AQUATIC SITE SENSITIVITY VERIFICATION REPORT FOR THE PROPOSED NYALA SOLAR ENERGY FACILITY 3, NEAR NORTHAM, THABAZIMBI LOCAL MUNICIPALITY, LIMPOPO PROVINCE.

JUNE 2023

Prepared By:

Ms Toni Belcher

Tel: 082 883 8055

Email: toni@bluescience.co.za

TABLE OF CONTENTS

TABLE OF FIGURES

LIST OF TABLES

1. SPECIALIST DETAILS, EXPERTISE AND DECLARATION

1.1. QUALIFICATIONS OF SPECIALIST CONSULTANT

Name: Antonia Belcher
Contact details: 53 Dummer St, Somerset West, 7130; Phone: 082 883 8055;
Email: toni@bluescience.co.za
Profession: Aquatic Scientist (P. Sci. Nat. 400040/10)
Fields of Expertise: Specialist in freshwater assessments, monitoring and reporting
Years in Profession: 30+ years

Toni Belcher worked for the Department of Water Affairs and Forestry for more than 17 years. During this period she worked for the Directorate Water Quality Management, the Institute for Water Quality Studies and the Western Cape Regional Office and has built up a wide skills base on water resource management and water resource quality for rivers, estuaries and the coastal marine environment. Since leaving the Department in 2007, she has been working in her private capacity and was co-owner of BlueScience (Pty) Ltd, working in the field of water resource management and has been involved in more than 500 aquatic ecosystem assessments for environmental impact assessment and water use authorisation purposes. In 2006 she was awarded a Woman in Water award for Environmental Education and was a runner up for the Woman in Water prize for Water Research.

Professional Qualifications:

1984 Matriculation Lawson Brown High School
1987 B.Sc. – Mathematics, Applied Mathematics University of Port Elizabeth
1989 B.Sc. (Hons) – Oceanography University of Port Elizabeth
1998 M.Sc. – Environmental Management (cum laude) Potchefstroom University

Key Skills: Areas of specialisation: Aquatic ecosystem assessments, Monitoring and evaluation of water resources, Water resource legislation and authorisations, River classification and Resource Quality Objectives, River Reserve determination and implementation, Water Quality Assessments, Biomonitoring, River and Wetland Rehabilitation Plans, Catchment management, River maintenance management, Water education.

Summary of Experience:

1987 – 1988	Part-time field researcher, Department of Oceanography, University of Port Elizabeth
1989 – 1990	Mathematics tutor and administrator, Master Maths, Randburg and Braamfontein Colleges, Johannesburg
1991 – 1995	Water Pollution Control Officer, Water Quality Management, Department of Water Affairs, Pretoria
1995 – 1999	Hydrologist and Assistant Director, Institute for Water Quality Studies, Department of Water Affairs and Forestry, Pretoria
1999 – 2007	Assistant and Deputy Director, Water Resource Protection, Western Cape Regional Office, Department of Water Affairs, Cape Town
2007 – 2012	Self-employed – Aquatic Specialist
2013 – 2020	Senior Aquatic Specialist and part-owner, BlueScience
2020 – present	Self-employed– Aquatic Specialist

1.2. DECLARATION OF INDEPENDENCE

I, A**ntonia Belcher,** as the appointed specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
  - other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
  - ~~am not independent, but another specialist that meets the general requirements set out in Regulation 13 of GN No. 326 have been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- in terms of the remainder of the general requirements for a specialist, am fully aware of and meet all of the requirements and that failure to comply with any the requirements may result in disqualification;
- have disclosed/will disclose, to the Applicant, the Department and registered interested and affected parties, all material information that have or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application;
- have ensured/will ensure that information containing all relevant facts in respect of the application was/will be distributed or was/will be made available to interested and affected parties and the public and that participation was/will be facilitated in such a manner that all interested and affected parties were/will be provided with a reasonable opportunity to participate and to provide comments;
- have ensured/will ensure that the comments of all interested and affected parties were/will be considered, recorded and submitted to the Department in respect of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations, 2014 (as amended).

Date: 9 June 2023

Name of company: -

Signature of the specialists: 

2. INTRODUCTION

2.1. SCOPE OF STUDY

This analysis report is an aquatic ecosystem constraints assessment into the proposed solar farms and associated infrastructure collectively referred to as the ABO Nyala Solar Farms. The proposed site is located directly north of the town of Northam and falls primarily under the jurisdiction of the Thabazimbi Local Municipality and is located within the greater Waterberg District Municipality in the Limpopo Province. The assessment is based on a desktop analysis of existing data and mapping available for the area that was originally undertaken by Flori Scientific Services as well as a site visit and field assessment undertaken in January 2023.

The Nyala project comprises the following three facilities: Nyala Solar Energy Facility 1 and associated infrastructure; Nyala Solar Energy Facility 2 and associated infrastructure; and Nyala Solar Energy Facility 3 and associated infrastructure. Each facility will require a stand-alone Environmental Authorisation, thus requiring separate applications and Scoping and Environmental Impact Assessment processes. It is however intended to combine the required public participation processes of the three applications. The total extent of the Nyala site assessed is approximately 633 ha. The area lies in the Brakspruit Sub-Catchment of the Crocodile Tributary of the Limpopo River. Details of the watercourses in the study area are provided in the table below.

