Low (2)
Duration	Long term (4)	Permanent (5)
Magnitude	Low (4)	Low (4)
Probability	Highly probable (4)	Definite (5)
Significance	**Medium**	**Medium**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	No	No
Can impacts be mitigated?	Yes	
Mitigation: See section 9.3		
Residual Impacts:		
Will result in the loss of: • **Less migratory species will be found in the area.** • **Instream sedimentation** • **Erosion** • **Instream and riparian habitat fragmentation**		

8 Conclusions from the 2022 Freshwater Ecology Assessment Report (M Ryan and A Husted, 2022) related to the Emoyeni Grid infrastructure with those applicable specifically to the Gamma Substation extracted included the following:

8.1. The Gamma Substation is located 'within' a watercourse identified at a desktop level, as shown below.

8.2. The towers can be positioned to avoid the watercourses and 18 m recommended for these systems.

8.3. Watercourses will not be directly affected by the project.

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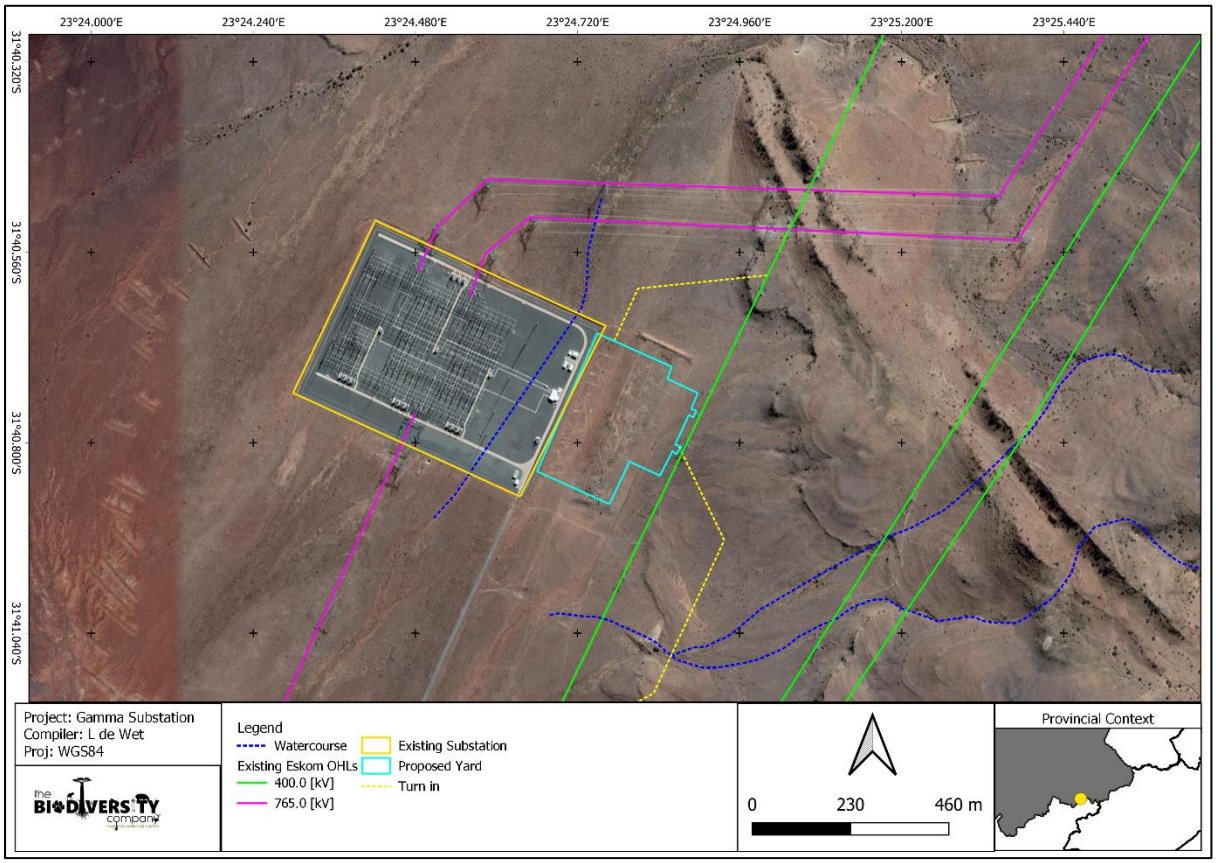

9 In order to manage the impacts effectively, the following mitigation management should be put into place as part of the EMPr's for the general impacts associated with watercourses:

9.1. The footprint area of the transmission line must be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.

9.2. The infrastructure footprint areas must avoid the delineated water resources and adhere to the prescribed buffer areas.

9.3. Vehicles and equipment required for the suspension of cables across watercourses are permitted to access the buffer areas but may not intrude into the delineated watercourses.

9.4. The footprint area must be aligned with the existing road/railway reserves wherever possible. Disturbed areas should be sought as the preferred alignment area.

9.5. The locations of all single circuit angle steel towers which hold the transmission line must be located outside of all delineated watercourses.

9.6. Where feasible all access roads should use existing farm roads before new roads are constructed.

9.7. Preferential flow paths should be identified that intersect with new roads so that silt traps and fences can be installed to avoid siltation of watercourses.

9.8. An appropriate stormwater management plan must be developed for all substations.

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10 The desktop aquatic biodiversity theme sensitivity according to the screening tool for a portion of the site area is 'Low'. A baseline assessment (2022) determined the sensitivity of the local watercourses to be 'Medium'.

11 Impacts identified and assessed as part of the Freshwater Ecology Assessment Report (M Ryan and A Husted, 2022) are relevant, though assessed for the entire grid and associated infrastructure including the corridor associated with the 400kV Droer- Hydra 2 Overhead Powerline and the Gamma substation yard location. No new impacts were identified in the most recent study, nor are any new impacts expected. It is considered that impacts so far identified and assessed are an accurate representation of the impacts associated with the proposed new layout of the Gamma substation.

12 In terms of freshwater ecology, there are no advantages of the proposed new layout. However, the proposed new layout is **not expected** to result in an increase in expected impacts or their associated severities. The increased area **does not pose a direct risk** to the identified watercourses.

13 All prescribed mitigation measures and supporting recommendations presented here will help to achieve an acceptable residual impact. These measures and recommendations will remain applicable for the requested amendment to the EA. To this end, these measures have been included in the Generic EMPr's (Generic EMPrs for the substation yard and turn-in's associated with the existing 400kV Droer- Hydra 2 Overhead Powerline) for this amendment per the requirements of the EIA Regulation, 2014 (as amended).

14 As such, should the measures described above, and as included in the Generic EMPr's for this development be implemented, it is the reasoned opinion of the specialist that the proposed layout changes i.e., the inclusion of the proposed substation yard within the authorised footprint of the existing 765kV Gamma Substation and the proposed turn-in of the existing Droer-Hydra 2 400kV powerline be approved.

15 We trust you find the above in order. If there are any uncertainties or additional information required, please feel free to contact the undersigned.

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Kind regards,

Andrew Husted

Project Management (SACNASP 400213/11)

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TERMS OF REFERENCE AND ENVIRONMENTAL IMPACT METHODOLOGY

TERMS OF REFERENCE:

The report amendment report must reflect:

- An assessment of all impacts related to the proposed changes;
- Advantages and disadvantages associated with the changes;
- Comparative assessment of the impacts before the changes and after the changes; and
- Measures to ensure avoidance, management and mitigation of impacts associated with such proposed changes, and any changes to the EMPr.

The assessment must be clear on whether each of the proposed changes to the EA will:

- Increase the significance of impacts originally identified in the EIA report or lead to any additional impacts; or
- Have a zero or negligible effect on the significance of impacts identified in the EIA report; or
- Lead to a reduction in any of the identified impacts in the EIA report.

Please take note that should there be no change to impacts and their significance ratings as identified in the EIA process (as the corridor has already been assessed), no impact tables will be necessary to include. Should there be an increase or decrease in significance or additional impacts not identified within the EIA process, the Impact Assessment Methodology and table format should be used and additional mitigation measures, if any, should be included.

ENVIRONMENTAL IMPACT METHODOLOGY:

The impact significance rating methodology, as provided by Nala, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended).

Direct, indirect and cumulative impacts associated with the projects must be assessed in terms of the following criteria:

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- The **nature**, which shall include a description of what causes the effect, what will be affected and how it will be affected.
- The **extent**, wherein it will be indicated whether the impact will be local (limited to the immediate area or site of development) or regional, and a value between 1 and 5 will be assigned as appropriate (with 1 being low and 5 being high):
- The **duration**, wherein it will be indicated whether:
  - the lifetime of the impact will be of a very short duration (0–1 years) – assigned a score of 1;
  - the lifetime of the impact will be of a short duration (2-5 years) - assigned a score of 2;
  - medium-term (5–15 years) – assigned a score of 3;
  - long term (> 15 years) - assigned a score of 4; or
  - permanent - assigned a score of 5;
- The **magnitude**, quantified on a scale from 0-10, where 0 is small and will have no effect on the environment, 2 is minor and will not result in an impact on processes, 4 is low and will cause a slight impact on processes, 6 is moderate and will result in processes continuing but in a modified way, 8 is high (processes are altered to the extent that they temporarily cease), and 10 is very high and results in complete destruction of patterns and permanent cessation of processes.
- The **probability** *of occurrence*, which shall describe the likelihood of the impact actually occurring. Probability will be estimated on a scale of 1–5, where 1 is very improbable (probably will not happen), 2 is improbable (some possibility, but low likelihood), 3 is probable (distinct possibility), 4 is highly probable (most likely) and 5 is definite (impact will occur regardless of any prevention measures).
- the **significance**, which shall be determined through a synthesis of the characteristics described above and can be assessed as low, medium or high; and
- the **status**, which will be described as either positive, negative or neutral.
- the degree to which the impact can be reversed.
- the degree to which the impact may cause irreplaceable loss of resources.
- the *degree* to which the impact can be *mitigated.*

The **significance** is calculated by combining the criteria in the following formula:

S = (E+D+M) P

S = Significance weighting

E = Extent

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D = Duration

M = Magnitude

P = Probability

The **significance weightings** for each potential impact are as follows:

- < 30 points: Low (i.e., where this impact would not have a direct influence on the decision to develop in the area),
- 30-60 points: Medium (i.e., where the impact could influence the decision to develop in the area unless it is effectively mitigated),
- > 60 points: High (i.e., where the impact must have an influence on the decision process to develop in the area).

