REPORT

DEVELOPMENT OF A 40MW PHOTOVOLTAIC PLANT ACROSS SITES 2B, 3B, 3C, 4B AND 5B ASSOCIATED WITH THE TUBATSE FERROCHROME PLANT, STEELPOORT, FETAKGOMO TUBATSE LOCAL MUNICIPALITY (REF 12/1/9/2-GS88)

Environmental Impact Assessment Report

Client:	TFC Solar (Pty) Ltd
LEDET Ref:	12/1/1/9/2-GS88
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Enhancing Society Together

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Project related

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Executive Summary

Samancor Chrome Ltd's core business is the mining and smelting of chrome ore. With an annual production capacity of 2.4 million tons of ferrochrome, Samancor Chrome is one of the largest integrated ferrochrome producers in the world. The ferrochrome produced is used in areas of the stainless-steel smelting process. Samancor Chrome has been, and continues to be, a major player in ferrochromium production. The company's total chromite resources exceed 900 million tons and are expected to support current mining activity for well over 100 years at the current rate of extraction. Some ores and concentrates are exported, but main allotments are destined for conversion into ferrochrome at the alloy plants.

The Tubatse Ferrochrome (TFC) Smelter was initially built as a three-furnace operation in 1975 as a joint venture between Gencor Ltd and Union Carbide Inc. (USA). In the same year, the Union Carbide Inc. shareholding was taken over by Samancor Chrome, and in 1989, Samancor Chrome acquired the Gencor Ltd shareholding. During the years 1989 – 1990, the plant was expanded to five furnaces with the sixth furnace being built in 1996. The plant is situated in Steelpoort, Limpopo Province and is in close proximity to the Eastern Chrome Mines. The core business of the operation is the production of charge chrome using six Submerged-Arc Furnaces, one metal recovery plant, and a Pellet and Sintering Plant.

The rising electricity tariffs in South Africa, combined with the increasingly severe load shedding patterns experienced across the country, has a negative impact on the production and revenue of Samancor Chrome business. Climate change is also a concern for Samancor Chrome referring to the emissions of greenhouse gases (GHG) in the use of fossil fuel electricity. This has motivated Samancor Chrome to consider renewable energy generation at their smelter plants. Implementing solar Photovoltaic (PV) generation will result in improved availability of supply and reduced utility bills as well as going 'green' in terms of environmental considerations.

In 2021, a Special Purpose Vehicle (SPV), TFC Solar (Pty) Ltd (hereafter referred to as TFC Solar), proposed the development of a Solar PV facility of up to 100 Megawatt (MW) generation capacity over five (5) sites: 1, 2, 3, 4 and 5. These five (5) sites were subject to an Environmental Impact Assessment (EIA) and an Environmental Authorisation (EA) was granted on 25 April 2022 from the Department of Forestry, Fisheries and the Environment (DFFE) (DFFE Ref: 14/12/16/3/3/2/2079). A General Authorisation was received from the Department of Water and Sanitation (DWS) on 28 March 2022. Site 1 is no longer considered for the Solar PV development.

A total of 60MW output can be achieved from the previously authorised Sites 2 – 5. Additionally, TFC Solar, propose the development of a 40MW Solar PV facility to be developed on Site 2B, 3B, 3C, 4B and 5B. All previously authorised Sites 2, 3, 4 and 5 as well as new Sites 2B, 3B, 3C, 4B and 5B would achieve a total of 100MW.

Objectives of the EIA Study

The objective of the EIA study is to, through a consultative process:

a) Determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
b) Describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted Environmental Scoping Report (ESR);
c) Identify the location of the development footprint within the approved site as contemplated in the accepted ESR based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the

geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;

d) Determine the –
   i. nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
   ii. degree to which these impacts can be reversed; may cause irreplaceable loss of resources, and can be avoided, managed or mitigated;
e) Identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted ESR based on the lowest level of environmental sensitivity identified during the assessment;
f) Identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted ESR through the life of the activity;
g) Identify suitable measures to avoid, manage or mitigate identified impacts; and
h) Identify residual risks that need to be managed and monitored.

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of environmental impacts and related legislation that were taken into consideration during this study and are elaborated on in this report.

The Limpopo Department of Economic Development, Environment and Tourism (LEDET) is the Competent Authority for this EIA study, and the project needs to be authorised by this Department.

Key Findings of the EIA Study

The project, in the EAPs opinion, does not pose a detrimental impact on the receiving environment and its inhabitants and although there are potentially high to moderate significant impacts, these impacts can be mitigated. There are no fatal flaws prohibiting the project from going ahead. This Environmental Impact Statement is based on the findings summarised in the section below.

Various cumulative impacts have also been identified in the preceding sections, and from a cumulative impact assessment perspective, the project is considered acceptable provided that the recommended mitigation approach is timeously and comprehensively implemented and adhered to during all stages of the development.

Agriculture

The proposed development is acceptable because it leads to no loss of potential, productive agricultural land and therefore no loss of future agricultural production potential.

The site is classified as high agricultural sensitivity by the Environmental Screening Tool. This has been confirmed by this assessment, because of the climate, terrain, and soil suitability. However, despite the natural agricultural resources, the site's agricultural potential is completely limited, and the high sensitivity rating is therefore not relevant to an assessment of the agricultural impact.

Agriculture is not possible on the sites while Samancor and related industries are operating there, and the land therefore effectively has zero current potential for agricultural production. The natural agricultural resources of the land must however still be conserved for a potential future time when agricultural use may again become possible.

Due to the fact that the proposed development will not result in the loss of any viable, productive agricultural land, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as acceptable. From an agricultural impact point

of view, it is recommended that the proposed development be approved. The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any other conditions other than recommended mitigation.

Hydrology

The floodlines are produced to suggest that some infrastructure at the site is situated inside probable zones of inundation. Hence, measures need to be taken to minimise flooding risk as mentioned in Section 7.1.2. The site specifically at risk is Site 4 as the panels will be placed in the 1:50-year and 1:100-year floodline. The hydrological risk of the proposed activities is considered low to marginal.

It would normally be recommended that the 1:100-year floodline be used as an avoidance area for any future development at the site. However, due to space constraints within the sites and the number of panels needed to generate the desired 100MW, some panel arrays will have to be placed within the inundation zones. With this, the internal access roads on the perimeter of the panel arrays will also be located within some inundation zones. It is the Hydrologist's opinion that this should be allowed if the mitigation measures in Section 8.3 and recommendations within the Conceptual Stormwater Management Plan (Section 7.1.2) be adhered to. The mitigation measures will not hinder the flow of flood waters within the drainage line, but merely divert it around the site, allowing the drainage system to function as it normally would and ensuring flood waters are allowed to flow to the downstream Steelpoort River system.

It is imperative that during the construction phase, stormwater management interventions are implemented particularly to manage sediment washing off the sites. The sediments result from the removal of vegetation disturbance of the soils and stockpiling of materials. From all these sources, particles are transported during rainfall events and if not managed can cause a problem in receiving waterways.

Ongoing inspection and maintenance of drainage management measures should be carried out throughout the construction period. As the site changes during the progression of construction, the drainage system may need to be re-evaluated and altered.

This assessment cannot find any grounds to not authorise the Environmental Authorisation. This is grounded on the assumption that the proposed mitigation, monitoring, and stormwater management recommendations are implemented.

Freshwater

The results of the identification of freshwater ecosystems indicated that eight (8) non-perennial drainage lines are located in the investigation area, as well as two small portions of the riparian zone of the Steelpoort River. The Site 2B development areas are located in close proximity to two drainage lines, but no part of the physical development footprint extends into the delineated extent of the drainage lines or an associated 20m development exclusion buffer. The results of the detailed assessment of freshwater ecosystems located in the vicinity of the Site 2B and Sites 3B and 3C and 4B development areas are provided in Table 7-8 and Table 7-9 respectively.

All activities associated with the construction, operation and decommissioning of the proposed PV facility pose a "Low" risk significance to the freshwater ecosystems within the study and investigation areas. To a large degree the assessment of low risk is due to the exclusion of the drainage line reaches and a 20m development exclusion buffer around their delineated extents from the development footprint. Two powerline crossings are proposed, but it is likely that with careful planning the freshwater drainage lines can be fully spanned. It is however highly important that all mitigation measures be fully implemented and that the integrity of the 20m development exclusion area be protected through all development phases.

Based on the strict proviso that all mitigation measures specified Section 8.5 and in the Freshwater Assessment Report (***Appendix F3***) implemented, it is the professional opinion of the Freshwater Ecologist that the proposed development can be considered acceptable and be able to be granted environmental authorisation.

Biodiversity

Th Biodiversity Assessment concludes that the study sites comprise of savannah habitat of varying status and sensitivity, which is consistent with natural habitat in proximity to the intensive anthropogenic and disruptive land use activities noted around Steelpoort. As most of the project sites are situated in proximity to, or are surrounded by, industrial infrastructure or areas where human activities are relatively of high frequency, remaining portions of natural habitat conforms to short, open and deteriorated woodland habitat or habitat that are fragmented. Extensive parts of the proposed sites comprise of deteriorated types that are characterised by unspecialised and generalist taxa and communities that are also well represented in the wider region. Portions of the proposed sites are considered diverse and sensitive, and retaining these areas for conservation purposes is highly recommended, although technical considerations for the proposed development might not allow for much mitigation in this sense. The presence of numerous and abundant conservation important plant and animal species, which provides for an elevated ecological sensitivity and importance of certain parts, are noted throughout the study areas.

The nature of the activity dictates that natural habitat will be lost through unavoidable land clearance, and the application of a recommended mitigation approach will allow for some moderation of anticipated impacts. It is predicted that impacts on the ecological environment will generally be of high to moderate significance, notably with regards to the anticipated loss of conservation important plant species and habitat that is associated with animal species of conservation concern (SCC).

In light of the conclusions reached in this report, and despite concerns that are raised about the loss of minor portions of highly sensitive habitat associated with southern sections of Site 2B, no specific objections to the project are raised in its current configuration. This is however with the explicit understanding that the suggested mitigation protocol is timeous and comprehensively implemented during all phases of the project, including the use of an offset strategy to compensate for these losses.

Avifauna

Areas of residual natural habitat in the wider study area have been identified, of which certain habitat units, in particular freshwater habitat and residual non-impacted woodland vegetation have been designated as sensitive habitat from an avifaunal perspective. A number of priority species were identified as part of the characterisation of the avifaunal assemblage of the study area and the assessment of impacts of the proposed development on avifauna.

The impact of greatest significance that is anticipated to occur is the alteration of areas of natural habitat in the development area footprint, reducing avian abundance and diversity within the study area and potentially impacting the priority species, most of which are avifaunal SCC. Further impacts that may result from the proposed project are as a result of potential collisions with the proposed PV plant.