Table 1. Water resource information related to the site assessed

Descriptor	Name / Details	Notes
Water Management Area	Crocodile (West) and Marico	
Catchment Area	Brakspruit Tributary of the Crocodile River	Limpopo River River
Quaternary Catchment	A24E and A24F	
Present Ecological State	Brakspruit River: C category (moderately modified)	DWA 2012 (Appendix A)
Ecological Importance and Ecological Sensitivity	Moderate Importance and Sensitivity	

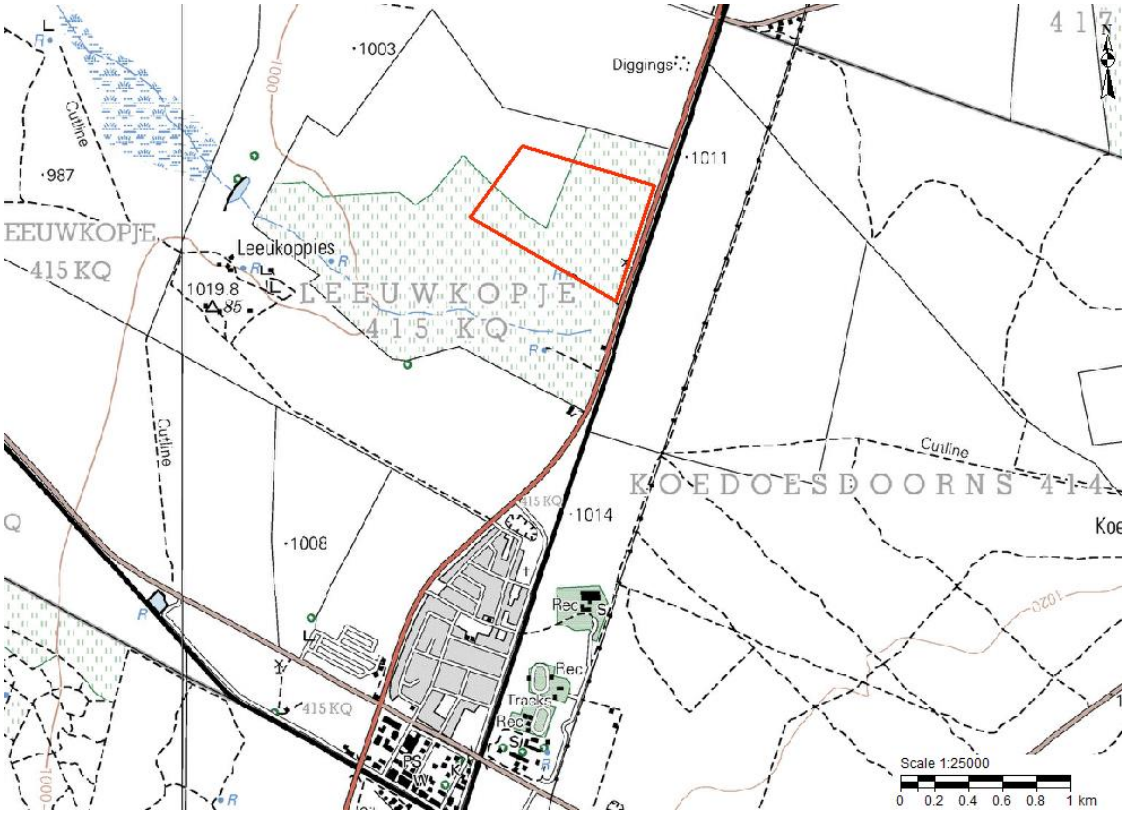

Figure 1. A topographical map of the study area indicating the locality of the site (red polygon)

ABO Nyala Solar Energy Facility 3 (Pty) Ltd proposes the development of Nyala 3, a photovoltaic (PV) solar energy generation facility, of up to **55 MWac** in capacity, and associated infrastructure on the Remaining Extent of the farm Leeuwkopje No. 415 situated 1.5 km north of Northam within the Limpopo Province. The proposed development area has been defined in a manner which has considered the environmental sensitivities present on the affected property and which intentionally remains beyond highly sensitive areas.

The proposed facility would comprise the following:

- Solar Field/Solar Arrays (up to approximately 3.5m in height);
- Internal access roads (existing farm roads would be used where possible, the maximum road width would be up to approximately 10m);
- A main access road (width of up to approximately 10m): Two access roads are proposed; 1) a primary road which will allow for access from the west and 2) a construction road which will access the site at the same access point but from the north.
- Internal electrical reticulation (low- and medium voltage lines) to be placed underground where feasible;
- An on-site substation hub and associated infrastructure (substation, transformation infrastructure, collector infrastructure, step-up infrastructure, battery energy storage system etc.) including auxiliary buildings (such as operation & maintenance buildings, admin buildings, workshops, gatehouse, security building, offices, visitor centre, warehouses, etc.) contained within up to approximately a 3 ha footprint; and
- Perimeter fencing.

A temporary laydown area would be established during the construction period but would be within the development footprint i.e., within the fenced area allocated for development. The laydown area would move as required while construction is underway.

Application for grid connection will be made through a separate process and assessed accordingly. Connecting via a new overhead line to a nearby substation or a LILO ("loop-in-loop-out") connection on neighbouring land into an existing 132kV overhead line are alternatives under consideration.

Water would be required for sanitation by operational staff, for washing solar panels and for dust control on internal roads (where necessary). Water would preferably be sourced from the local municipality in terms of a Service Level Agreement established between the Municipality and the facility. If this is not possible, then other options for water supply will be investigated. Where required, a storage tank (i.e., Jo-Jo tank) of up to approximately 10,000L may be used on site for temporary water storage.

Sanitation requirements would be minimal, given that there would only be a small staff complement during the operations of the facility. Sanitation for auxiliary buildings would be connected to the existing municipal sewage system. If the Municipality does not approve, or have the capacity for such a connection, sewage would be stored in a conservancy tank and collected either by a honey-sucker truck or by a service provider for treatment at a licensed disposal site. Alternatively, a standalone system would be used (i.e., porta-loos) which would be regularly serviced by an independent contractor. Note that it is **not** intended to make use of soakaways or on-site treatment solutions.