Example of Impact table summarising the significance of impacts (with and without mitigation)

Nature: **[Outline and describe fully the impact anticipated as per the assessment undertaken]**		
	Without mitigation	**With mitigation**
Extent	High (3)	Low (1)
Duration	Medium-term (3)	Medium-term (3)
Magnitude	Moderate (6)	Low (4)
Probability	Probable (3)	Probable (3)
Significance	**Medium (36)**	**Low (24)**
Status (positive or negative)	Negative	Negative
Reversibility	Low	Low
Irreplaceable loss of resources?	Yes	No
Can impacts be mitigated?	Yes	
Mitigation: "Mitigation", means to anticipate and prevent negative impacts and risks, then to minimise them, rehabilitate or repair impacts to the extent feasible. Provide a description of how these mitigation measures will be undertaken keeping the above definition in mind		
Residual Impacts: "Residual Risk", means the risk that will remain after all the recommended measures have been undertaken to mitigate the impact associated with the activity (Green Leaves III, 2014).		

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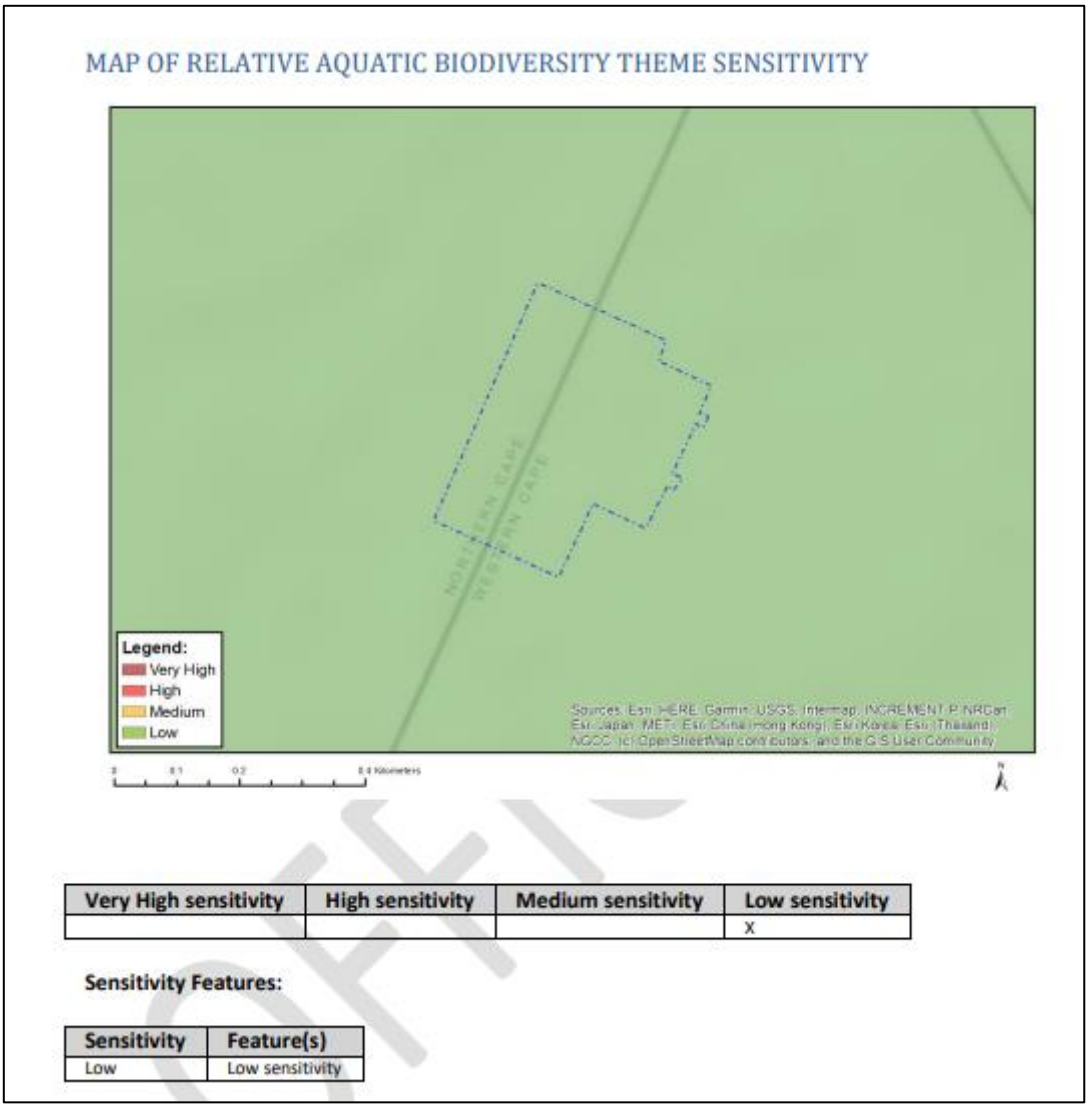

Figure 1. Map of relative aquatic biodiversity theme for the proposed Gamma substation yard as per the DFFE Screening Tool

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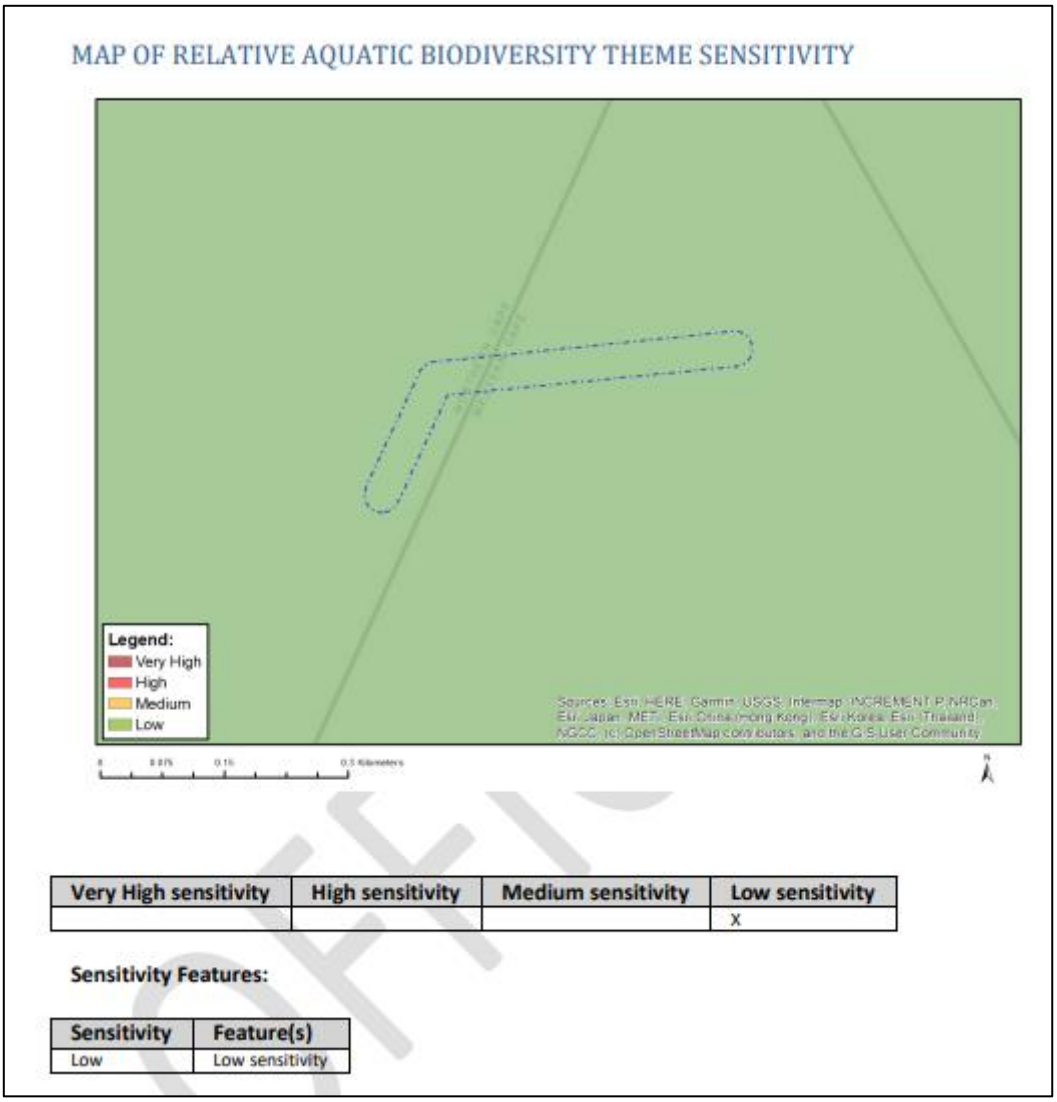

Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
			X

Sensitivity Features:

Sensitivity	Feature(s)
Low	Low sensitivity

Figure 2. Map of relative aquatic biodiversity theme for the proposed 400kV turn-in as per the DFFE Screening Tool

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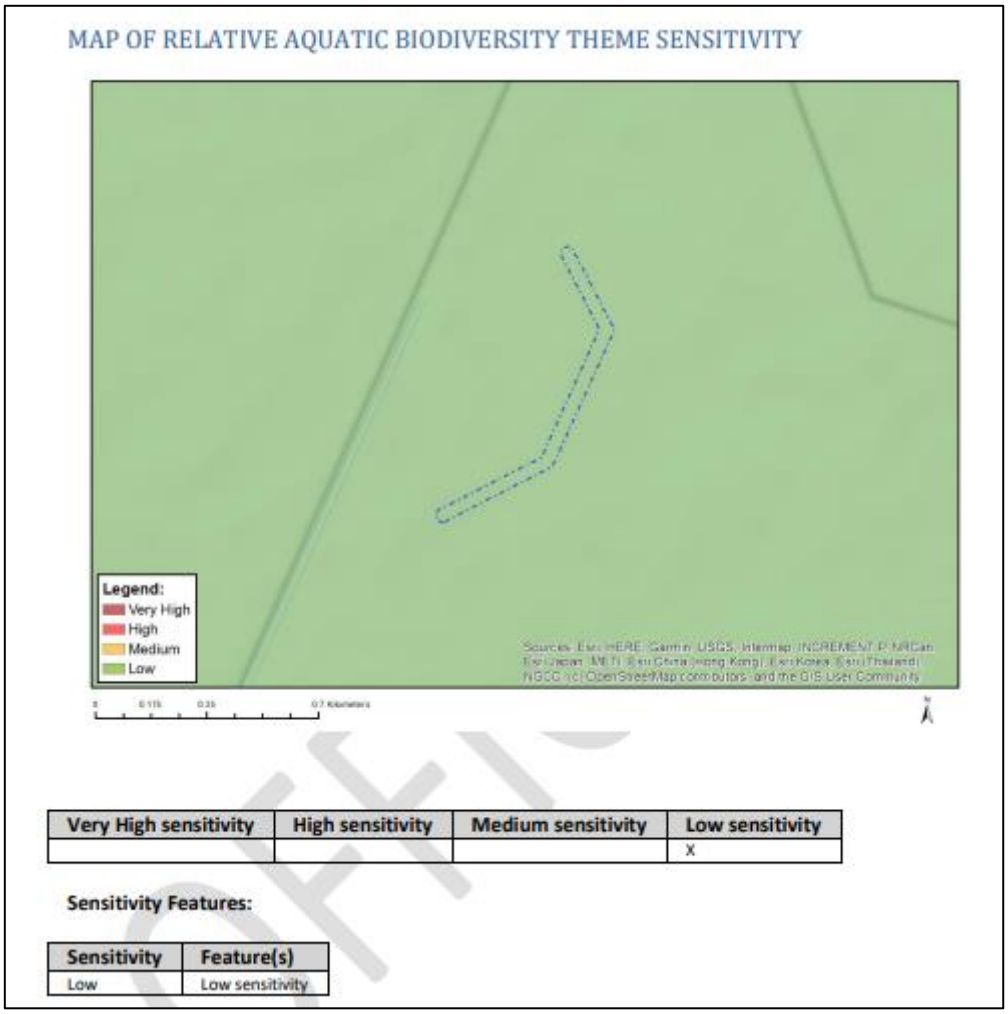

Figure 3. Map of relative aquatic biodiversity theme for the proposed 400kV turn-in as per the DFFE Screening Tool

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SITE SENSIVITY VERIFICATION REPORT

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AQUATIC SITE SENSITIVITY VERIFICATION

CONTENTS

1. INTRODUCTION

The construction of the Eskom Gamma Substation was authorised by the Department of Environmental Affairs in 2007. The approval was for constructing the complete Gamma substation. However, it was noted that individual components would be constructed in a phased approach as determined by the electricity demand over several years.

As such, the first construction phase of the Gamma substation commenced during the original validity period of the EA and was completed in 2013 (**Figure 1**).

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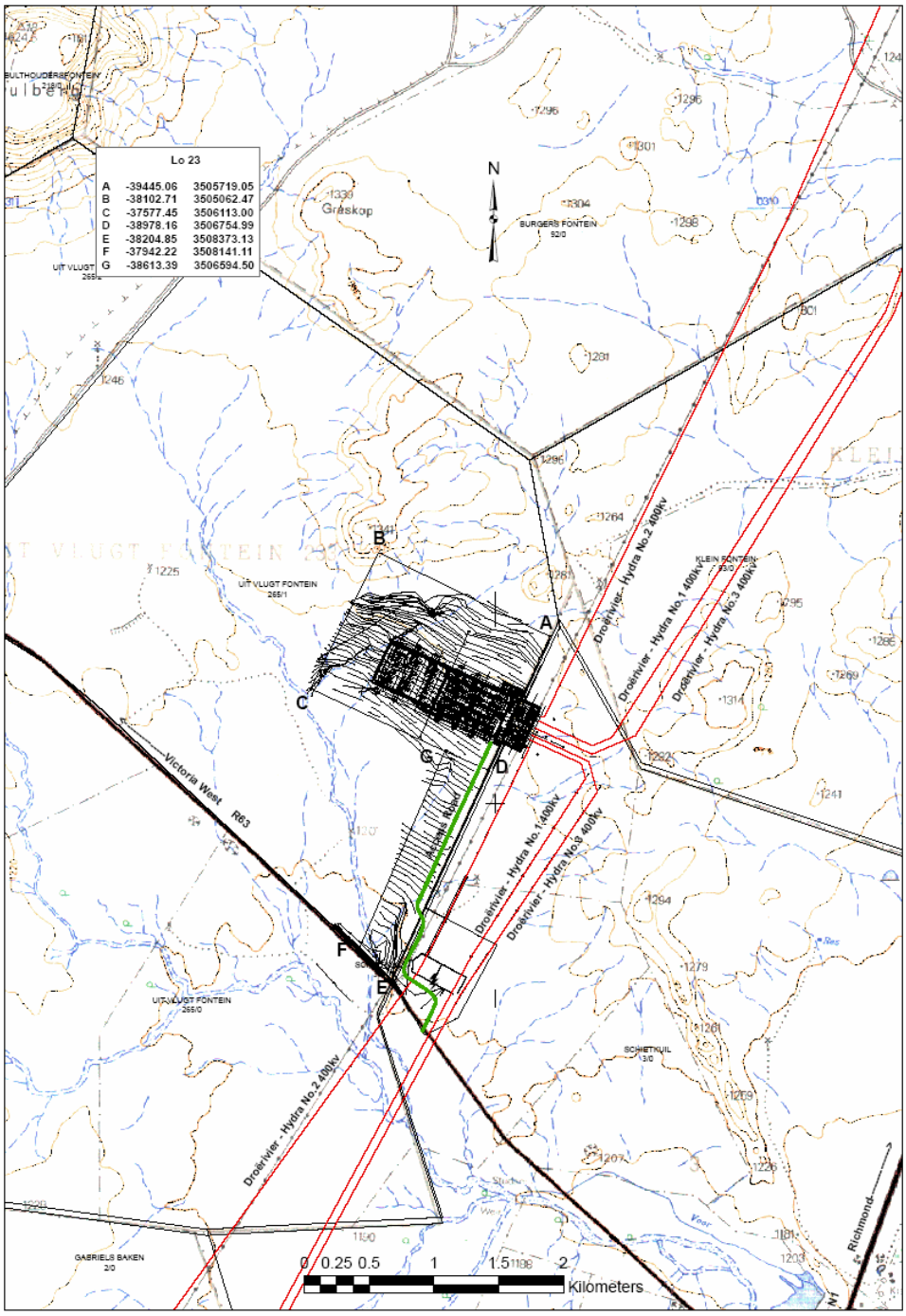

Figure 1 - As per the Final Environmental Impact Report (FEIR) (2007) indicating the layout of the 765kV Gamma Substation as authorised.

Proposed Second Phase

The holder of the EA proposes to commence construction of the second phase of the authorised substation development, specifically the development of a 132/400kV yard at the

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existing MTS and OHL turn-in of the existing 400kV Droer-Hydra 2 Overhead Powerline into the substation yard, as provided for in the current EA.

The next phase of construction activities associated with the EA is directly linked to the increased demand for grid infrastructure which is linked to upcoming Renewable Energy projects in the Northern and Western Cape Provinces. Notably, the 132kV/400kV yard and 400kV OHL turn-ins are needed to enable the connection of the authorised Umsinde Emoyeni Wind Farm (DFFE Ref: 14/12/16/3/3/2/686) with has been registered as Strategic Integrated Project (SIP).

The proposed 132kV/400kV yard and 400kV OHL turn-ins fall within the scope of the current EA. However – based on further technical analysis and design – it has been identified that the layout of the authorised infrastructure will need to be updated to reflect the updated configuration proposed (i.e., the 132kV/400kV substation yard and 400kV turn-in) to be implemented. The updated layout falls within the scope and footprint of what was originally assessed in the original EIA process, however for the avoidance of doubt the holder wishes to have the updated layout approved by DFFE prior to implementation thereof.