On its own the Phase 2 development would impact relatively small land parcels and areas of residual natural habitat, however the Phase 2 development needs to be viewed in the context of the larger Phase 1 development with the Phase 2 development sites being located immediately adjacent to Phase 1 development sites (which have been authorised to be developed). The Phase 2 development would thus constitute a cumulative impact in the context of the Phase 1 development. In certain areas, the Phase 2 development sites would result in further transformation of areas earmarked in the Phase 1 Avifaunal Study as areas of residual natural habitat that should be kept free of development. Despite this cumulative impact,

the riparian corridors of drainage lines in the vicinity of the Phase 2 development sites and a 20m development exclusion buffer have been left as non-developable areas. A set of mitigation measures have been stipulated to reduce the impacts of habitat loss in the development footprints.

The solar arrays and proposed powerlines are potential sources of collision impacts. It is anticipated that should the proposed mitigation measures be implemented the risk of collisions can be drastically reduced. Due to the low potential of occurrence of Species of Conservation Concern (SCCs) in the study, impacts to these priority species are not anticipated to be regionally significant.

It is important that all essential mitigation measures and recommendations presented in this report should be adhered to as to ensure the ecology within the proposed construction areas as well as surrounding zone of influence is protected or adequately rehabilitated in order to minimise the deviations from the Present Ecological State (PES) as much as possible.

Based on the findings of the avifaunal assessment it is the opinion of the ecologists that from an avifaunal perspective, the proposed components of the development can be considered acceptable and can be granted environmental authorisation.

Heritage and Palaeontology

The Heritage Impact Assessment (HIA) identified various heritage resources within the study area including archaeological resources and burial grounds and graves (BGG) which are rated as having a high heritage significance and will require further mitigation work before the project can continue.

Three additional sites previously identified in the 2021 survey[1] also fall within the current study area. Site 2-1 is a BGG with eighteen graves, Site 2-2, being a potential gravesite and Site 2-4 is another low significance archaeological site (Figure 5-28) and the individual site descriptions as contained in Table 7-17. The field description forms were collected with ArcGIS Survey123 in field software.

The recent historic structures are all older than sixty years given that they appear on the 1954 aerial photography and the 1963 map and are all poorly preserved homesteads intercepted and disturbed by the large servitude (TFC002-1 - TFC002-8). It is possible for stillborn burials to have been buried in association with the homestead locality at site TCF002, it is therefore given the high grading of IIIA. All BGGs should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines.

The stone packed archaeological site of TFC003 is rated as IIIC given its degradation and could potentially be a grain bin stand or initiation cairn. The other features surrounding the potential grain bin stand/initiation cairn were too degraded which made identification difficult. The previously identified stone packed Site 2-4 was given the same rating and is detailed thoroughly in the HIA (2021)[2]. The potential grave sites of TFC001, TFC004 and TFC005 still require further investigation, but burial grounds have a high heritage rating and a heritage grading of IIIA. TCF001 contains potentially more than the five graves observed due to limited visibility. TFC004 and TFC005 contained two and three graves, respectively.

If any of the identified archaeological sites are to be disturbed, a Phase 2 archaeological mitigation process must be implemented. This will include surface collections, test excavations and analysis of recovered material. A permit issued under Section 35 of the NHRA will be required to conduct such work. On completion of the mitigation work, the developer can apply for a destruction permit with the backing of the mitigation report.

[1] *Fourie, W., 2021. Proposed 100MW PV Plant at the Samancor Chrome Operations, Steelpoort, Limpopo.*
[2] *Fourie, W., 2021. Proposed 100MW PV Plant at the Samancor Chrome Operations, Steelpoort, Limpopo.*

The proposed development is underlain by Quaternary alluvium and scree while the south and south-eastern margins is underlain by the Magaliesberg Formation of the Pretoria Group (Transvaal Supergroup). According to the Palaeo-sensitivity Map available on the South African Heritage Resources Information System database (SAHRIS), the Palaeontological Sensitivity of the proposed development area is rated as low for superficial deposits, however, the small portion of Site 2B's southern section is within the Magaliesberg Formation of the Pretoria Group (Transvaal Supergroup) which has a high palaeontological sensitivity. The proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

It is the combined considered opinion of the Heritage Specialists that the proposed project will have a direct impact on several identified heritage resources rated being of low to high heritage significance. With the implementation of recommended mitigation measures the overall impact on heritage resources will be reduced to acceptable levels during the activities of the project.

Visual

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact. With the study area situated in an anthropogenically altered visual landscape the visual receptors in the receiving environment are accustomed to such a landscape. Based on the findings of the Visual Compliance Statement, the proposed solar development is expected to have a minimal visual impact on the receiving environment. It is therefore the opinion of the specialist that the project be considered favourably from a visual resource management perspective.

Social

Construction activities and impacts that pose a danger to proximate residents (Mohlakwana, Matholeng, Stocking, Steelpoort Town) through increased road traffic, dust and potential noise must be managed by the implementation of mitigation measures as proposed in the EMPrs (***Appendix G – H***).

The influx of Contractors and staff will result in the proliferation of social ills and issues such as crime, prostitution, alcohol consumption, abuse, the spread of HIV/AIDs etc. Communication with local communities is also an important tool that will assist in monitoring such a situation as well as the implementation of a formal grievance system to be maintained throughout project.

The potential job creation at the construction phase of the project will be a positive for the local and regional economy as unemployment in the country is increasing.

Other Impacts

Other impacts relate to dust, emissions, traffic and waste must be managed during the construction, post-construction and rehabilitation and operations. Mitigation measures proposed in the EMPrs (***Appendix G and H***) must be adhered to reduce the significance of these potential impacts.

Note: Key changes from the final ESR to the final EIAR have been underlined for ease of reference.

Acronyms

Acronym	Acronym description
AC	Alternating Current
AIP	Alien Invasive Plant
BAS	Best Attainable State
BESS	Battery Energy Storage System
BID	Background Information Document
BGG	Burial Grounds and Graves
BRP	Bioregional Plan
CBA	Critical Biodiversity Area
C-Plan	Conservation Plan
CRR	Comments and Response Report
CSP	Concentrated Solar Power
CSWMP	Concept Stormwater Management Plan
DC	Direct Current
DWS	Department of Water and Sanitation
DFFE	Department of Forestry, Fisheries and the Environment
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EDL	Episodic Drainage Line
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EIS	Ecological Importance and Sensitivity
EMPr	Environmental Management Programme
EPL	Ecosystem Protection Level
ESA	Ecological Support Areas
ESR	Environmental Scoping Report
ESS	Environmental Scoping Study
EST	Environmental Screening Tool
ETS	Ecosystem Threat Status
FGTM	Fetakgomo Tubatse Local Municipality

GA	General Authorisation
GG	Government Gazette
GHG	Greenhouse Gases
GN	Government Notice
HEC-RAS	Hydrologic Engineering Centre's River Analysis System
HFA	Hyogo Framework for Action
HGM	Hydrogeomorphic
HIA	Heritage Impact Assessment
HRU	Hydrological Response Unit
I&APs	Interested and affected parties
IBA	Important Bird Area
IDP	Integrated Development Plan
IUCN	International Union for Conservation of Nature
LEDET	Limpopo Department of Economic Development, Environment and Tourism
LEMA	Limpopo Environmental Management Act
LoO	Likelihood of Occurrence
MAP	Mean Annual Precipitation
MAE	Mean Annual Evaporation
MAMSL	Meters Above Mean Sea Level
MIPI	Midgley and Pitman
MWh	Megawatt per hour
MW	Megawatt
NBA	National Biodiversity Assessment
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)(as amended)
NEM:BA	National Environmental Management Act: Biodiversity Act, 2004 (Act No. 10 of 2004)
NEM: WA	National Environmental Management: Waste Act (Act No. 59 of 2008) (as amended)
NGO	Non-governmental organisation
NFEPA	National Freshwater Ecosystem Priority Areas
NMAR	Natural Mean Annual Run-off
NNHR	No Natural Habitat Remaining

NWA	National Water Act, 1998 (Act No. 36 of 1998) (as amended)
ONA	Other Natural Areas
PA	Protected Areas
PES	Present Ecological State
PPP	Public Participation Process
PV	Photovoltaic
REC	Recommended Ecological Class
RM	Rational Method
RMO	Recommended Management Objective
RoW	Right of Way
SAIIAE	South African Inventory of Inland Aquatic Ecosystem
SABAP	Southern African Bird Atlas Project
SAHRA	South African Heritage Resource Agency
SANBI	South African National Biodiversity Institute
SCC	Species of Conservation Concern
SCPE	Sekhukhune Centre of Plant Endemism
SDF	Standard Design Flood
SDGs	Sustainable Development Goals
SDM	Sekhukhune District Municipality
SEI	Site Ecological Importance
SEZ	Special Economic Zone
SIP	Strategic Infrastructure Projects
SP	Significance Points
SPV	Special Purpose Vehicle
SSV	Site Sensitivity Verification
TFC	Tubatse Ferrochrome
UNFCCC	United Nations Framework Convention on Climate Change
WMA	Water Management Area
ZoR	Zone of Regulation

Glossary

Glossary Term	Glossary Text
Activity (Development)	An action either planned or existing that may result in environmental impacts through pollution or resource use. For the purpose of this report, the terms 'activity' and 'development' are freely interchanged.
Albedo	Ground reflectance.
Alternatives	Different means of meeting the general purpose and requirements of the activity, which may include site or location alternatives; alternatives to the type of activity being undertaken; the design or layout of the activity; the technology to be used in the activity and the operational aspects of the activity.
Applicant	The project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.
Biodiversity	The diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.
Buffer	A buffer is seen as an area that protects adjacent communities from unfavourable conditions. A buffer is usually an artificially imposed zone included in a management plan.
Construction	The building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.
Cumulative Impact	The impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Decommissioning	Decommissioning means to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily re-commissioned.
Direct Impact	Impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.
Ecosystem	A dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.
Environment	In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), "Environment" means the surroundings within which humans exist and that are made up of: i. the land, water and atmosphere of the earth; ii. micro-organisms, plants and animal life; iii. any part or combination of (i) and (ii), and the interrelationships among and between them; and

	iv. the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
Environmental Assessment	The generic term for all forms of environmental assessment for projects, plans, programmes, or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.
Environmental Authorisation	An authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.
Environmental Assessment Practitioner (EAP)	The individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.
Environmental Impact	Change to the environment (biophysical, social and/ or economic), whether adverse or beneficial, wholly, or partially, resulting from an organisation's activities, products or services.
Environmental Management	Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.
Environmental Management Programme (EMPr)	A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project.
Groundwater	Water in the ground that is in the zone of saturation from which wells, springs, and groundwater runoff are supplied.
Hazardous Waste	Any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles as outlined in the National Environmental Management: Waste Amendment Act (No 26 of 2014). Schedule 3: Category A – Hazardous Waste.
Hornfels	Hornfels is a metamorphic rock formed by the contact between mudstone/ shale, or other clay-rich rock, and a hot igneous body, and represents a heat-altered equivalent of the original rock.
Hydrology	The science encompassing the behaviour of water as it occurs in the atmosphere, on the surface of the ground, and underground.
Hydrologic Engineering Centre's River Analysis System	Hydrologic Engineering Centre's River Analysis System is a hydraulic programme designed to perform one-dimensional hydraulic calculations for a range of applications, from a single watercourse to a full network of natural or constructed channels.
Indirect Impacts	Indirect or induced changes that may occur as a result of the activity. These types if impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken, or which occur at a different place as a result of the activity