Refuse/solid waste produced on site would also be minimal (approximately two wheelie bins per week are anticipated) and would ideally be removed by the Municipality, however, if this is not possible, the facility would employ private contractors to remove the refuse and dispose of it appropriately.

There are no specific stormwater and/or landscaping initiatives proposed as part of the proposed solar facility at this stage, but any interventions prescribed by the relevant specialist/s through the environmental impact assessment process would be implemented.

Water and sanitation requirements during the construction phase will be the primary responsibility of the appointed Contractor. It would be preferable for water to be sourced from the local Municipality, if available, with alternative arrangements to be made where required (for example transporting water to the site with trucks). Solid waste produced during the construction phase would be managed in accordance with the specifications of the site-specific Environmental Management Programme (EMPr).

Alternatives:

The proposed development as described above has been assessed with the following alternatives:

1) Layout: Two alternative access roads are under assessment:

- Access road 1: Accessing the site from the east, directly off the R502 via a new access road.
- Access road 2: Accessing the site from a new road which would connect to the R502 at an existing intersection approximately 1 km north-east of the facility. The new road would run parallel to the R502.

2) Technology: With regard to the proposed BESS, the technology thereof is dynamic and so the specific type/technology to be developed would be selected based on market demands and technology available at the time of construction. Therefore, both Lithium-ion and redox-flow are assessed as technology alternatives, with Lithium-ion being the current preferred technology.

2.2. TERMS OF REFERENCE

It is requested that the Specialist undertake the following:

Aquatic and Wetland Delineation Sensitivity Verification and Impact Assessment: This report includes the findings of the above as well as the outcomes of a site visit and field verification exercise to revise the initial mapping and provide interpretation of the aquatic ecosystem sensitivity,

- Site Visit;
- Site Sensitivity Verification Report;
- The DFFE Environmental Screening Report outcomes need to be confirmed/disputed as part of the Site Sensitivity Verification.
- Updated Sensitivity mapping;
- Sensitivity shapefiles and KMZ files; and
- Draft Impact Assessment Reports.

The Specialist is required to undertake a site visit for the buildable areas of the solar plants and associated connection lines that make up the Nyala sites to verify the findings of the Environmental Screening Report and provide a sensitivity report with maps and shapefiles based on the findings, in order to identify a development footprint. It is also desired that both potential grid connection corridors at each site be assessed with desktop-level data. This will then be followed by the Impact Assessment Reports once the exact sites have been confirmed. The S&EIR at this point will only cover the PV facilities – the only grid connections that will be included are potential on-site and/or Loop-in Loop-out (LiLo) solutions.

2.3. METHODOLOGY AND LIMITATIONS OF THE STUDY

Input into this report was informed by a desktop assessment for the study area as well as field verification that was undertaken on 17 January 2023. The timing of the site visit was deemed suitable for the assessment as the

area has summer rainfall and had recently received rain that assisted with the delineation and assessment of aquatic features.

The 1 in 50000 topographical rivers cover was used as a basis and refined based on knowledge of the aquatic features in the area as well as Satellite imagery. The SANBI Biodiversity GIS, Cape Farm Mapper and Freshwater Biodiversity Information System websites were consulted to identify any constraints in terms of features of aquatic biodiversity conservation importance within the area. This information/data was used to inform the resource protection-related recommendations.

2.4. USE OF THIS REPORT

This report reflects the professional judgment of its author. The full and unedited content of this should be presented to the regulatory authority. Any summary of these findings should only be produced in consultation with the author.

3. DESCRIPTION OF THE STUDY AREA

3.1. GENERAL OVERVIEW

The proposed project comprises Nyala 3 which is on the Remaining Extent of the farm Leeuwkopje No. 415 situated 1.5 km north of Northam. The study area is located on the flats north of the Dwarsberge in the Savanna Biome. The topography is flat to gently sloping, with the Pilanesberg to the south and some low hills to the north of the study area. Drainage is predominately northwestwards via minor drainage features that drain from the site towards the Brakspruit River. The Brakspruit River rises in the Pilanesberg and flows in the northeasterly direction to join the Crocodile River approximately 30 km north of the study site. The Brakspruit passes approximately 4 km to the west of the study area (Figure 3). The study site is devoid of any significant aquatic features.

The area normally receives about 582mm of rain per year, mostly during summer. On average, it receives no rainfall for the months of June to August and the highest rainfall (107mm) occurs in March (Figure 2). As a result of the very low rainfall in winter, the smaller rivers near the sites are seasonal, only flowing in the summer months.

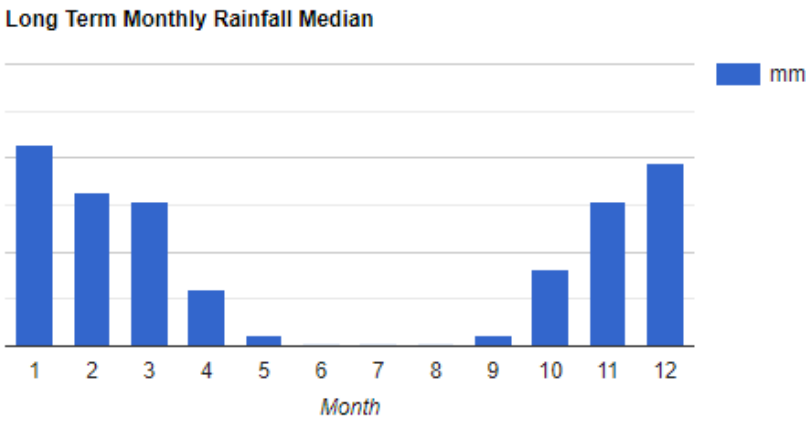

Figure 2. Average monthly rainfall for the area (SA Atlas of Climatology and Agrohydrology, R.E. Schulze, 2009 – obtained from CapeFarmMapper, 2023)