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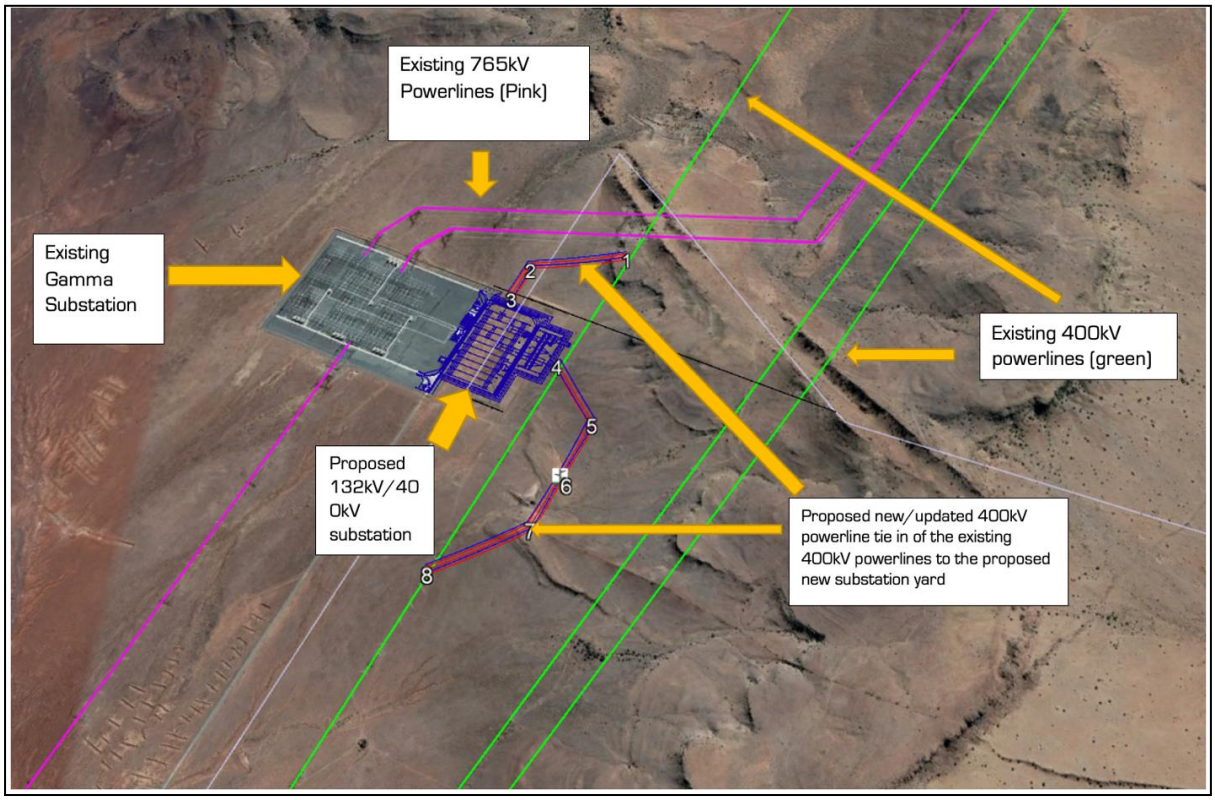

Figure 2 - Proposed Updated Layout depicting the existing Gamma Substation with the next phase of the authorised development now proposed for implementation (new proposed 132kV/400kV Substation yard and new reconfigured turn-in and turn-out of the existing 400kV powerline).

A Part 2 amendment application is proposed to be undertaken for the proposed update to the layout to the existing 765kV Gamma Substation and associated powerline turn-in infrastructure. The next phase of the Gamma MTS development that will now be implemented will consist of:

1. A substation yard with a step-up voltage of 132kV/400kV on Farm Schietkuil 3 and Farm Uit Vlugt Fontein 265; and
2. In addition, the existing Eskom 400kV overhead powerline that currently bypasses the existing Gamma Substation (i.e. the "Droerivier- Hydra No. 2" 400kV OHL) will be reconfigured to turn-in and turn-out of the new substation yard.

In terms of the National Environmental Management Act (Act 107 of 1998, as amended) (NEMA) Environmental Impact Assessment (EIA) Regulations [4 December 2014, Government Notice (GN) R982, R983, R984 and R985, as amended], various aspects of the proposed development may have an impact on the environment and are considered to be listed activities. These activities require authorisation from the National Competent Authority

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(CA), namely the Department of Forestry, Fisheries and the Environment (DFFE), prior to the commencement thereof. Further to this as per GN R. 2313 : ***Adoptions of the standard for the development and expansion of powerlines and substation with identified geographical areas and the exclusion of this infrastructure from the requirements to obtain Environmental Authorisation*** , the Standard was adopted in terms of section 24(10)(a) of the Act for the purpose of excluding the activities contemplated in paragraph 5.1 and 5.2 of the Schedule from the requirement to obtain environmental authorisation prior to commencement. In terms of the procedural requirement set out in the standard, screening tool reports have been undertaken for the updated gamma substation layout and associated infrastructure and site sensitivity verifications have been undertaken by the relevant specialists in accordance with the sensitivity themes. As per 6.1. of the GNR .2313, "Where any part of the infrastructure occurs on an area for which the environmental sensitivity for any environmental theme is identified as being very high or high by the national web based environmental screening tool and confirmed to be such through the application of the procedures set out in the Standard", the site sensitivity verifications have been performed as per the procedural requirements set out.

In accordance with GN 320 and GN 1150 (20 March 2020)[1] of the NEMA EIA Regulations of 2014 (as amended), prior to commencing with a specialist assessment, a site sensitivity verification must be undertaken to confirm the current land use and environmental sensitivity of the proposed project areas as identified by the National Web-Based Environmental Screening Tool (i.e., Screening Tool). Leigh- Ann De Wet, Andrew Husted and Jan Jacobs, as terrestrial specialists, have been commissioned to verify the sensitivity of the project sites under these specialist protocols.

The scope of this report is for one (1) application, namely the Part 2 ammendment application for the proposed update top the layout to the exisiting 765kV Gamma Substation and associated powerline turn-in infrastructure. The next phase of the Gamma MTS development that will now be implemented will consist of:

1. A substation yard with a step-up voltage of 132kV/400kV on Farm Schietkuil 3 and Farm Uit Vlugt Fontein 265; and
2. In addition, the existing Eskom 400kV overhead powerline that currently bypasses the existing Gamma Substation (i.e. the "Droerivier- Hydra No. 2" 400kV OHL) will be reconfigured to turn-in and turn-out of the new substation yard

[1] GN 320 (20 March 2020): Procedures for The Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation

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2. SITE SENSITIVITY VERIFICATION METHODOLOGY

The following information sources were consulted to compile this report:

Aquatic Assessment

Two late high flow survey was conducted from the 28th of March until the 1st of April 2022 followed by the 11th to 14th April 2022 as a result of a flood event which occurred on the 1st of April which hindered the applicability of the results thereafter, requiring a subsequent survey to complete the assessment. Standard methods were used to establish the baseline conditions of the considered river reaches. Details pertaining to the specific methodologies applied are provided in the relevant sections below.

Water Quality

Water quality was measured in situ using a handheld calibrated Extech® DO700 multi-meter. The constituents considered that were measured included: pH, conductivity (µS/cm), water temperature (°C) and Dissolved Oxygen (DO) in mg/l.

Aquatic Habitat Integrity

The Intermediate Habitat Assessment Index (IHIA) as described in the Procedure for Rapid Determination of Resource Directed Measures for River Ecosystems (Section D), 1999 was used to define the ecological status of all NFEPA river reaches. The reaches within the project area experience uniform influences with similar geomorphological processes. As a result, many river systems were grouped together.

The IHIA model will be used to assess the integrity of the habitats from a riparian and in-stream perspective. The habitat integrity of a river refers to the maintenance of a balanced composition of physico-chemical and habitat characteristics on a temporal and spatial scale which are comparable to the characteristics of natural habitats of the region (Kleynhans, 1996).

This model compares current conditions with reference conditions that are expected to have been present. Specification of the reference condition follows an impact based approach where the intensity and extent of anthropogenic changes are used to interpret the impact on the habitat integrity of the system. To accomplish this, information on abiotic changes that can potentially influence river habitat integrity are obtained from surveys or available data sources. These changes are all related and interpreted in terms of modification of the drivers of the system, namely hydrology, geomorphology and physico-chemical conditions and how these changes would impact on the natural riverine habitats. The criteria and ratings utilised in the

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assessment of habitat integrity in the current study are presented in Table 1 and Table 2 respectively.

Table 1: Criteria used in the assessment of habitat integrity (Kleynahns, 1996).

Criterion	Relevance
Water abstraction	Direct impact on habitat type, abundance and size. Also implicated in flow, bed, channel and water quality characteristics. Riparian vegetation may be influenced by a decrease in the supply of water.
Flow modification	Consequence of abstraction or regulation by impoundments. Changes in temporal and spatial characteristics of flow can have an impact on habitat attributes such as an increase in duration of low flow season, resulting in low availability of certain habitat types or water at the start of the breeding, flowering or growing season.
Bed modification	Regarded as the result of increased input of sediment from the catchment or a decrease in the ability of the river to transport sediment. Indirect indications of sedimentation are stream bank and catchment erosion. Purposeful alteration of the stream bed, e.g. the removal of rapids for navigation is also included.
Channel modification	May be the result of a change in flow, which may alter channel characteristics causing a change in marginal instream and riparian habitat. Purposeful channel modification to improve drainage is also included.
Water quality modification	Originates from point and diffuse point sources. Measured directly or alternatively agricultural activities, human settlements and industrial activities may indicate the likelihood of modification. Aggravated by a decrease in the volume of water during low or no flow conditions.
Inundation	Destruction of riffle, rapid and riparian zone habitat. Obstruction to the movement of aquatic fauna and influences water quality and the movement of sediments.
Exotic macrophytes	Alteration of habitat by obstruction of flow and may influence water quality. Dependent upon the species involved and scale of infestation.
Exotic aquatic fauna	The disturbance of the stream bottom during feeding may influence the water quality and increase turbidity. Dependent upon the species involved and their abundance.
Solid waste disposal	A direct anthropogenic impact which may alter habitat structurally. Also, a general indication of the misuse and mismanagement of the river.