Integrated Environmental Management	A philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity - at local, national and international level – that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing, and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).
Interested and Affected Party (I&AP)	Any person, group of persons or organisation interested in or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.
Method Statement	A method statement is a written submission by the Contractor to the Engineer in response to the specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting a Method Statement. It contains sufficient detail to enable the Engineer to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.
Midgley and Pitman Method	The Midgley and Pitman method is an empirical method that relates peak discharge to catchment size, slope, and distance from the drainage point to the centroid of the catchment **Invalid source specified.**. The MIPI method uses 10-unit hydrographs for 10 zones in South Africa. The method does not consider overland flow as a component separate from streamflow but considers only the total longest flow path.
Mitigate	The implementation of practical measures designed to avoid, reduce, or remedy adverse impacts or enhance beneficial impacts of an action.
No-Go Option	In this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.
Physiognomy	Physiognomy refers to overall structure or physical appearance - what the community and its dominant species look like, their height and spacing (height and canopy cover), and shape.
Pollution	The National Environmental Management Act, No. 107 of 1998 (as amended) defines pollution to mean any change in the environment caused by – substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.

Public Participation Process	A process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.
Rational Method	The rational method was developed in the mid-19th century and is one of the most widely used methods for the calculation of peak flows for small catchments (< 15 km^2). The formula indicates that Q = CIA, where I is the rainfall intensity, A is the upstream runoff area and C is the runoff coefficient. Q is the peak flow**.** The third alternative uses the Design Rainfall software for South Africa.
Re-use	To utilise articles from the waste stream again for a similar or a different purpose without changing the form of properties of the articles.
Rehabilitation	A measure aimed at reinstating an ecosystem to its original function and state (or as close as possible to its original function and state) following activities that have disrupted those functions.
Scour	The removal of sediment or materials from the bed or banks of a watercourse occur when the forces imposed by the flow on a sediment particle exceed the stabilising forces.
Sensitive Environments	Any environment identified as being sensitive to the impacts of the development.
Significance	Significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. magnitude, intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgements and science-based criteria (i.e. biophysical, social and economic).
Stakeholder Engagement	The process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities.
Standard Design Flood Method	The Standard Design Flood method was developed specifically to address the uncertainty in flood prediction under South African conditions. The runoff coefficient (C) is replaced by a calibrated value based on the subdivision of the country into 26 regions or Water Management Areas (WMAs). The design methodology is slightly different and looks at the probability of a peak flood event occurring at any one of a series of similarly sized catchments in a wider region, while other methods focus on point probabilities.
Sustainable Development	Development which meets the needs of current generations without hindering future generations from meeting their own needs.
Vadose Zone	The vadose zone is the Earth's terrestrial subsurface that extends from the surface to the regional groundwater table.
Watercourse	Defined as: i. a river or spring; ii. a natural channel or depression in which water flows regularly or intermittently; iii. a wetland, lake or dam into which, or from which, water flows; and iv. any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.
Water Pollution	The National Water Act, 36 of 1998 (as amended) defines water pollution to be the direct or indirect alteration of the physical, chemical

	or biological properties of a water resource so as to make it – less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful (aa) to the welfare, health or safety of human beings; (bb) to any aquatic or non-aquatic organisms; (cc) to the resource quality; or (dd) to property".
Wetland	Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

1 Introduction

1.1 Background

Samancor Chrome Ltd's core business is the mining and smelting of chrome ore. With an annual production capacity of 2.4 million tons of ferrochrome, Samancor Chrome is one of the largest integrated ferrochrome producers in the world. The ferrochrome produced is used in areas of the stainless-steel smelting process. Samancor Chrome has been, and continues to be, a major player in ferrochromium production. The company's total chromite resources exceed 900 million tons and are expected to support current mining activity for well over 100 years at the current rate of extraction. Some ores and concentrates are exported, but main allotments are destined for conversion into ferrochrome at the alloy plants.

The Tubatse Ferrochrome (TFC) Smelter was initially built as a three-furnace operation in 1975 as a joint venture between Gencor Ltd and Union Carbide Inc. (USA). In the same year, the Union Carbide Inc. shareholding was taken over by Samancor Chrome, and in 1989, Samancor Chrome acquired the Gencor Ltd shareholding. During the years 1989 – 1990, the plant was expanded to five furnaces with the sixth furnace being built in 1996. The plant is situated in Steelpoort, Limpopo Province and is in close proximity to the Eastern Chrome Mines. The core business of the operation is the production of charge chrome using six Submerged-Arc Furnaces, one metal recovery plant, and a Pellet and Sintering Plant.

1.2 Project Need and Justification

The rising electricity tariffs in South Africa, combined with the increasingly severe load shedding patterns experienced across the country, has a negative impact on the production and revenue of Samancor Chrome business. Climate change is also a concern for Samancor Chrome referring to the emissions of greenhouse gases (GHG) in the use of fossil fuel electricity. This has motivated Samancor Chrome to consider renewable energy generation at their smelter plants. Implementing solar Photovoltaic (PV) generation will result in improved availability of supply and reduced utility bills as well as going 'green' in terms of environmental considerations.

In 2021, a Special Purpose Vehicle (SPV), TFC Solar (Pty) Ltd (hereafter referred to as TFC Solar, proposed the development of a Solar PV facility of up to 100 Megawatt (MW) generation capacity over five (5) sites: 1, 2, 3, 4 and 5. These five (5) sites were subject to an Environmental Impact Assessment (EIA) and an Environmental Authorisation (EA) was granted on 25 April 2022 from the Department of Forestry, Fisheries and the Environment (DFFE) (DFFE Ref: 14/12/16/3/3/2/2079). A General Authorisation was received from the Department of Water and Sanitation (DWS) on 28 March 2022. Site 1 is no longer considered for the Solar PV development.

A total of 60MW output can be achieved from the previously authorised Sites 2 – 5. Additionally, TFC Solar, propose the development of a 40MW Solar PV facility to be developed on Site 2B, 3B, 3C, 4B and 5B (Figure 1-1 and ***Appendix A***). All previously authorised Sites 2, 3, 4 and 5 as well as new Sites 2B, 3B, 3C, 4B and 5B would achieve a total of 100MW.

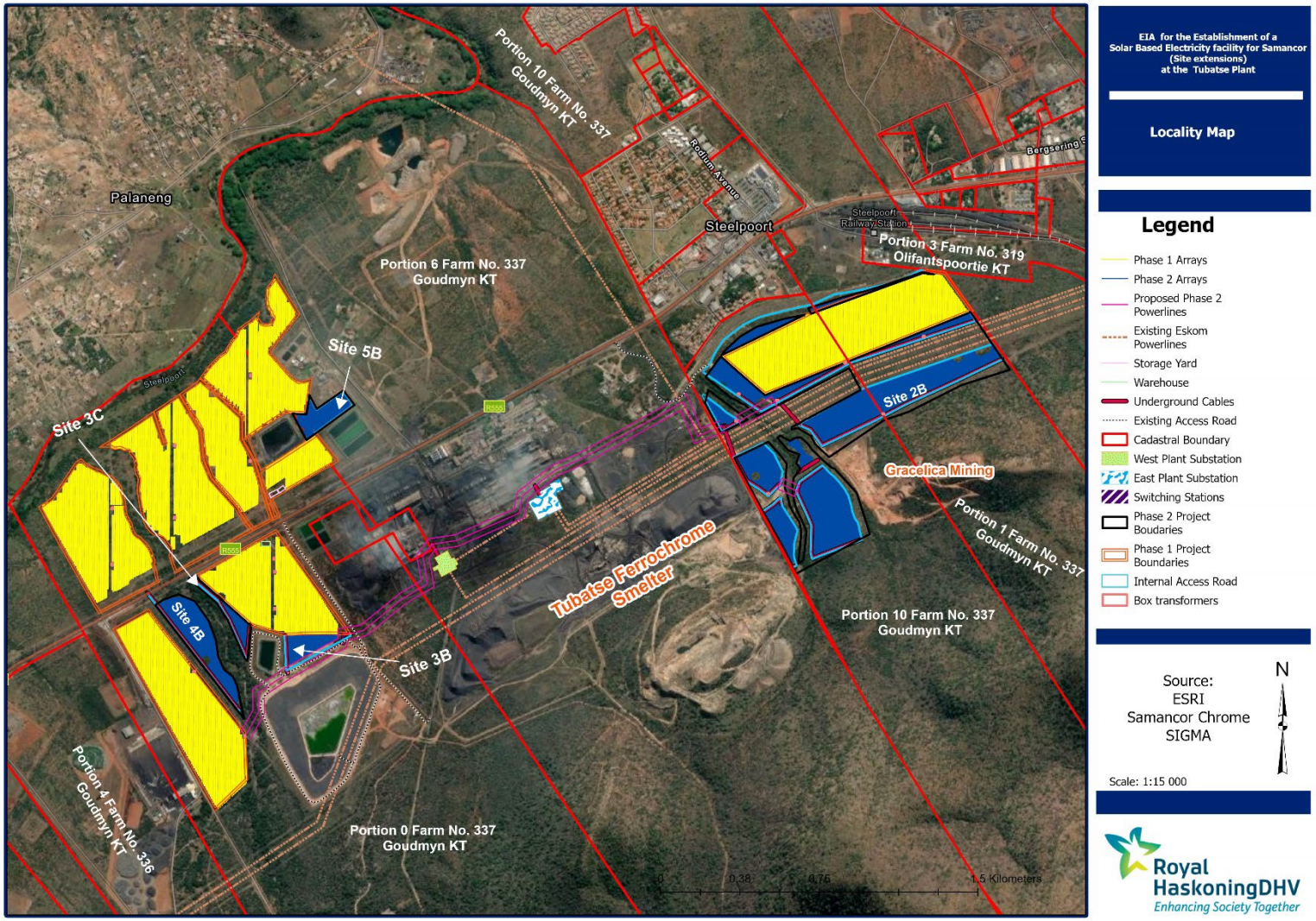


Figure 1-1: Locality map

1.3 Objectives of the EIA Study

The objective of the EIA study is to, through a consultative process:

a) determine the policy and legislative context within which the activity is located and document how the proposed activity complies with and responds to the policy and legislative context;
b) describe the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the development footprint on the approved site as contemplated in the accepted Environmental Scoping Report (ESR);
c) identify the location of the development footprint within the approved site as contemplated in the accepted ESR based on an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects of the environment;
d) determine the –
    i. nature, significance, consequence, extent, duration and probability of the impacts occurring to inform identified preferred alternatives; and
    ii. degree to which these impacts can be reversed; may cause irreplaceable loss of resources, and can be avoided, managed or mitigated;
e) identify the most ideal location for the activity within the development footprint of the approved site as contemplated in the accepted ESR based on the lowest level of environmental sensitivity identified during the assessment;
f) identify, assess, and rank the impacts the activity will impose on the development footprint on the approved site as contemplated in the accepted ESR through the life of the activity;
g) identify suitable measures to avoid, manage or mitigate identified impacts; and
h) identify residual risks that need to be managed and monitored.