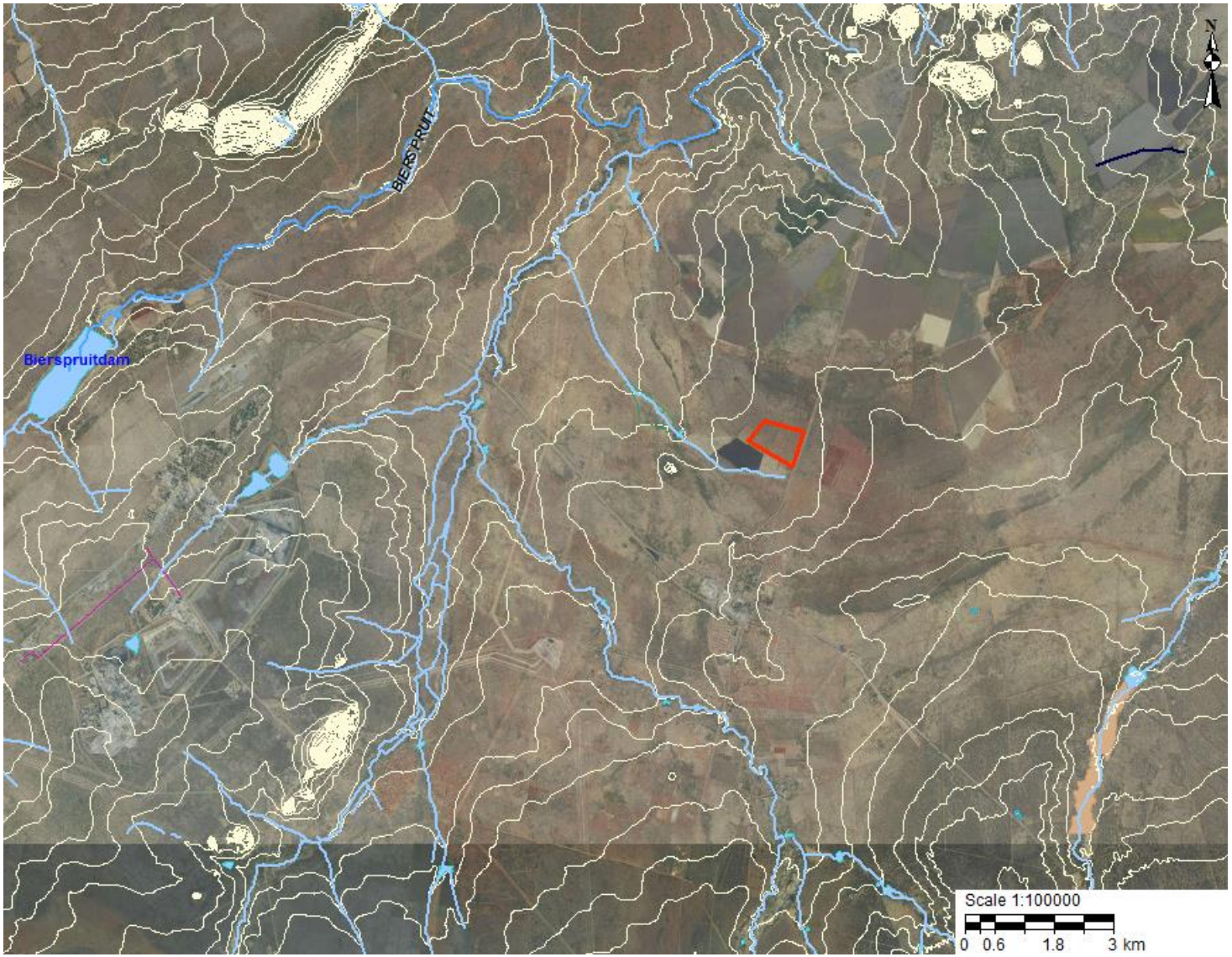

Figure 3. Rivers map for the study site (red polygon represents the study boundaries) overlaid on a 2018 Orthophotograph of the area

The area does not lie in a strategic water source area for ground or surface water. A minor intergranular and fractured aquifer occurs within the area, with the water table typically occurring at depths of about 29 m below ground level with a yield of less than 0.5 litres a second. The surface and groundwater quality tend to be relatively good, with natural electrical conductivity concentrations of 70 to 150 mS/m. The recharge of the aquifer is low and estimated to be about 6.5 mm/a. The aquifer has a low susceptibility and vulnerability to contamination.

The geology of the area comprises Archaean granite-gneiss terrain of the Swazian Erathem, covered by clastic and chemical sediments as well as volcanics of the Rayton and Silverton Formations, Pretoria Group (Transvaal Supergroup). The associated soils tend to be freely drained, structureless red soils.

The natural vegetation of the study area is mapped as comprising Dwaalboom THornveld vegetation (Least Concern) of the Central Bushveld Bioregion. This vegetation comprises a mix of scattered trees and shrubs (buffalo thorn *Ziziphus mucronata;* umbrella thorn *Vachellia tortilis,* blue thorn *Senegalia erubescens* and black thorn *S. mellifera;* marula *Sclerocarya birrea;* African olive *Olea europaea* ssp. *cuspidata;* blue gwarrie *Euclea crispa;* sandpaper raisinbush *Grewia flavescens;* common spikethorn *Gymnosporia buxifolia*; Kalahari star-apple *Diospyros lycioides;* African sumac *Searsia lancea;* wild camphorbush *Tarchonanthus camphoratus,* with grasses such as *Cymbopogon pospischilii*, *Eragrostis curvula* and *Stenotaphrum secondatum*. All of the above are bushveld trees and not indicators of wet areas, that is, with the exception of *Ziziphus mucronata,* which was found near the area where drainage occurs through the site however no distinct drainage channel was visible.