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Indigenous vegetation removal	Impairment of the buffer the vegetation forms to the movement of sediment and other catchment runoff products into the river. Refers to physical removal for farming, firewood and overgrazing.
Exotic vegetation encroachment	Excludes natural vegetation due to vigorous growth, causing bank instability and decreasing the buffering function of the riparian zone. Allochtonous organic matter input will also be changed. Riparian zone habitat diversity is also reduced.
Bank erosion	Decrease in bank stability will cause sedimentation and possible collapse of the riverbank resulting in a loss or modification of both instream and riparian habitats. Increased erosion can be the result of natural vegetation removal, overgrazing or exotic vegetation encroachment.

Table 2: Descriptions used for the ratings of the various habitat criteria

Impact Category	Description	Score
None	No discernible impact or the modification is located in such a way that it has no impact on habitat quality, diversity, size and variability.	0
Small	The modification is limited to very few localities and the impact on habitat quality, diversity, size and variability are also very small.	1-5
Moderate	The modifications are present at a small number of localities and the impact on habitat quality, diversity, size and variability are also limited.	6-10
Large	The modification is generally present with a clearly detrimental impact on habitat quality, diversity, size and variability. Large areas are, however, not influenced.	11-15
Serious	The modification is frequently present and the habitat quality, diversity, size and variability in almost the whole of the defined area are affected. Only small areas are not influenced.	16-20
Critical	The modification is present overall with a high intensity. The habitat quality, diversity, size and variability in almost the whole of the defined section are influenced detrimentally.	21-25

Riparian Habitat Delineation

The riparian delineation was completed according to DWAF (2005a; Figure 3). Typical riparian cross sections and structures are provided in. Indicators such as topography and vegetation were the primary indicators used to define the riparian zone. Contour data obtained from topography spatial data was also utilised to support the infield assessment.

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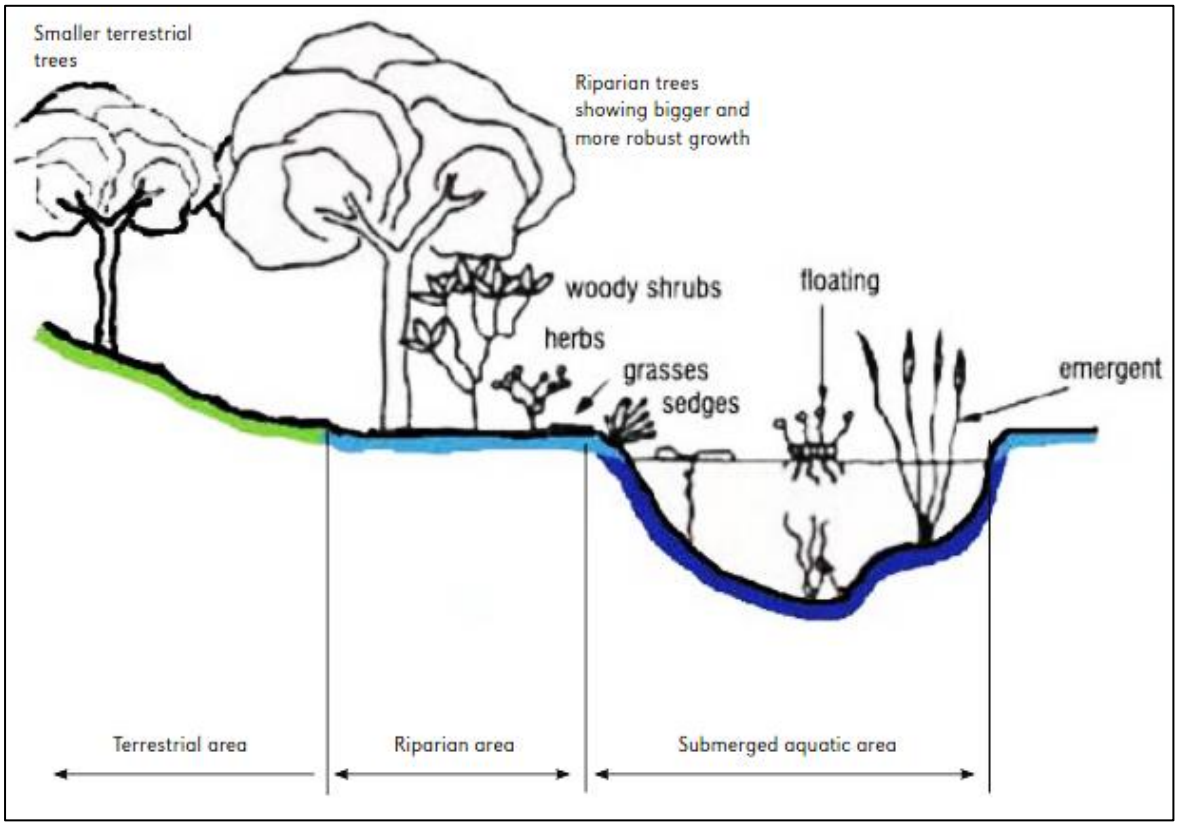

Figure 3: Riparian Habitat Delineations (DWAF, 2005a)

Aquatic Macroinvertebrate Assessment

Macroinvertebrate assemblages are good indicators of localised conditions because many benthic macroinvertebrates have limited migration patterns or a sessile mode of life. They are particularly well-suited for assessing site-specific impacts (upstream and downstream studies) (Barbour *et al.,* 1999). Benthic macroinvertebrate assemblages are made up of species that constitute a broad range of trophic levels and pollution tolerances, thus providing strong information for interpreting cumulative effects (Barbour *et al.,* 1999). The assessment and monitoring of benthic macroinvertebrate communities forms an integral part of the monitoring of the health of an aquatic ecosystem.

Invertebrate Habitat

The invertebrate habitat at the site was assessed using the South African Scoring System version 5 (SASS5) biotope rating assessment as applied in Tate and Husted (2015). A rating system of 0 to 5 was applied, 0 being not available. The weightings for lowland rivers (slope class F) were used to categorize biotope ratings (Rowntree et al. 2000; Rowntree & Ziervogel, 1999).

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South African Scoring System

The South African Scoring System version 5 (SASS5) is the current index being used to assess the status of riverine macroinvertebrates in South Africa. According to Dickens and Graham (2002), the index is based on the presence of aquatic invertebrate families and the perceived sensitivity to water quality changes of these families. Different families exhibit different sensitivities to pollution, these sensitivities range from highly tolerant families (e.g. Chironomidae) to highly sensitive families (e.g. Perlidae). SASS results are expressed both as an index score (SASS score) and the Average Score Per recorded Taxon (ASPT value). Sampled invertebrates were identified using the "Aquatic Invertebrates of South African Rivers" Illustrations book, by Gerber and Gabriel (2002). Identification of organisms was made to family level (Thirion *et al.,* 1995; Dickens and Graham, 2002; Gerber and Gabriel, 2002).

All SASS5 and ASPT scores are compared with the SASS5 Data Interpretation Guidelines (Dallas, 2007) for the Nama Karoo – Lower Ecoregion (Figure 4). The project area falls within the Drought Corridor ecoregion however this ecoregion has no available data. The drainage network potentially affected by the project area flows into the Buffels River downstream which falls within the Great Karro ecoregion which has inadequate data to generate biological bands. As a result, the nearest ecoregion to the project area was utilized which is the Nama Karoo – Lower Ecoregion, ~15 km to the north of the project area. This method seeks to develop biological bands depicting the various ecological states and is derived from data contained within the Rivers Database and supplemented with other data not yet in the database.