1.4 DFFE Environmental Screening Tool

Government Notice No. 320, dated 20 March 2020, includes the requirement for a Site Sensitivity Verification (SSV) exercise to be undertaken by either an Environmental Assessment Practitioner (EAP) or a specialist to confirm the current use of the land and the environmental sensitivity of the site under consideration identified by the National Web-based Environmental Screening Tool (EST).

The SSV must be undertaken through the use of:

- A desktop analysis, using satellite imagery;
- A preliminary on-site inspection; and
- Any other available and relevant information.

The outcome of the SSV is recorded in the form of a report (***Appendix B***) that-

- Confirms or disputes the current use of the land and the environmental sensitivity as identified by the EST, such as new development or infrastructure, the change in vegetation cover or status etc.;
- Contains a motivation and evidence of either the verified or different use of the land and environmental sensitivity; and
- Is submitted together with the relevant reports prepared in accordance with the requirements of the Environmental Impact Assessment Regulations.
- National Web-based Environmental Screening Tool.

An EST Report for the proposed project was generated on 21 August 2023 (***Appendix B***) to determine the current use of the land and the environmental sensitivity of the site under consideration. Table 1-1 confirms

or disputes the current use of the land and the sensitivity and contains a motivation of either the verified or different use of the land.

Table 1-1: Identified environmental themes and their sensitivities according to the EST report

Theme	Very High	High	Medium	Low	Verification
Agriculture		x			'High' - however it is not relevant to an assessment of agricultural impact.
Animal Species		x			'High' - animals of conservation concern have been recorded from nearby localities.
Aquatic Biodiversity				x	'Very High' – Steelpoort River and Episodic Drainage Lines (EDLs) that form tributaries to the Steelpoort River have a 'Very High' sensitivity.
Archaeological and Cultural Heritage	x				'Low' for Sites 3B and 5B and 'Very High' for Sites 2B, 3C and 4B due to the presence of burial grounds and graves, historical structures and archaeological sites.
Avian Theme				x	'Very High' - habitat for avifaunal species of conservation concern (SCC) confirmed during surveys.
Civil Aviation (Solar PV)				x	'Low' - there will be no impact on the communication systems, navigation, or surveillance systems.
Defence				x	'Low' - there are no defence installations in close proximity to the sites.
Landscape (Solar)	x				'Low' due to the level of anthropogenic alteration of the landscape.
Palaeontology		x			'Low' (Sites 3B, 3C, 4B and 5B) – 'High' (southern portion of Site 2B).
Plant Species			x		Plant SCC species recorded in all sites, but specific reference to Sites 2B, 3C and 4B, therefore a sensitivity of 'High' is confirmed.
RFI			x		'Low' – various service providers (Sentech, Vodacom, Openserve, SAWS, Cell C) have confirmed that no interference, operational risks, or direct impacts will be experienced at any of their infrastructure.
Terrestrial Biodiversity	x				'High' - Sites 3C and 4B are likely to be exhibit 'High' sensitivity, while southern parts of Site 2B are likely to exhibit 'Very High' sensitivity.

1.5 Specialist Input into the EIA Study

To ensure the scientific rigour of the EIA process as well as a robust assessment of impacts, Royal HaskoningDHV was assisted by various specialists as identified in the SSV exercise to comprehensively identify both potentially positive and negative environmental impacts (social and biophysical) associated with the project and where possible mitigate the potentially negative impacts and enhance the positive impacts (Table 1-2).

Table 1-2: Specialist inputs into the EIA study

Specialist Study	Organisation
Hydrology	GCS Water and Environmental Consultants
Freshwater	Scientific Aquatic Services
Agriculture	SoilZA
Biodiversity	Bathusi Environmental Consultants
Avifauna	Scientific Aquatic Services
Heritage and Palaeontology	PGS Heritage & Banzai Environmental
Visual	Scientific Aquatic Services

1.6 Details of Applicant

The Applicant for the project is TFC Solar (Pty) Ltd, a SPV created by Samancor Chrome. The details of the responsible person are listed in Table 1-3 below.

Table 1-3: Applicant details

Applicant	TFC Solar (Pty) Ltd	
Representative	[redacted]	
Physical Address	[redacted]	
Telephone	[redacted]	
E-mail	[redacted]	

1.7 Details of Environmental Assessment Practitioner

The environmental team of Royal HaskoningDHV have been appointed as the EAPs by TFC Solar to undertake the appropriate environmental studies for this proposed project (Table 1-4).

The professional team of Royal HaskoningDHV has considerable experience in the environmental management field. Royal HaskoningDHV been involved in and/or managed several of the largest EIAs undertaken in South Africa to date. A specialist area of focus is on the assessment of multi-faceted projects, including the establishment of linear developments (national and provincial roads, and powerlines), mixed-use developments, bulk infrastructure and supply (e.g. wastewater treatment works, pipelines, landfills), electricity generation (renewable as well as non-renewable) and transmission, urban, rural and township developments, environmental aspects of Local Integrated Development Plans, as well as general environmental planning, development and management.

The EAP CVs are attached as ***Appendix C***.

Table 1-4: EAP details

Consultant	Royal HaskoningDHV	
Contact Persons	Seshni Govender	Prashika Reddy
Postal Address	PO Box 867, Gallo Manor, 2191	PO Box 867, Gallo Manor, 2191
Telephone	087 352 1592	087 352 1577
E-mail	Seshni.govender@rhdhv.com	prashika.reddy@rhdhv.com
Qualification	BSc (Hons) Environmental Science	BSc (Hons) Geography BSc (Hons) Botany
Expertise	Seshni Govender is an Environmental Consultant with 12 years' experience working on compliance and strategic planning projects across South Africa. She has been involved in numerous Screening Studies, Basic Assessment, Water Use License projects, including complex integrated licensing that requires understanding cumulative environmental impacts. She is a Professional Natural Scientist (132741) with the SACNASP as well as a Registered EAP with EAPASA (2022-6018).	Prashika Reddy is a Senior Environmental Scientist with 23 years' experience in various environmental fields including: EIAs, EMPrs, PPP and environmental monitoring and audits. She is/has been part of numerous multi-faceted large-scale projects, including the establishment of linear developments (roads and powerlines), industrial plants, electricity generation plants, mixed-use developments and mining projects. She is a Professional Natural Scientist (400133/10) with the South African Council for Natural Scientific Professions (SACNASP) as well as a Registered EAP with Environmental Assessment Practitioners Association of South Africa (EAPASA) (2019/917).

1.8 Structure of the EIA Report

This draft consultation Environmental Impact Assessment Report (EIAR) has been compiled in accordance with the stipulated requirements in GNR 326, Appendix 3 of the EIA Regulations 2014 (as amended) - Table 1-5.

Table 1-5: Compliance with Appendix 3 of GNR 326

EIAR Requirements	Section/Comment
An environmental impact assessment report must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include-	
a. details of— (i) the EAP who prepared the report; and (ii) (ii) the expertise of the EAP, including a curriculum vitae;	Section 1.6

EIAR Requirements	Section/Comment
b. the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including: (i) the 21 digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; and (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	Section 2.1 Figure 1-1
c. a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;	Figure 2-2
d. a description of the scope of the proposed activity, including— (i) all listed and specified activities triggered and being applied for; and (ii) a description of the associated structures and infrastructure related to the development;	Section 2.3 Chapter 3
e. a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;	Chapter 3
f. a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Section 2.5
g. a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;	Chapter 4
h. a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including: (i) details of the development footprint alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner	Chapter 4, 5, 6, 7, 8 and 9

EIAR Requirements	Section/Comment
in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts— (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) if no alternative development footprints for the activity were investigated, the motivation for not considering such; and (x) a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;	
i. a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including— (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;	Chapter 8

EIAR Requirements	Section/Comment
j. an assessment of each identified potentially significant impact and risk, including— (i) cumulative impacts; (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring;(v) the degree to which the impact and risk can be reversed; (v) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vi) the degree to which the impact and risk can be mitigated;	Chapter 8
k. where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;	Chapter 7
l. an environmental impact statement which contains— (i) a summary of the key findings of the environmental impact assessment: (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;	Chapter 9
m. based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;	Chapter 8 and 9
n. the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;	Chapter 4
o. any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;	Chapter 10
p. a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;	Section 9.4

EIAR Requirements	Section/Comment
q. a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;	Section 9.1
r. where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;	Chapter 10
s. an undertaking under oath or affirmation by the EAP in relation to (i) the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;	Section 10.2
t. where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;	N/A
u. an indication of any deviation from the approved scoping report, including the plan of study, including— (i) any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and (ii) a motivation for the deviation;	N/A
v. any specific information that may be required by the competent authority; and	▪ It is noted that a portion of the land earmarked for the development is owned by Goldbroz, kindly provide landowner consent, lease agreement or title deed if the property has been acquired - *Landowner consent provided in the Application Form (attached as Appendix C).* ▪ Kindly confirm that no BESS is associated with this application as the system has already been authorised" – *no BESS is applicable to this project.* ▪ Kindly provide proof of consultation with the next-of-kin of the deceased buried on the site – *As the structures cannot be confirmed or denied as graves, as a precautionary measure, all potential burial grounds and graves have been demarcated by a 30m buffer as per SAHRA guidelines.* *No party came forward during the PP process to claim the potential or actual graves in the area.* ▪ You are required to submit one (1) hard copy and one (1) soft copy of the EIAR (addressing the above issues), which has been subjected to at

EIAR Requirements	Section/Comment
	least 30 days public participation, within 106 days from the date of acceptance of the Scoping Report – *The Final EIAR is being submitted to comply with this request. A review period was granted to all I&APs from 27 March to 30 April 2024.*
w. any other matters required in terms of section 24(4)(a) and (b) of the Act.	N/A

2 Project Description

2.1 Property Details

Sites 2B, 3B, 3C, and 4B are located to the south of the R555, whilst Site 5B is located to the north of the R555 and to the south of the Steelpoort River, Limpopo Province. The project area falls within the Sekhukhune District Municipality (SDM) and the Fetakgomo Tubatse Local Municipality (FGTM). Small settlements of Pelaneng (located to the north), Stocking, Matholeng and Mohlakwana (located to the east) exist within the project area. The town of Steelpoort is located to the east of the TFC Plant.