The typical land cover of the area comprises a mix of natural bushveld and grassland used for livestock grazing with some areas cleared for cultivation. The town of Northam lies immediately to the south of the site. Leeuwkopje Private Nature Reserve occurs to the west of the site, which, although indicated to be a private nature reserve, is not mapped in the mapping of the formally protected areas.

Eleven amphibian species have been recorded in the wider area. The only amphibian species of conservation concern that occurs in the area is the Giant Bullfrog (Near Threatened), which breeds in ephemeral pans and farm dams. It is unlikely that Giant Bullfrog are present in the study area, given the general absence of suitable breeding habitats in the vicinity.

3.2. CONSERVATION VALUE OF AQUATIC FEATURES

Three sets of conservation mapping at a national, provincial and local scale are of relevance to the identification of aquatic features of ecological and biodiversity conservation importance. These are the 2011 National Freshwater Ecosystem Priority Areas (FEPA) map, the 2018 National Wetland Map (version 5), and the 2018 provincial Limpopo Province Map of Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs).

FEPAs are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting the sustainable use of water resources. FEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for serving ecosystems and associated biodiversity of rivers, wetlands and estuaries. The river and wetland FEPAs are required to be maintained in a largely natural ecological state, while Fish Support Areas should not be allowed to degrade from their existing ecological condition. In terms of FEPA mapped within the study area, the sites do not lie within a FEPA River Sub-catchment. There is also no mapped natural FEPA wetland area within the study site (Figure 5). An artificial channelled valley-bottom wetland occurs to the west of the Eskom servitude and the site. There is also a small artificial FEPA wetland associated with a dam at Leeukoppies Farm. These have low aquatic ecosystem significance but do provide aquatic habitat for biota, such as the giant bullfrog.

Figure 6 shows the National Wetland Map version 5 for the area together with the FEPA Wetlands. A channelled valley-bottom wetland is mapped that is associated with the Brakspruit further to the south of the site. A valley-floor wetland is also mapped to the southeast that is associated with the Renosterspruit, a tributary of the Crocodile River. These natural wetlands are not likely to be impacted by the proposed activities at the site as they are 5 – 6 kilometres away from the site.

In the 2018 Limpopo Critical Biodiversity Areas mapping (Figure 7), a CBA2 is mapped along the Bierspruit to the west of the site. CBA2 sites (can be either terrestrial or aquatic) are more widespread or not threatened, with choices on where in the landscape targets for these features can be achieved. The proposed activities are also unlikely to impact the CBA landscape targets. Much of the site is mapped as still containing natural terrestrial areas and is addressed by the botanist for the project with no aquatic ecosystem concerns.

3.3. AQUATIC BIODIVERSITY SENSITIVITY MAPPING

In terms of the DFFE Screening Tool, the study site lies mostly within an area considered Low Aquatic Combined Biodiversity Sensitivity (Figure 4). There are no Aquatic Critical Biodiversity Areas (CBAs) or Freshwater Ecosystem Priority Area (FEPA) River Sub catchments within the study areas. The sites are also not located within Strategic Water Source Areas for groundwater or surface water. Only the natural wetland areas mapped in the National Wetland Map mentioned above are mapped within the wider area as being of very high sensitivity. As stated above, these natural wetlands are not likely to be impacted by the proposed activities at the site as they are 5 – 6 kilometres away from the site.

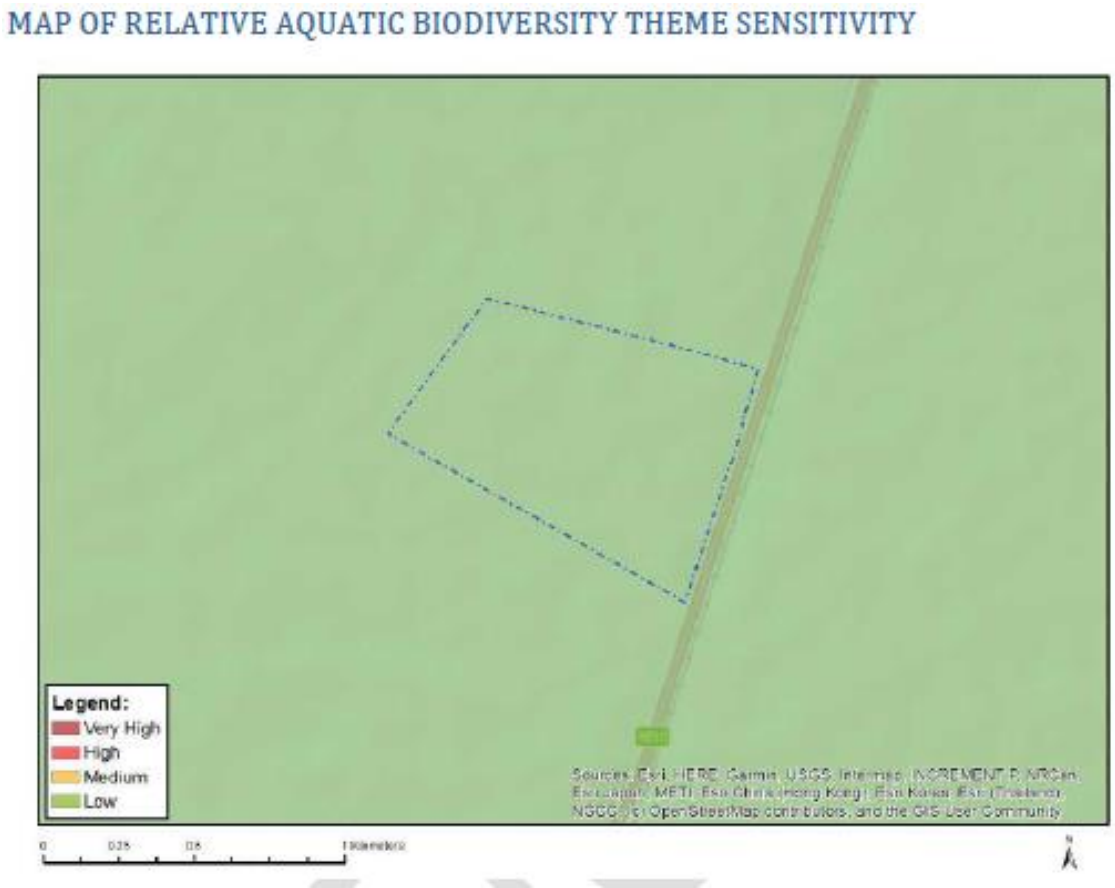

Figure 4. DFFE Screening Map for the area in terms of Aquatic Biodiversity Combined Sensitivity