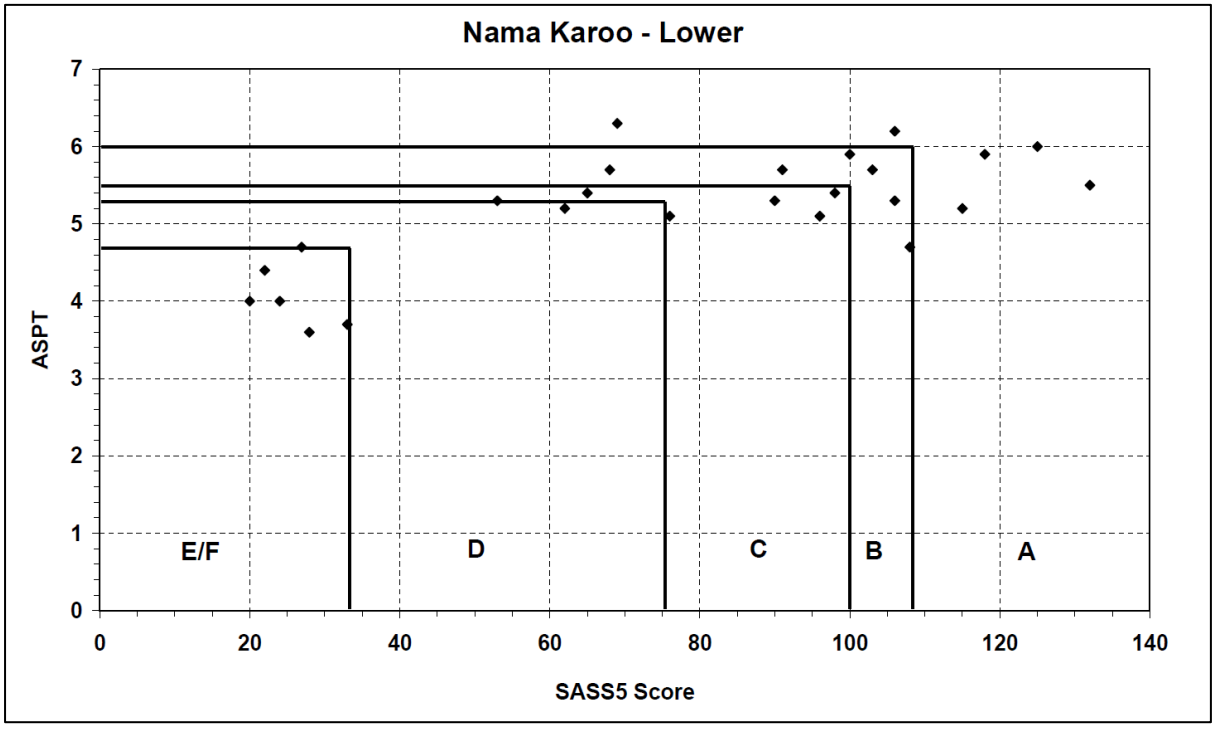

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Figure 4: Biological Bands for the Nama Karoo – Lower Ecoregion, calculated using percentiles

Fish Presence

Fish were sampled through electroshocking. All fish were identified in the field and released at the point of capture, in order not to cross fish populations. Fish species were identified using the guide Freshwater Fishes of Southern Africa (Skelton, 2001). The identified fish species were compared to those expected to be present for the quaternary catchment. The expected fish species list for the reach was developed from a literature survey to compare to the sampled species at site. Different fish species represent different sensitivities to water chemistry, habitat and flow (Kleynhans *et al*., 2007 and Skelton 2001).

Fish Sensitivities

Fish have different sensitivities or levels of tolerance to various aspects that they are subjected to within the aquatic environment. These tolerance levels are rated with a sensitivity score as presented in Table 3. These tolerance levels are scored to show each fish species' sensitivity to flow and physico-chemical modifications.

Table 3: Intolerance rating and sensitivity of fish species

Sensitivity Score	Tolerance/Sensitivity Level
0-1	Highly tolerant = Very low sensitivity
1-2	Tolerant = Low sensitivity
2-3	Moderately tolerant = Moderate sensitivity
3-4	Moderately intolerant = High sensitivity
4-5	Intolerant = Very high sensitivity

Site Ecological Importance

The different habitat types within the assessment area were delineated and identified based on observations during the field assessment as well as information from available satellite imagery. These habitat types were assigned Ecological Importance (EI) categories based on their ecological integrity, conservation value, the presence of Species of Conservation Concern (SCC) and their ecosystem processes.

Site Ecological Importance (SEI) is a function of the Biodiversity Importance (BI) of the receptor (e.g., SCC, the vegetation/fauna community or habitat type present on the site) and Receptor Resilience (RR) (its resilience to impacts).

BI is a function of Conservation Importance (CI) and the Functional Integrity (FI) of the receptor. The criteria for the CI and FI ratings are provided in Table 4 and Table 5 respectively.

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Table 4: Summary of Conservation Importance Criteria

Conservation Importance	Fulfilling Criteria
Very High	Confirmed or highly likely occurrence of CR, EN, VU or Extremely Rare or Critically Rare species that have a global EOO of < 10 km^2. 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 an EN ecosystem type. Globally significant populations of congregatory species (> 10% of global population).
High	Confirmed or highly likely occurrence of CR, EN, VU species that have a global EOO of > 10 km^2. 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. 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. Presence of Rare species. Globally significant populations of congregatory species (> 1% but < 10% of global population).
Medium	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. Any area of natural habitat of threatened ecosystem type with status of VU. Presence of range-restricted species. > 50% of receptor contains natural habitat with potential to support SCC.
Low	No confirmed or highly likely populations of SCC. No confirmed or highly likely populations of range-restricted species. < 50% of receptor contains natural habitat with limited potential to support SCC.
Very Low	No confirmed and highly unlikely populations of SCC. No confirmed and highly unlikely populations of range-restricted species. No natural habitat remaining.

Table 5: Summary of Functional Integrity Criteria

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

BI can be derived from a simple matrix of CI and FI as provided in Table 6.

Table 6: Matrix used to derive Biodiversity Importance from Functional Integrity and Conservation Importance

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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

The fulfilling criteria to evaluate RR are based on the estimated recovery time required to restore an appreciable portion of functionality to the receptor as summarised in Table 7.

Table 7: Summary of Receptor Resilience criteria

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.

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Resilience	Fulfilling Criteria
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.

After the determination of the BI and RR, the SEI can be ascertained using the matrix as provided in Table 8.

Table 8: Matrix used to derive Site Ecological Importance from Receptor Resilience and Biodiversity Importance.

Site Ecological Importance		Biodiversity Importance				
		Very high	High	Medium	Low	Very low
Receptor Resilience	**Very Low**	Very high	Very high	High	Medium	Low
	Low	Very high	Very high	High	Medium	Very low
	Medium	Very high	High	Medium	Low	Very low
	High	High	Medium	Low	Very low	Very low
	Very High	Medium	Low	Very low	Very low	Very low

Interpretation of the SEI in the context of the proposed activities is provided in Table 9.

Table 9: Guidelines for interpreting Site Ecological Importance in the context of the proposed activities.

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.

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Site Ecological Importance	Interpretation in relation to proposed development 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.

The SEI evaluated for each taxon can be combined into a single multi-taxon evaluation of SEI for the assessment area. Either a combination of the maximum SEI for each receptor should be applied, or the SEI may be evaluated only once per receptor but for all necessary taxa simultaneously. For the latter, justification of the SEI for each receptor is based on the criteria that conforms to the highest CI and FI, and the lowest RR across all taxa.

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3. OUTCOME OF SITE SENSITIVITY VERIFICATION

Spatially Sensitive Mapping

This approach has also taken cognisance of the recently published Government Notice 320 in terms of NEMA dated March 2020: “Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in terms of Sections 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998, when applying for Environmental Authorisation” (DWS, 2020). The National Web Based Environmental Screening Tool (NWBEST) has characterised the aquatic biodiversity theme sensitivity for the project area as “Low” – which required only a compliance statement (Figures 5, 6 and 7). The freshwater ecology of the immediate project area and further downstream areas are considered sensitive to disturbance from a hydrological and biological perspective. This will include all watercourses within the project area which are considered sensitive due to their relatively small spatial scale when compared to terrestrial habitat with a large demand for the ecosystem services which they provide.

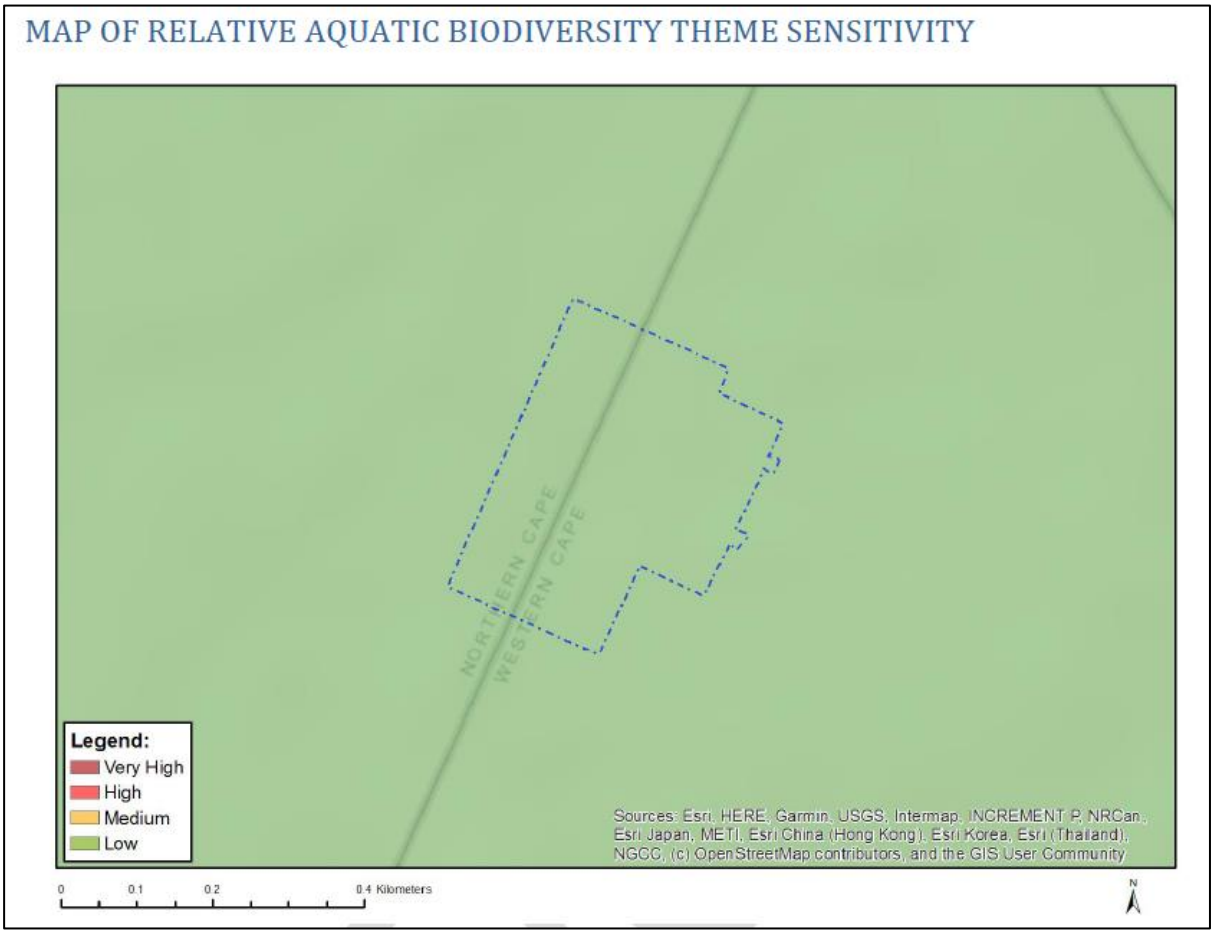

Figure 5: Aquatic Biodiversity Combined Sensitivity (National Web based Environmental Screening Tool)*: Gamma Substation*