The details regarding the proposed sites are provided in Table 2-1 and Table 2-2.

Table 2-1: Property details (PV plant)

Site	Size (ha)	Property Name	SG code	Property Owner	Zoning
2B	47,49	Goudmyn No.337 KT Portion 1	T0KT00000000033700001	Samancor Chrome Ltd	Agriculture/Mining
		Goudmyn No.337 KT Portion 10	T0KT00000000033700010	Goldbroz Inv Pty Ltd	Possible Agriculture
3B	2,37	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
3C	1,71	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
4B	5,52	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
5B	2,14	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Agriculture
		Goudmyn 337 KT Portion 6	T0KT00000000033700006	Samancor Chrome Ltd	Agriculture

Table 2-2: Property details for the associated infrastructure

Component	Property Name	SG code	Owner	Zoning
Powerline	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
	Goudmyn 337 KT Portion 6	T0KT00000000033700006	Samancor Chrome Ltd	Agriculture
	Goudmyn No.337 KT Portion 10	T0KT00000000033700010	Goldbroz Inv Pty Ltd	Possible Agriculture
Internal Access Roads: Site 2B	Goudmyn No.337 KT Portion 10	T0KT00000000033700010	Goldbroz Inv Pty Ltd	Possible Agriculture

Component	Property Name	SG code	Owner	Zoning
	Goudmyn No.337 KT Portion 1	T0KT00000000033700001	Samancor Chrome Ltd	Agriculture/Mining
Internal Access Roads: Site 3B	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
Internal Access Roads: Site 3C	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
Internal Access Roads: Site 4B	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
Internal Access Roads: Site 5B	Goudmyn 337 KT Portion 6	T0KT00000000033700006	Samancor Chrome Ltd	Agriculture
Underground Cables: Site 2B	Goudmyn No.337 KT Portion 10	T0KT00000000033700010	Goldbroz Inv Pty Ltd	Possible Agriculture
	Goudmyn No.337 KT Portion 1	T0KT00000000033700001	Samancor Chrome Ltd	Agriculture/Mining
Underground Cables: Site 3B	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
Underground Cables: Site 3C	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
Underground Cables: Site 4B	Goudmyn No.337 KT Portion 0	T0KT00000000033700000	Samancor Chrome Ltd	Industrial
Underground Cables: Site 5B	Goudmyn 337 KT Portion 6	T0KT00000000033700006	Samancor Chrome Ltd	Agriculture

2.2 Project Co-ordinates

The corner points of each site (Table 2-3), powerlines (Table 2-4) and internal access roads are provided below.

Table 2-3: Site co-ordinates

Site Corner points	Latitude (S)			Longitude (E)		
Site 2B						
1	24˚	44'	4.66"	30˚	12'	34.26"
2	24˚	43'	59.68"	30˚	12'	51.72"
3	24˚	43'	59.97"	30˚	12'	53.39"
4	24˚	43'	59.80"	30˚	12'	51.74"

Site Corner points	Latitude (S)			Longitude (E)		
5	24˚	44'	5.44"	30˚	12'	34.65"
6	24˚	44'	6.14"	30˚	12'	32.90"
7	24°	44'	7.74"	30°	12'	25.72"
8	24°	44'	9.17"	30°	12'	23.05"
9	24°	44'	11.16"	30°	12'	20.70"
10	24°	44'	11.70"	30°	12'	20.29"
11	24°	44'	11.91"	30°	12'	20.21”
12	24°	44'	11.91"	30°	12'	20.18"
13	24°	44'	14.73"	30°	12'	17.86"
14	24°	44'	17.53"	30°	12'	21.60"
15	24°	44'	17.94"	30°	12'	22.54"
16	24°	44'	18.54"	30°	12'	23.76"
17	24°	44'	19.29"	30°	12'	24.74"
18	24°	44'	20.10"	30°	12'	25.87"
19	24°	44'	13.56"	30°	12'	39.79"
20	24°	44'	16.57"	30°	12'	41.55"
21	24°	44'	21.77"	30°	12'	31.00"
22	24°	44'	22.07"	30°	12'	30.99"
23	24°	44'	21.91"	30°	12'	31.50"
24	24°	44'	21.82"	30°	12'	31.96"
25	24°	44'	22.47"	30°	12'	33.15"
26	24°	44'	22.93"	30°	12'	33.97"
27	24°	44'	23.25"	30°	12'	34.13"
28	24°	44'	23.98"	30°	12'	34.56"
29	24°	44'	25.87"	30°	12'	36.71"
30	24°	44'	20.82"	30°	12'	45.22"
31	24°	44'	15.84"	30°	12'	56.89"
32	24°	44'	13.78"	30°	13'	4.32"
33	24°	44'	5.78"	30°	12'	58.30"
34	24°"	44'	17.34”	30°	12'	26.98"
35	24°	44'	27.42"	30°	12'	37.51"
36	24°	44'	27.35"	30°	12'	37.17"
37	24°	44'	24.79"	30°	12'	34.08"
38	24°	44'	24.00"	30°	12'	33.45"
39	24°	44'	23.13"	30°	12'	32.39"
40	24°	44'	23.21"	30°	12'	31.53"
41	24°	44'	23.62"	30°	12'	30.73"
42	24°	44'	22.86"	30°	12'	29.27"

Site Corner points	Latitude (S)			Longitude (E)		
43	24°	44'	23.19"	30°	12'	28.83"
44	24°	44'	24.91"	30°	12'	30.45"
45	24°	44'	25.48"	30°	12'	32.23"
46	24°	44'	26.75"	30°	12'	31.68"
47	24°	44'	27.50"	30°	12'	32.42"
48	24°	44'	28.77"	30°	12'	31.34"
49	24°	44'	31.79"	30°	12'	31.30"
50	24°	44'	33.65"	30°	12'	32.01"
51	24°	44'	36.17"	30°	12'	33.29"
52	24°	44'	40.19"	30°	12'	32.81"
53	24°	44'	40.60"	30°	12'	32.04"
54	24°	44'	36.27"	30°	12'	32.51"
55	24°	44'	34.99"	30°	12'	32.26"
56	24°	44'	33.36"	30°	12'	31.12"
57	24°	44'	32.65"	30°	12'	30.77"
58	24°	44'	31.14"	30°	12'	30.33"
59	24°	44'	30.42"	30°	12'	30.03"
60	24°	44'	26.86"	30°	12'	30.27"
61	24°	44'	23.75"	30°	12'	27.43"
62	24°	44'	26.04"	30°	12'	22.32"
63	24°	44'	42.06"	30°	12'	31.68"
64	24°	44'	39.06"	30°	12'	37.75"
65	24°	44'	36.52"	30°	12'	42.94"
66	24°	44'	30.81"	30°	12'	40.97"
67	24°	44'	20.65"	30°	12'	24.25"
68	24°	44'	16.57"	30°	12'	18.29
69	24°	44'	18.38"	30°	12'	17.78"
70	24°	44'	22.44"	30°	12'	20.19"
Site 3B						
71	24°	44'	50,65"S	30°	11'	13,24"
72	24°	44'	50,72"	30°	11'	23,61"
73	24°	44'	55,66"	30°	11'	13,5"
Site 3C						
74	24°	44'	42,3"S	30°	10'	59,68"
75	24°	44'	49,27"	30°	11'	8,34"
76	24°	44'	54,17"	30°	11'	7,75"
77	24°	44'	42,72"	30°	10'	58,77"
Site 4B						

Site Corner points	Latitude (S)			Longitude (E)		
78	24°	44'	46,32"	30°	10'	53,63"
79	24°	44'	44,86"	30°	10'	57,16"
80	24°	44'	57,56"	30°	11'	6,08"
81	24°	45'	2,19"	30°	11'	7,14"
Site 5B						
82	24°	44'	19,9"	30°	11'	14,82"
83	24°	44'	16,6"	30°	11'	22,44"
84	24°	44'	18,61"	30°	11'	24,14"
85	24°	44'	23,39"	30°	11'	17,0"

Table 2-4: Overhead powerline co-ordinates

Route	Latitude (S)			Longitude (E)		
Powerline 50m Assessment Corridor – Main						
Start point of the activity	24˚	45'	5"	30˚	11'	8"
Point 1 (Bend Point)	24°	45'	1"	30°	11'	10"
Point 2 (Bend Point)	24°	44'	59"	30°	11'	10"
Point 3	24°	44'	55"	30°	11'	17"
Point 4 (Bend Point)	24°	44'	52"	30°	11'	23"
Point 5 (Bend Point)	24°	44'	51"	30°	11'	23"
Point 6 (Bend Point)	24°	44'	51"	30°	11'	23"
Point 7	24°	44'	51"	30°	11'	25"
Point 8 (Bend Point)	24°	44'	51"	30°	11'	26"
Point 9 (Bend Point)	24°	44'	46"	30°	11'	32"
Point 10 (Bend Point)	24°	44'	44"	30°	11'	36"
Point 11 (Bend Point)	24°	44'	40"	30°	11'	36"
Point 12 (Bend Point)	24°	44'	39"	30°	11'	36"
Point 13 (Bend Point)	24°	44'	38"	30°	11'	40"
Point 14	24°	44'	36"	30°	11'	46"
Point 15 (Bend Point)	24°	44'	34"	30°	11'	50"
Point 16 (Bend Point)	24°	44'	32"	30°	11'	51"
Point 17 (Bend Point)	24°	44'	28"	30°	11'	55"
Point 18	24°	44'	25"	30°	12'	3"