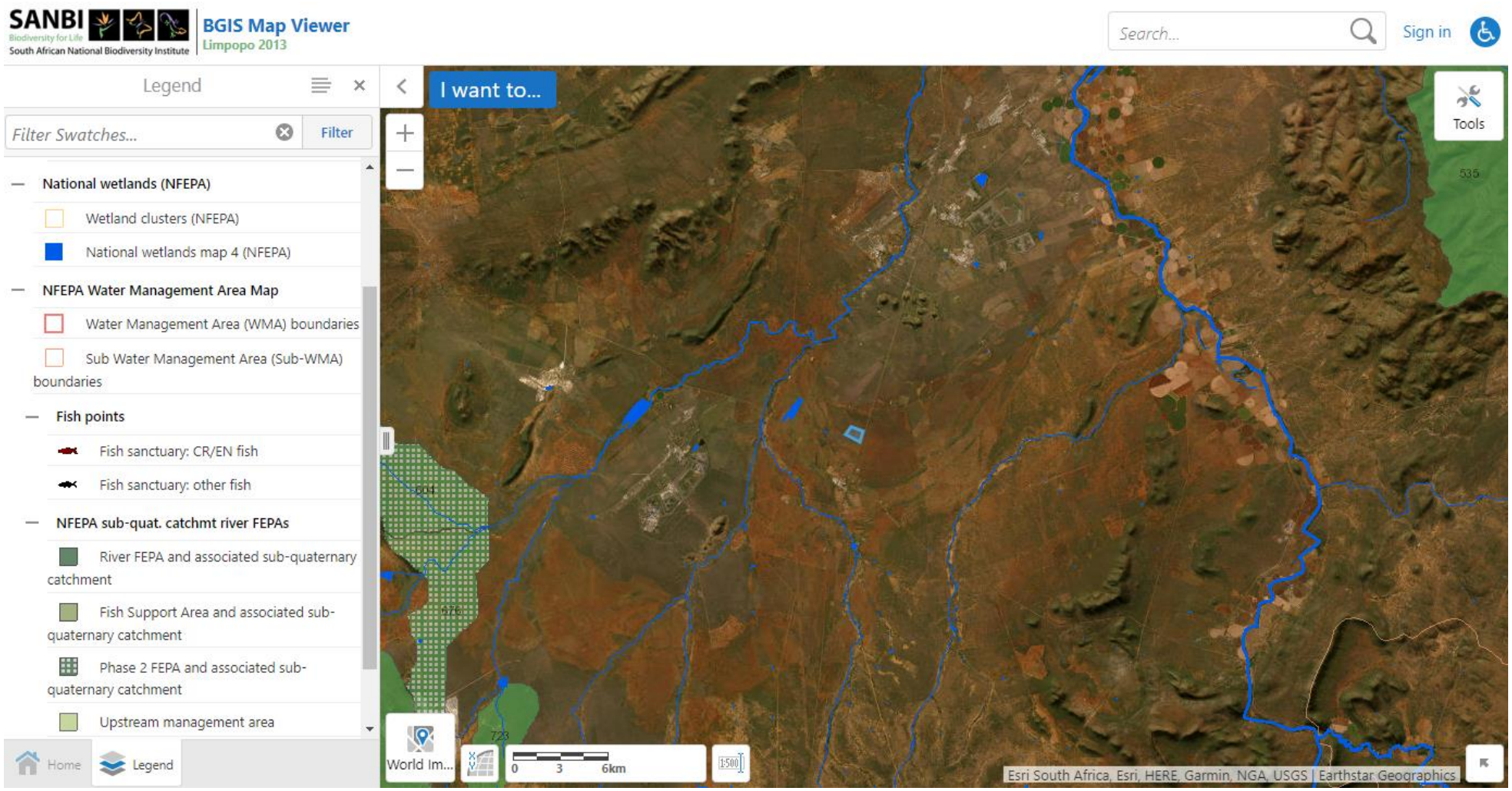

Figure 5. National Freshwater Ecosystem Priority Areas for the study site (SANBI Biodiversity GIS, 2023)