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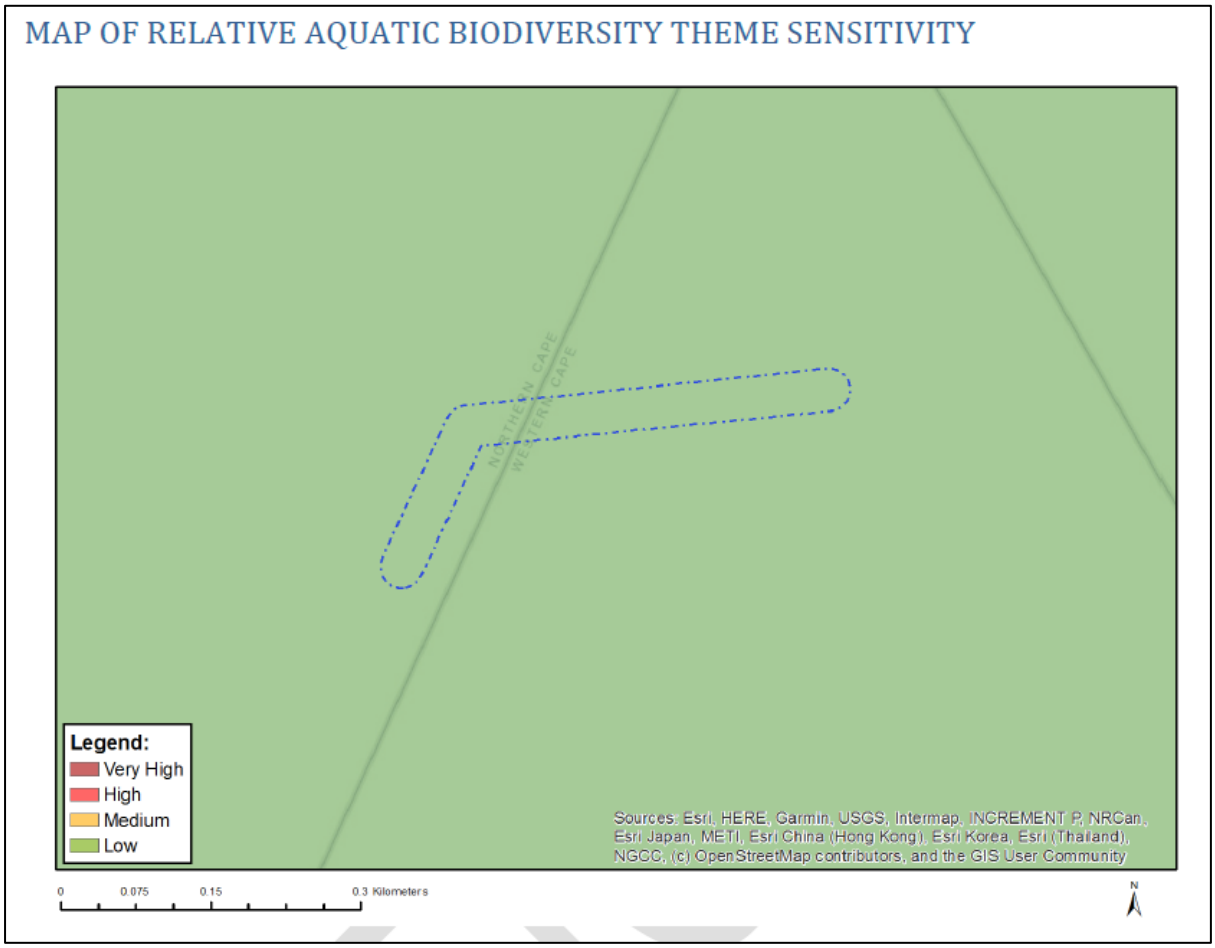

Figure 6: Aquatic Biodiversity Combined Sensitivity (National Web based Environmental Screening Tool)*: Turn in points 1 - 3*

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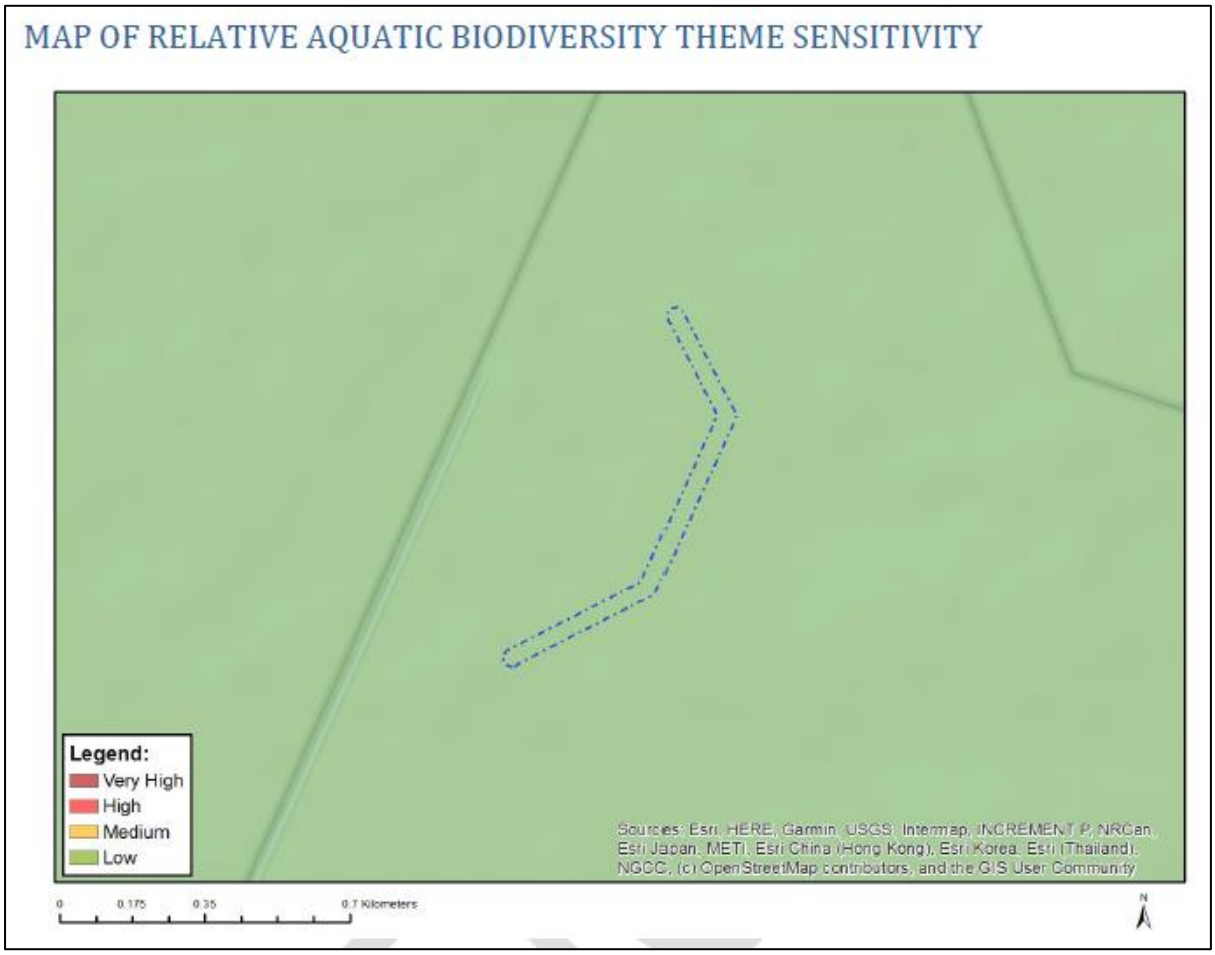

Figure 7: Aquatic Biodiversity Combined Sensitivity (National Web based Environmental Screening Tool)*: Turn-in Points 4 - 8*

Site Ecological Importance

The main habitat types identified across the project area were initially identified and pre-delineated largely based on aerial imagery from late 2021. These main habitat types were then refined based on the field coverage and data collected during the survey. Three habitat units are delineated for the project area based on their geomorphology: Perennial watercourses and Ephemeral watercourses.