Route	Latitude (S)			Longitude (E)		
Point 19	24°	44'	22"	30°	12'	9"
Point 20 (Bend Point)	24°	44'	19"	30°	12'	14"
Point 21 (Bend Point)	24°	44'	24"	30°	12'	16"
Point 22	24°	44'	22"	30°	12'	21"
Point 23	24°	44'	21"	30°	12'	20"
Point 24 (Bend Point)	24°	44'	22"	30°	12'	17"
Point 25 (Bend Point)	24°	44'	17"	30°	12'	15"
Point 26	24°	44'	21"	30°	12'	8"
Point 27	24°	44'	24"	30°	12'	1"
Point 28 (Bend Point)	24°	44'	27"	30°	11'	54"
Point 29 (Bend Point)	24°	44'	31"	30°	11'	49"
Point 30 (Bend Point)	24°	44'	33"	30°	11'	49"
Point 31	24°	44'	35"	30°	11'	45"
Point 32 (Bend Point)	24°	44'	37"	30°	11'	39"
Point 33 (Bend Point)	24°	44'	37"	30°	11'	35"
Point 34 (Bend Point)	24°	44'	39"	30°	11'	34"
Point 35 (Bend Point)	24°	44'	43"	30°	11'	34"
Point 36 (Bend Point)	24°	44'	45"	30°	11'	31"
Point 37 (Bend Point)	24°	44'	49"	30°	11'	25"
Point 38 (Bend Point)	24°	44'	49"	30°	11'	24"
Point 39 (Bend Point)	24°	44'	50"	30°	11'	22"
Point 40 (Bend Point)	24°	44'	51"	30°	11'	22"
Point 41	24°	44'	55"	30°	11'	14"
Point 42 (Bend Point)	24°	44'	58"	30°	11'	9"
Point 43 (Bend Point)	24°	45'	1"	30°	11'	9"
End point of the activity	24°	45'	4"	30°	11'	7"
Powerline 50m Assessment Corridor - Section A within Site 2B						
Start point of the activity	24°	44'	20"	30°	12'	22"
Point 1 (Bend Point)	24°	44'	17"	30°	12'	28"
Point 2 (Bend Point)	24°	44'	19"	30°	12'	29"

Route	Latitude (S)			Longitude (E)		
End point of the activity	24°	44'	22"	30°	12'	23"
Powerline 50m Assessment Corridor - Section B within Site 2B						
Start point of the activity	24°	44'	29"	30°	12'	30"
Point 1 (Bend Point)	24°	44'	30"	30°	12'	32"
Point 2 (Bend Point)	24°	44'	31"	30°	12'	31"
End point of the activity	24°	44'	30"	30°	12'	29"

Table 2-5: Internal access roads co-ordinates

Route	Latitude (S)			Longitude (E)		
Internal Access Road 1-Site 2B						
Start point of the activity	24°	44'	0"	30°	12'	51"
Point 1 (Bend Point)	24°	44'	1"	30°	12'	47"
Point 2	24°	44'	2"	30°	12'	43"
Point 3 (Bend Point)	24°	44'	2"	30°	12'	38"
Point 4 (Bend Point)	24°	44'	3"	30°	12'	38"
Point 5 (Bend Point)	24°	44'	5"	30°	12'	34"
Point 6	24°	44'	5"	30°	12'	30"
Point 7 (Bend Point)	24°	44'	6"	30°	12'	26"
Point 8 (Bend Point)	24°	44'	7"	30°	12'	24"
Point 9 (Bend Point)	24°	44'	10"	30°	12'	21"
Point 10 (Bend Point)	24°	44'	11"	30°	12'	19"
Point 11 (Bend Point)	24°	44'	13"	30°	12'	18"
Point 12 (Bend Point)	24°	44'	14"	30°	12'	17"
Point 13	24°	44'	16"	30°	12'	21"
Point 14	24°	44'	18"	30°	12'	24"
Point 15 (Bend Point)	24°	44'	20"	30°	12'	26"
Point 16	24°	44'	16"	30°	12'	33"
Point 17 (Bend Point)	24°	44'	13"	30°	12'	40"
Point 18	24°	44'	10"	30°	12'	50"
End point of the activity	24°	44'	6"	30°	12'	58"

Route	Latitude (S)			Longitude (E)		
Internal Access Road 2-Site 2B						
Start point of the activity	24°	44'	21"	30°	12'	32"
Point 1	24°	44'	19"	30°	12'	38"
Point 2 (Bend Point)	24°	44'	16"	30°	12'	42"
Point 3	24°	44'	13"	30°	12'	52"
Point 4 (Bend Point)	24°	44'	10"	30°	13'	2"
Point 5 (Bend Point)	24°	44'	12"	30°	13'	3"
Point 6	24°	44'	16"	30°	12'	54"
Point 7	24°	44'	19"	30°	12'	48"
Point 8	24°	44'	22"	30°	12'	40"
Point 9 (Bend Point)	24°	44'	24"	30°	12'	36"
Point 10 (Bend Point)	24°	44'	22"	30°	12'	34"
End point of the activity	24°	44'	22"	30°	12'	33"
Internal Access Road 3-Site 2B						
Start point of the activity	24°	44'	29"	30°	12'	32"
Point 1 (Bend Point)	24°	44'	27"	30°	12'	36"
Point 2 (Bend Point)	24°	44'	28"	30°	12'	37"
Point 3 (Bend Point)	24°	44'	29"	30°	12'	38"
Point 4 (Bend Point)	24°	44'	31"	30°	12'	40"
Point 5	24°	44'	33"	30°	12'	40"
Point 6 (Bend Point)	24°	44'	35"	30°	12'	41"
Point 7 (Bend Point)	24°	44'	37"	30°	12'	42"
Point 8	24°	44'	39"	30°	12'	38"
Point 9 (Bend Point)	24°	44'	40"	30°	12'	34"
Point 10 (Bend Point)	24°	44'	39"	30°	12'	39"
Point 11 (Bend Point)	24°	44'	35"	30°	12'	34"
Point 12	24°	44'	33"	30°	12'	33"
Point 13 (Bend Point)	24°	44'	31"	30°	12'	32"
End point of the activity	24°	44'	29"	30°	12'	32"
Internal Access Road 4-Site 2B						

Route	Latitude (S)			Longitude (E)		
Start point of the activity	24°	44'	34"	30°	12'	26"
Point 1 (Bend Point)	24°	44'	32"	30°	12'	28"
Point 2 (Bend Point)	24°	44'	32"	30°	12'	29"
Point 3 (Bend Point)	24°	44'	33"	30°	12'	30"
Point 4	24°	44'	34"	30°	12'	31"
Point 5 (Bend Point)	24°	44'	36"	30°	12'	32"
Point 6 (Bend Point)	24°	44'	38"	30°	12'	31"
Point 7 (Bend Point)	24°	44'	31"	30°	12'	31"
Point 8 (Bend Point)	24°	44'	41"	30°	12'	32"
Point 9 (Bend Point)	24°	44'	41"	30°	12'	31"
Point 10	24°	44'	39"	30°	12'	30"
Point 11	24°	44'	36"	30°	12'	28"
End point of the activity	24°	44'	34"	30°	12'	27"
Internal Access Road 5-Site 2B						
Start point of the activity	24°	44'	26"	30°	12'	22"
Point 1 (Bend Point)	24°	44'	24"	30°	12'	27"
Point 2 (Bend Point)	24°	44'	25"	30°	12'	28"
Point 3 (Bend Point)	24°	44'	28"	30°	12'	20"
Point 4 (Bend Point)	24°	44'	30"	30°	12'	29"
Point 5 (Bend Point)	24°	44'	31"	30°	12'	27"
Point 6 (Bend Point)	24°	44'	29"	30°	12'	24"
End point of the activity	24°	44'	26"	30°	12'	22"
Internal Access Road 6-Site 2B						
Start point of the activity	24°	44'	17"	30°	12'	18"
Point 1 (Bend Point)	24°	44'	19"	30°	12'	20"
Point 2 (Bend Point)	24°	44'	20"	30°	12'	21"
Point 3 (Bend Point)	24°	44'	21"	30°	12'	23"
Point 4 (Bend Point)	24°	44'	22"	30°	12'	20"
Point 5	24°	44'	20"	30°	12'	19"
End point of the activity	24°	44'	17"	30°	12'	18"

Route	Latitude (S)			Longitude (E)		
Internal Access Road-Site 3B						
Start point of the activity	24°	44'	51"	30°	11'	13"
Point 1	24°	44'	53"	30°	11'	14"
Point 2 (Bend Point)	24°	44'	55"	30°	11'	14"
Point 3	24°	44'	53"	30°	11'	19"
Point 4 (Bend Point)	24°	44'	51"	30°	11'	24"
End point of the activity	24°	44'	50"	30°	11'	24"
Internal Access Road-Site 3C						
Start point of the activity	24°	44'	43"	30°	11'	24"
Point 1 (Bend Point)	24°	44'	43"	30°	10'	59"
Point 2 (Bend Point)	24°	44'	46"	30°	11'	3"
Point 3 (Bend Point)	24°	44'	48"	30°	11'	5"
Point 4	24°	44'	51"	30°	11'	6"
Point 5 (Bend Point)	24°	44'	54"	30°	11'	8"
Point 6	24°	44'	51"	30°	11'	8"
End point of the activity	24°	44'	49"	30°	11'	8"
Internal Access Road-Site 4B						
Start point of the activity	24°	44'	45"	30°	11'	53"
Point 1	24°	44'	51"	30°	10'	58"
Point 2	24°	44'	55"	30°	11'	2"
Point 3 (Bend Point)	24°	45'	1"	30°	11'	6"
End point of the activity	24°	45'	1"	30°	11'	7"
Internal Access Road-Site 5B						
Start point of the activity	24°	44'	18"	30°	11'	7"
Point 1 (Bend Point)	24°	44'	19"	30°	11'	18"
Point 2	24°	44'	18"	30°	11'	20"
Point 3 (Bend Point)	24°	44'	17"	30°	11'	22"
Point 4 (Bend Point)	24°	44'	19"	30°	11'	24"
Point 5	24°	44'	21"	30°	11'	21"
End point of the activity	24°	44'	23"	30°	11'	18"

2.3 Technical Description

The PV plant will consist of the following infrastructure:

- Solar PV panels that will be able to deliver the required 40MW output to the Samancor grid;
- Inverters that convert direct current (DC) generated by the PV modules into alternating current (AC) to be exported to the Samancor electrical grid;
- Transformer/s that raises the system AC low voltage to medium voltage. The transformer converts the voltage of the electricity generated by the PV panels to the correct voltage for delivery to the TFC Plant;
- Transformer substation; and
- Instrumentation and Control consisting of hardware and software for remote plant monitoring and operation of the facility.

Associated infrastructure includes:

- Mounting structures for the solar panels in a fixed tilt or rotating tracking configuration;
- Cabling between the structures, to be lain underground where practical;
- 33kV overhead powerlines between the various sites and the Tubatse East and West substation buildings;
- Two switching stations at Site 2B and 3B as well as transformer yard at each PV site;
- Containerised switching station connecting to Tubatse East and West MV substations;
- Water provision infrastructure (i.e. pipeline/s, storage tank/s, etc.) for PV panel cleaning; and
- Internal access roads (approximately 6 - 8m) roads will be constructed, but existing roads will be used as far as possible), fencing (approximately 3m in height), gates and access control.