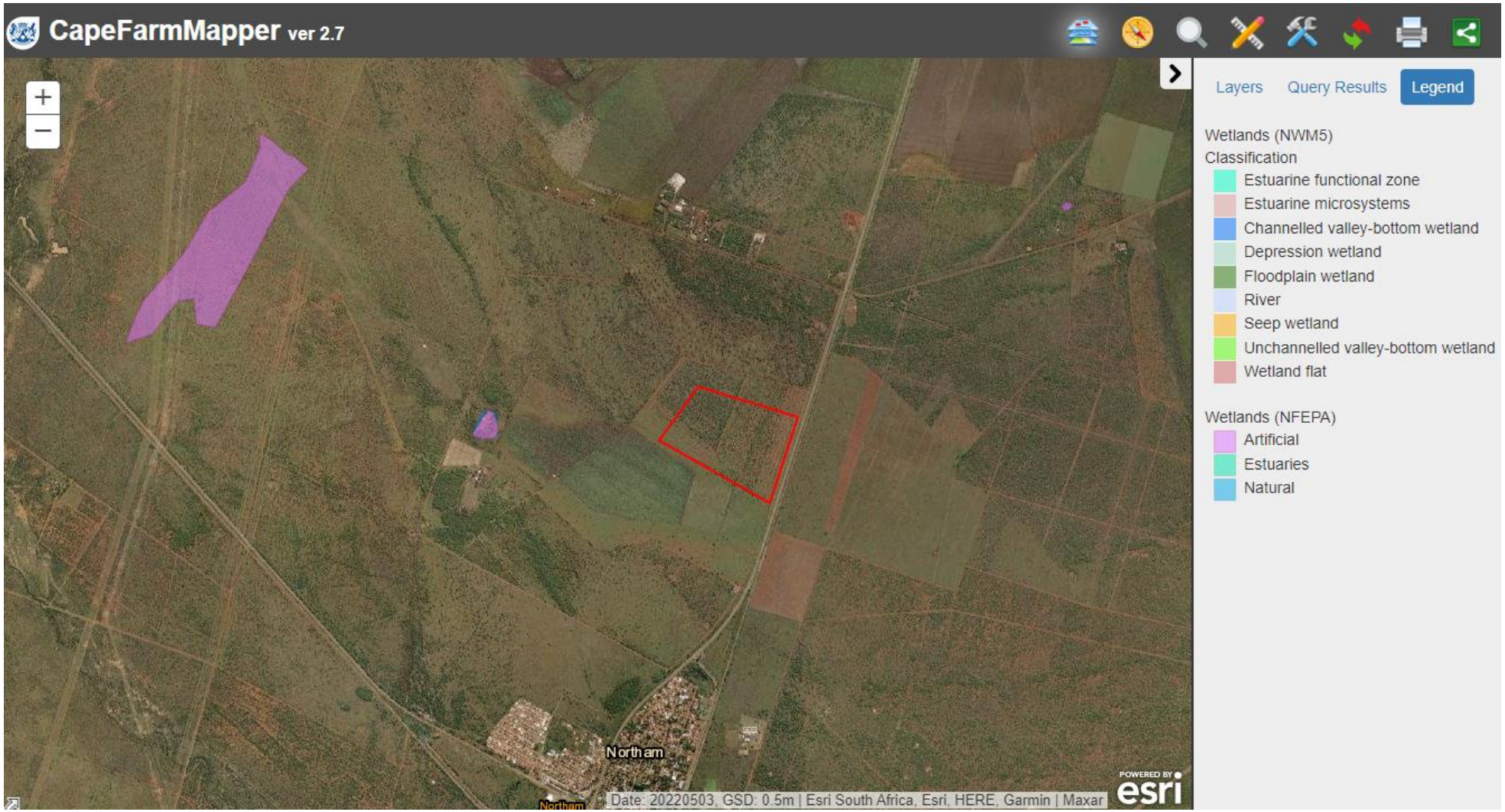

Figure 6. National Wetland map and National Freshwater Ecosystem Priority Areas map for the study site, where the red polygon indicates the study boundaries (CapeFarmMapper, 2023)

Figure 7. Limpopo Critical Biodiversity Areas map for the study site, where the blue polygon indicates the study boundaries (SANBI Biodiversity GIS, 2023)

4. SITE VERIFICATION OUTCOMES

The initial desktop screening assessment undertaken by Flori Scientific Services in August 2022 indicated that no major watercourses or aquatic ecosystems were present in the general study area that would impact the project, with the potential exception of the 'wet' area to the south of the site. This assessment also confirmed that the National Wetland Map does not highlight/demarcate any major wetlands or watercourses in the study area. Figure 8 shows the aquatic constraints map resulting from the desktop assessment.

Figure 8. Google Earth image showing aquatic constraints mapped in the desktop assessment of the site with the yellow area indicating the potential wet area

Past imagery of the site from 1948 and again in 2009 (Figure 9) indicates that there was definitely a minor drainage system with an associated unchanneled valley floor wetland present at the site. The wetland area has, however been targeted for cultivation even prior to 1948. During the site visit, no aquatic features of any significance were found within the proposed development site. There was however some indication of wetness visible in terms of the topography, soils and vegetation along the drainage feature and within the location of the valley bottom wetland. The drainage feature was however only marginal and not supportive of functional aquatic ecosystems. The area is visible on the aerial images as a wetland area is dominated by cultivated alien grasses and also did not display any distinctive wetland characteristics, having had a long history of modification. The soils however did comprise clay that is seasonally wet, indicating the presence of wetland habitat within this area. There were also areas where there was visible wetness within the site, but these were confirmed to be associated with the water supply infrastructure on the site.

Figure 9. Aerial image of the sites taken in 1948 (top) and a more recent Google Earth image from April 2009 (bottom)

Figure 10. View of the area where there is a small drainage line south of the site **where the wet area occurs (bottom)**

5. AQUATIC CONSTRAINTS MAPPING AND AQUATIC SENSITIVITY

The aquatic constraints and sensitivity mapping are shown in Figures 11 and 12. In the aquatic sensitivity mapping, the only aquatic feature of any significance in the greater that is recommended to be avoided is the valley bottom wetland to the south of the site. the drainage feature within Site 1 is not deemed significant enough to comprise an aquatic constraint. It is recommended that a 10m buffer or setback area be provided for in the proposed layout for this site.

Site management measures such as fire breaks and access roads could potentially be placed within the buffer but not in any of the proposed facilities. It is also recommended that, as mitigation, the wetland be allowed to return to a more natural state as part of the proposed development of the site, rather than the regular cultivation of this area.