Due to the scale of the project, watercourses were grouped together with the defining feature decided on to separate watercourses being the presence of surface flow. Those watercourses which have surface flow are predominantly main stem rivers considered as NFEPA rivers based on scale not sensitivity by the GIS layer. These systems are known as perennial rivers. The majority of watercourses within the project area however lack surface flow and are predominantly smaller systems which compromise the tributaries and drainage lines of the main stem systems. These systems are known as ephemeral rivers.

Based on the criteria provided in section 0 of this report the two delineated habitat types have each been allocated a sensitivity category, or SEI, and this breakdown is presented in Table 10

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below. In order to identify and spatially present sensitive features in terms of the relevant specialist discipline, the sensitivities of each of the habitat types delineated within the project area are mapped in Figure 8.

It is important to note that this map does not replace any local, provincial, or national government legislation relating to these areas or the land use capabilities or sensitivities of these environments.

Table 10: Site Ecological Importance assessment summary of the habitat types delineated within the project area.

Habitat	Conservation Importance	Functional Integrity	Biodiversity Importance	Receptor Resilience	Site Ecologica Importance
Perennial watercourses	Low	Very High	Medium	Medium	Medium
Ephemeral watercourses	Very Low	High	Low	Low	Medium

Consider the following guidelines when interpreting SEI in the context of any proposed development or disturbance activities:

- Medium: Minimisation and restoration mitigation - Development activities of medium impact acceptable followed by appropriate restoration activities.

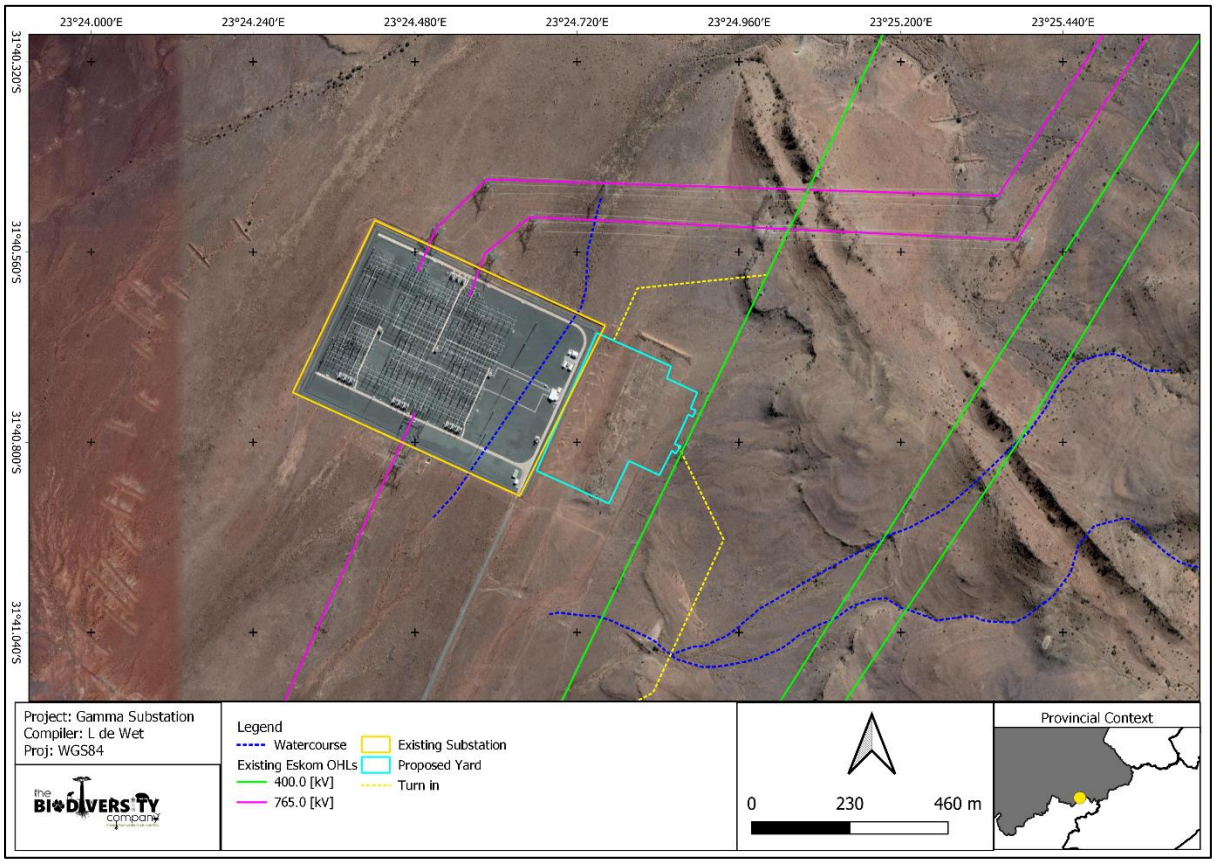

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Figure 8: Biodiversity SEI delineation relative to the project area

The terrestrial biodiversity theme sensitivity as indicated in the screening report (compiled by the National Web based Environmental Screening Tool) was derived to be 'Very High' (Figure 5: Aquatic Biodiversity Combined Sensitivity (National Web based Environmental Screening Tool)*: Gamma Substation*

), mainly due to the CBA and ESA status of the area and the fact that the watercourses are either CR on E ecosystem.

The completion of the aquatic biodiversity desktop and field assessments largely agrees with the 'Low' sensitivity presented by the screening report. As discussed above, the project area is a low/ very low probability of CR, EN, VU or Extremely Rare species with none sampled during the survey, however the resilience of these systems is low as their recovery to original species composition and functionality due to modification will be slow. As a result, the calculated sensitivity rating of 'Medium' was assigned to the watercourses of the project area.

4. CONCLUSION

The National Web Based Environmental Screening Tool (NWBEST) has characterised the aquatic theme sensitivity of the project area as "Low". The locally associated watercourses are predominantly designated as either critical biodiversity areas or ecological support areas, with the conservation status ranging from Critically Endangered to Endangered. The protection level of these systems range from poorly protected to not protected. The ecological integrity of the associated catchments ranges from a class A (natural/close to natural) to a class D (largely modified).

The *in situ* water quality results indicated modified conditions with pH concentrations alkaline in nature. The Habitat Integrity Assessment indicated a largely natural (class B) instream habitat for ephemeral systems and moderately modified (class C) instream habitat for perennial systems. Riparian habitat was classified as moderately modified (class C) for both ephemeral and perennial systems. Aquatic macroinvertebrate species were found to be intolerant to tolerant indicating seriously modified conditions (class E/F) in the Brak River, largely modified conditions (class D) in the Snyderskraal, Swavel Kranse and Buffels River and moderately modified conditions (class C) in the Driefontein River while conditions in the Bakensklip River range from seriously modified to largely natural. One of the three expected fish species were sampled along with the alien invasive *Cyprinus carpio* further indicating modification to the system. The sensitivity of the sampled community to modification indicated tolerance to changes in physio-chemical composition of the system and moderate tolerance to changes in flow.

The completion of the aquatic biodiversity desktop and field assessments conducted on the 28th of March until the 1st of April 2022 followed by the 11th to 14th April 2022 largely agrees with the 'Low' sensitivity presented by the screening report, with only the sensitivity of the ephemeral watercourses determined to be 'Medium'.. The calculated site ecological importance sensitivity rating of 'High' was assigned to the watercourses of the project area based on the lack of rare

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or listed species expected or sampled within watercourses which were considered critically endangered (CR), Endangered (EN) habitat with a low to very low recovery to original species composition and functionality. The extent of encroachment on the watercourses Is low due to the nature of the project where the powerline will cross few watercourses at a small spatial scale. The ephemeral nature of these watercourses does make them a risk for flood events and this should be considered.

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APRIL 2023 UPDATED LAYOUT

23°24'30"E 23°25'0"E 23°25'30"E 23°26'0"E

31°40'30"S 31°41'0"S 31°41'30"S

1/265 765kV 765kV RE/93 765kV RE/3

Northern Cape Western Cape Northern Cape Western Cape

Droërivier-Hydra No.2 (400kV) Droërivier-Hydra No.1 (400kV) Droërivier-Hydra No.3 (400kV)

1 start
2 middle
3 end
4 end
5
6 middle
7
8 start

Droërriver-Hydra 2 400kV (turn-in from the North)	Structure locations	Latitude	Longitude
Start	1	31° 40.592'S	23° 25.000'E
Middle	2	31° 40.609'S	23° 24.813'E
End	3	31° 40.673'S	23° 24.779'E
Droërriver-Hydra 2 400kV (turn-in from the South)			
End	4	31° 40.809'S	23° 24.871'E
	5	31° 40.923'S	23° 24.937'E
Middle	6	31° 41.022'S	23° 24.883'E
	7	31° 41.113'S	23° 24.834'E
Start	8	31° 41.188'S	23° 24.663'E

Legend

- Main roads
- Rivers
- Provincial boundaries

Land parcel no

- 1/265
- 1/3
- RE/3
- RE/93

Existing

- Existing Eskom 400kV powerlines
- Existing Eskom 765kV powerlines
- Existing Gamma substation

Proposed new/update

- Proposed new/updated 400kV powerline tie in of the existing 400kV powerlines to the proposed new substation yard
- Proposed 132kV/400kV substation yard
- Proposed structure locations

Prepared for:
Nala Environmental Consulting Firm

Prepared by:
Ecofluence Consulting

Gamma Substation:
Layout (400kV works Phase 1)

Layout map

Province	Municipality
Northern Cape	Ubuntu Local Municipality
Western Cape	Central Karoo District Municipality

N

Coordinate System: GCS WGS 1984
Datum: WGS 1984
Units: Degree
Scale: 1:10 000

Date: April 2023

0 300 600 1 200 m