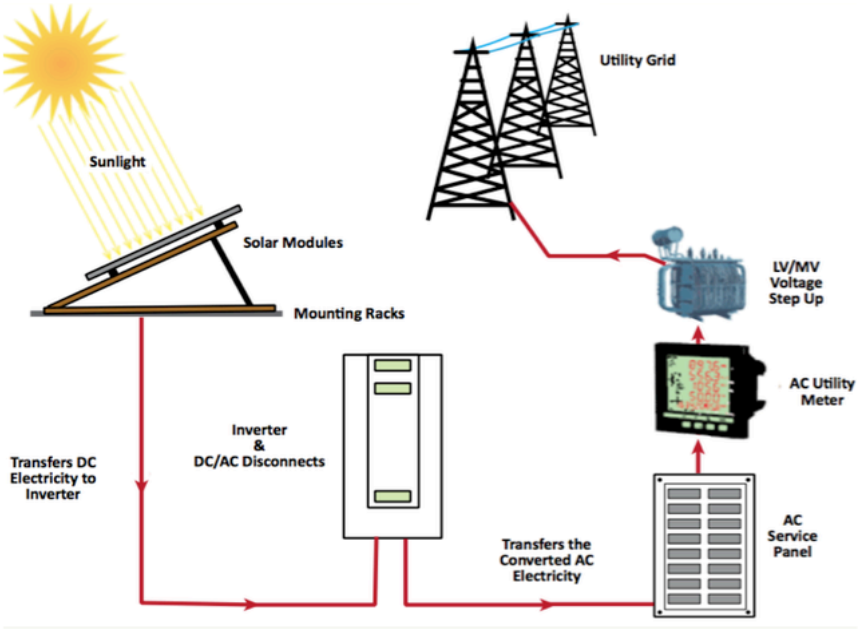


Figure 2-1: Overview of a solar PV plant[3]

2.3.1 Internal Access

Internal access roads (approximately 6 – 8m wide) will be constructed, but existing roads will be used as far as possible.

[3] *Source: International Finance Corporation. 2015. Utility-scale Solar Photovoltaic Power Plants. A Project Developer's Guide.*

Internal access roads are proposed for each site, these access roads are aligned around the respective sites and no feasible alternatives can be considered as the internal access roads are restricted to the respective site boundaries as well as the location of the arrays and associated infrastructure within the project site. Additionally, in order to maximise the area available for the placement of the PV arrays, the internal access roads have been aligned to the boundary of each project site (Figure 1-1 and Figure 2-2).

2.3.2 Power Corridors

The infrastructure required to connect the solar PV generation sites to the Samancor 33kV power grid is accommodated in a power corridor. These corridors are indicated on the site layout drawing (Figure 4-4) attached to this report.

Overhead line or underground cable technology can be used for the power evacuation in these corridors. The proposed width of the power corridor is 50m to accommodate the proposed 100MW power flow.

2.3.2.1 Underground Cables

The design proposal for the underground cables is single core cables to accommodate the combined power flow of more than one solar field. The cables will be buried 1m below ground level in a trefoil configuration for each circuit. Different circuits shall be spaced at approximately 300mm away from each other.

2.3.2.2 Overhead Powerlines

Powerlines comprising of a wood pole tower construction is proposed for the 33kV powerlines. In cases where there is a double power corridor, either two wood pole lines will be used or a single steel monopole with a double circuit configuration.

The height of the single circuit wood pole construction is 11 - 13m and the steel monopoles are typically 20m tall. A 50m assessment corridor has been applied for in the EIA in order to cater for the optimal route for the powerlines.

2.3.3 Shared Infrastructure

The following infrastructure will be shared with the previously authorised PV plant (Phase 1) across the Sites 2 – 5 and these proposed additional areas across sites 2B, 3B, 3C, 4B and 5B.

2.3.3.1 On-Site Substations

The solar fields will connect to the Tubatse East and West Substations by means of power corridors to evacuate the AC power. The power corridor will comprise of overhead lines or underground cables, or a combination thereof, at a voltage level of 33kV. The connections into the Tubatse East and West Plant Substations will comprise of 33kV indoor switchgear blocks located within the PV field. The purpose of these blocks would be to collect the feeders from the solar fields and combine them into one or two feeders to be connected onto the existing 33kV substation infrastructure. On-site substation upgrades have been approved in the previous EIA study (DFFE Ref: 14/12/16/3/3/2/2079).

2.3.3.2 Construction Camps/Laydown Areas

Only one construction camp and laydown area will be used for the project. The proposed size of laydown areas is defined as follows: 6000m^2 for west region (Site 3, 3B, 3C, 4, 4B, 5 & 5B) and 5000m^2 for the east region (Site 2 and 2B). The construction camp is approximately 2000m^2 and has been approved in the previous EIA study (DFFE Ref: 14/12/16/3/3/2/2079).

Chemical toilets (gender-specific) will be provided per 15 people which will be serviced at a minimum of once every week.

2.3.3.3 Water Provision

Water will be required during the construction activities as well as during the operational phase for panel cleaning. During construction, it is estimated that 2 x 15000ℓ water tankers will be used for dust suppression and other construction activities.

During operations, it is estimated that the proposed PV plant will require approximately 1200m^3 per cleaning cycle (based on best practice). The cleaning cycle depends on the type of technology, the pollution at the location as well as the seasonality.

Water will be obtained from the TFC process and no raw water sources will be required.

2.3.3.4 BESS

No BESS will be required for this phase of the project.

2.4 Summary of Technical Specifications

A summary of the technical specification for the proposed project are provided in Table 2-6. In terms of advanced technologies and upgrading this will be determined by a more detailed design. The technology proposed is for a lifecycle of 20 years, as one normally operates a solar PV plant for this duration, due to the large capital investment, it is uneconomical to change the technology to follow latest trends and developments.

The lifespan for the solar module is 30 years. As the panels are classified a hazardous waste, the disposal of the panels will be according to waste legislation and waste disposal followed by TFC to a licenced hazardous waste facility. The waste will not be disposed of into any landfills within the Sekhukhune District Municipality and no additional burden will be placed on these landfills.

Table 2-6: Technical specifications for the PV plants and associated infrastructure

Facility Component	Description
Height of PV panels	Approximately 5m
Total site extent	59,23 ha
Length of internal roads	Varies
Width of internal roads	Approximately 6 - 8m
Number of inverters/transformers	3
Area occupied by inverter/ transformers (inverters are combined with the transformers on each site)	200m^2
Height of and type of fencing	Security fencing approximately 3m high
Overhead powerline length	Main Powerline (50m corridor): approximately 3098.15m Section A Powerline within Site 2B: approximately 192.05m

Facility Component	Description
	Section B Powerline within Site 2B: approximately 89.18m
Overhead powerline capacity	33kV (40MVA Site 2 to East Substation)
Overhead powerline servitude	50m corridor to be assessed in the EIA study Overhead line or underground cable technology can be used for the power evacuation in these corridors
Overhead powerline tower height	▪ Powerlines comprising of a wood pole tower construction is proposed for the 33kV powerlines. In cases where there is a double power corridor, either two wood pole lines will be used or a single steel monopole with a double circuit configuration ▪ The height of the single circuit wood pole construction is 11 - 13m and the steel monopoles are typically 20m tall
Underground cables	Varies in length according to site location and connection point
Switching Station	Two switching stations are proposed: 33kV switching station 40MVA - 100m^2
Chemical Toilets	Chemical toilets (gender-specific) will be provided per 15 people which will be serviced at a minimum of once every week
On-site substations	▪ Existing substation capacity - Tubatse East (160 000kVA) = 60MW generated from Phase 1 and 2 ▪ Tubatse West (85 000kVA) = 40MW generated from Phase 1 and 2 ▪ 33kV indoor switchgear blocks will be added to the Tubatse East- and West Substations with a footprint of approximately 300m^2 respectively (authorised as part of Phase 1)
Laydown areas	Laydown areas authorised as part of Phase 1 to be used
Construction camp	Laydown areas authorised as part of Phase 1 to be used
Access roads	Internal Access Road 1 - Site 2B: approximately 2850.82m Internal Access Road 2 - Site 2B: approximately 2205.24m Internal Access Road 3 - Site 2B: approximately 1506.47m Internal Access Road 4-Site 2B: approximately 821.42m Internal Access Road 5-Site 2B: approximately 704.34m Internal Access Road 6-Site 2B: approximately 482.72m Site 3B Internal Access Road: approximately 526.55m Site 3C Internal Access Road: approximately 638.72m Site 4B Internal Access Road: approximately 725.43m Site 5B Internal Access Road: approximately 745.11m
BESS	No BESS applicable to this project as the BESS has been authorised part of Phase 1

Refer to layout drawing Figure 2-2 (***Appendix D***) indicating the proposed solar field per site as well as ancillary infrastructure associated with the proposed project.