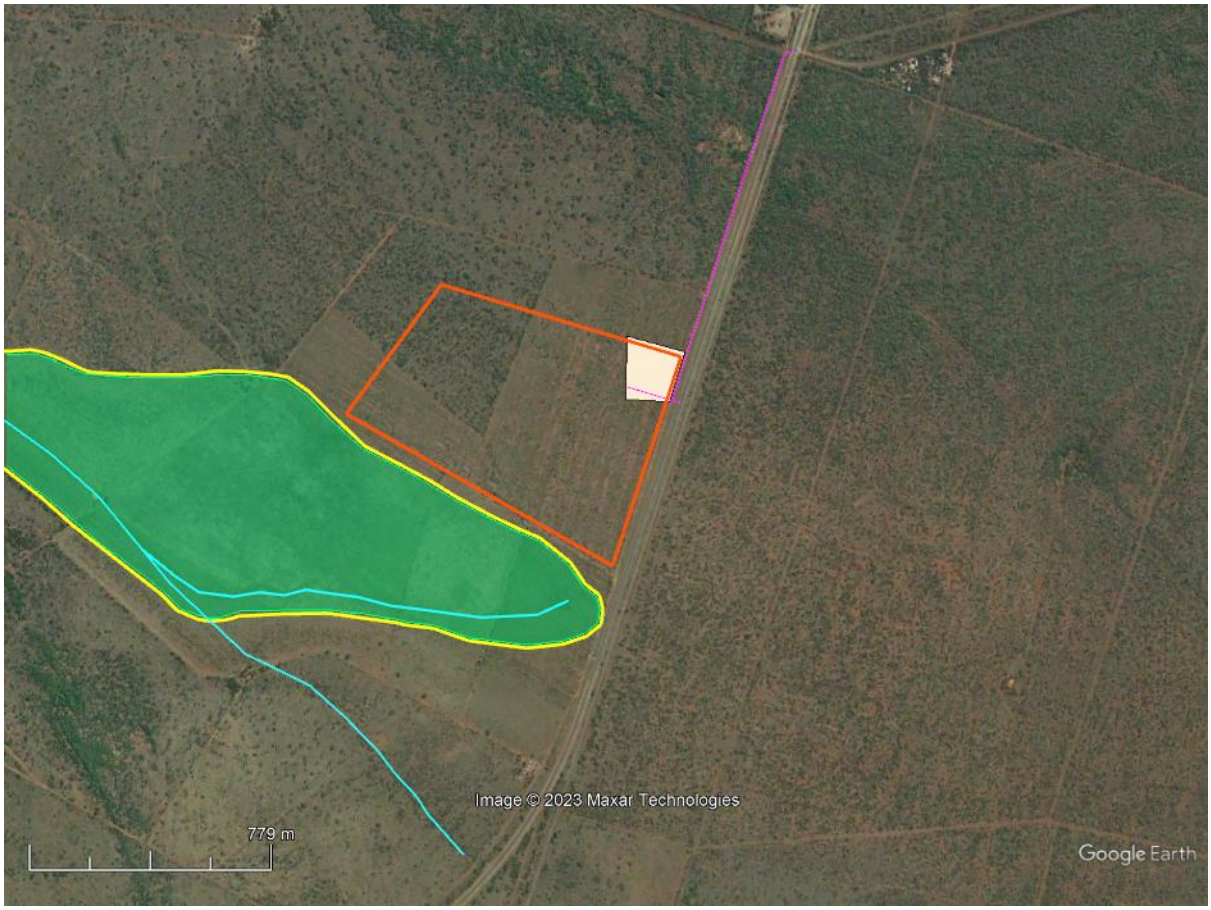

Figure 11. Mapped aquatic features within the project area (green polygon indicates the wetland area, with the blue line indicating the drainage feature that lies within the wetland), shown in Google Earth

Figure 12. Mapped sensitivity of aquatic features within the project area, shown in Google Earth.

Any of the potential aquatic ecosystem impacts of the proposed solar farms are likely to take place during the construction phase. These potential aquatic ecosystem impacts of the proposed activities during construction include:

- Disturbance and possibly loss of aquatic habitat within the wetland with the associated impact on sensitive aquatic biota;
- The removal of indigenous aquatic vegetation that has the potential to reduce the ecological integrity and functionality of the wetland;
- Demand for water for construction could place stress on the existing available water resources;
- Road crossing structures, if not adequately designed, could impede flow in the wetland;
- Alien vegetation infestation within the aquatic feature due to disturbance; and
- Increased sedimentation and risks of contamination of surface water runoff during construction.

During the operational phase for all the proposed works, the potential impacts would include:

- Ongoing disturbance of aquatic features and associated vegetation along access roads or adjacent to the infrastructure that needs to be maintained;
- Modified runoff characteristics from hardened surfaces that have the potential to result in erosion or sedimentation of the wetland; and

- Possible increase in water consumption and potential for water quality impacts (such as contamination from sewage generated on-site) as a result of the operation of the site.

During the decommissioning phase, the potential impacts would largely be associated with an increased disturbance of aquatic habitat due to the increased activity on the site. Increased sedimentation and risks of contamination of surface water runoff may also occur.

By implementing suitable buffers (10m) adjacent to the wetland and minimising the disturbance within the wetland, the impact of the proposed project activities would be low and unlikely to impact the integrity of the aquatic ecosystems. The recommended buffers are deemed adequate, irrespective of the proposed infrastructure. There is thus unlikely to be any potential aquatic ecosystem impacts associated with the proposed Nyala Solar Energy Facility 3 and this assessment largely concurs with the Screening Tool Mapping for Aquatic Combined Sensitivity except for the degraded wetland area adjacent to the site that is considered of high sensitivity.

The proposed layout and technology alternatives are all within low sensitivity areas and thus will have very similar impacts such that there is no preferred alternative from an aquatic ecosystem point of view.