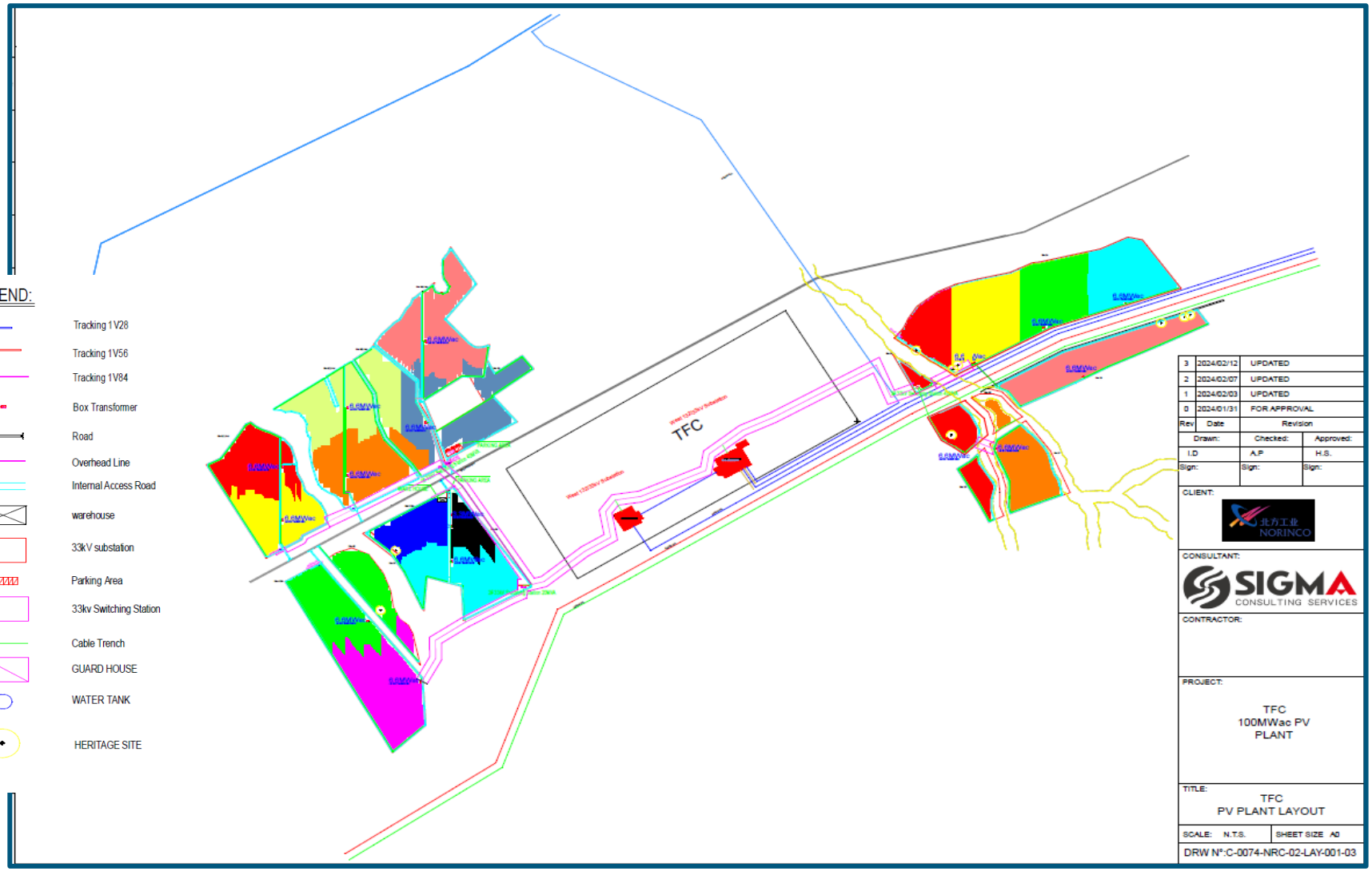


Figure 2-2: Additional areas layout

2.5 Project Motivation and Desirability

South Africa experiences some of the highest levels of solar radiation in the world. The average daily solar radiation in South Africa varies between 4.5 and 6.5kWh/m^2 (16 and 23MJ/m^2), compared to about 3.6kWh/m^2 for parts of the United States and about 2.5kWh/m^2 for Europe and the United Kingdom.

Figure 2-3 below shows the annual solar radiation (direct and diffuse) for South Africa, which reveals considerable solar resource potential for solar water heating applications, solar photovoltaic and solar thermal power generation.

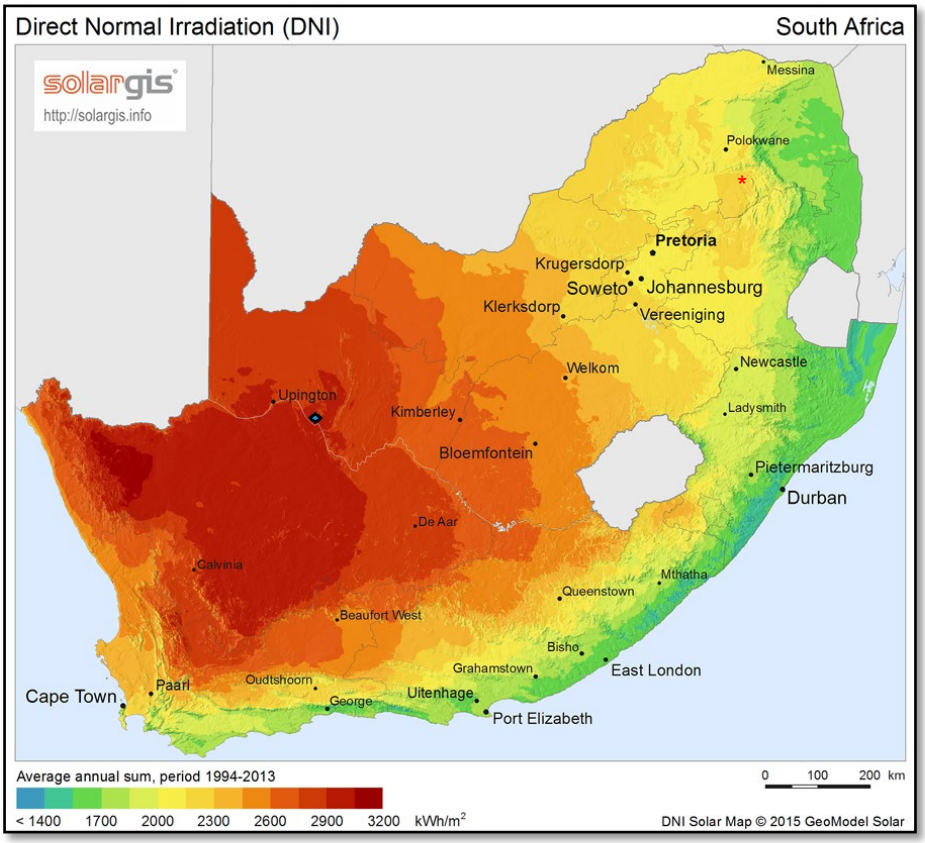


Figure 2-3: Annual incoming short-wave radiation for South Africa[4] (indicative study area indicated by the red asterisk)

2.5.1 Integrated Resources Plan (2019)

The Integrated Resources Plan (IRP 2019) is an electricity infrastructure development plan based on least-cost electricity supply and demand balance, considering security of supply and the environment (minimize negative emissions and water usage). The promulgated IRP 2010 – 2030 identified the preferred generation technology required to meet expected demand growth up to 2030. It incorporated government objectives such as affordable electricity, reduced GHG emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development.

[4] *www.soalrgis.info*

Besides capacity additions, several assumptions have changed since the promulgation of IRP 2010 – 2030. Key assumptions that changed include the electricity demand projection, Eskom's existing plant performance, as well as new technology costs. These changes necessitated the review and update of the IRP which resulted in the draft IRP 2018 and the promulgation of the IRP 2019.

The IRP 2019 recognises that whilst South Africa relies heavily on coal to meet its energy needs, the country is well endowed with renewable energy resources that offer sustainable alternatives to fossil fuels and therefore the country continues to pursue a diversified energy mix that reduces reliance on a single or a few primary energy sources. The extent of decommissioning of the existing coal fleet due to end of design life, could provide space for a completely different energy mix relative to the current mix. Solar PV, wind and Concentrated Solar Power (CSP) with storage present an opportunity to diversify the electricity mix, to produce distributed generation and to provide off-grid electricity. Renewable technologies also present huge potential for the creation of new industries, job creation and localisation across the value chain.

The recent power cuts or increasingly severe loadshedding events by Eskom have emphasised the need for additional power generation capacity in South Africa. There is a focus on moving towards increased generation from renewable energy sources. Due to South Africa's electricity generation and supply system being overloaded, the demand for an increased and stable electricity supply is a priority. Solar energy plants are important for reducing the country's overall environmental footprint from power generation and for directing a pathway towards sustainability.

2.5.2 The National Development Plan (2030)

The National Development Plan[5] (NDP) for 2030 seeks to promote economic growth and development through the provision of quality energy services that are competitively priced, reliable, and efficient. The NDP also seeks to promote social equity through the expansion of access to energy services. *Chapter 5: Environmental Sustainability and Resilience*, focuses on ensuring environmental sustainability and an equitable transition to a lower carbon economy and includes a number of objectives and actions which are specifically linked to climate change.

There are also strong climate change links with other chapters in the NDP, including *Chapter 3: Economy and Employment*, which includes a focus on the green economy, transition to a low carbon economy and society, and fostering motivation in green product and service development; *Chapter 4: Economy Infrastructure*, which includes the efficient and effective implementation of the environmental impact management governance system for new developments and the implementation of Strategic Infrastructure Projects (SIPs) proactive authorisation process. *Chapter 6* focuses on the promotion of an integrated and inclusive rural economy and *Chapter 8: Transforming Human Settlements* focuses on green cities and sustainable development.

The NDP states that energy generation makes up to 48% of South Africa's emissions, coupled with extensive natural coal resources, the Energy sector is both the most important and most challenging to transform. It is further suggested in the NDP that industrial energy consumption makes up to 9% of South Africa's emissions, with a further 14% from industrial processes and product use. The chemical industry, especially coal to liquids, and the minerals industry are primary contributors. The development of the PV plant to support the operations at the TFC Plant can be seen as a means to reduce the reliance on traditional coal generated electricity thereby ensuring that there is a reduction in emissions and the successful implementation though Samancor Chrome's activities can set the precedent for other industries to incorporate more sustainable methods of generating electricity.

[5] *South Africa. 2012. The National Development Plan 2030: Our Future-Make it Work. National Planning Commission Department of The Presidency Republic of South Africa.*

2.5.3 Fetakgomo Tubatse Local Municipality Integrated Development Plan

According to the FGTM Integrated Development Plan (IDP)[6], the local economy is driven by mining and agricultural activities, and the PV development will be used to supplement electricity requirements for the TFC Plant. The FGTM hosts the biggest portion of the eastern limb of the Platinum Group Metals and the chrome ore. The Municipality, in conjunction with other government sectors, are busy with projects to expand the roads, ensuring that there is water to run the mines and the community, sourcing electrical energy to supply the mine and community etc. The project area is located between a Provincial Growth Point located in Burgersfort which consists of higher order land uses including residential, retail, warehouses, government functions and transport facilities. The construction of the PV development also provides a significant opportunity for members of the immediate community to benefit from the creation of jobs during the construction phase of the project and an opportunity to become skilled. Approximately four hundred (400) skilled and two hundred (200) unskilled jobs will potentially be created during the construction phase. During the operational phase, ten (10) skilled and five (5) unskilled jobs could potentially be created.

2.5.4 Samancor Chrome Operations

The TFC Plant is a large consumer of electricity supplied by Eskom. The proposed project will offset a portion of the smelter's electricity requirements, the tariff being a main driver for the project as it has direct impact on the production and revenue of Samancor Chrome's business. The PV plant will assist to generate energy during the peak and standard tariff periods at a lower tariff than the current Megaflex peak tariff, thereby resulting in an overall cost of production saving.

The long-term profitability of the smelter operations at the TFC Plant depend on minimising the cost of production. Electricity comprises a significant portion of this production cost. The proposed project will assist in alleviating the cost pressure of continuously increasing electricity costs and help to improve the GHG footprint of the operations and reduce the exposure to carbon tax. This will also help to reduce the risk of job losses associated with businesses under cost pressures.

This has motivated Samancor Chrome to consider renewable energy generation at their smelter plants as well as going 'green' with their operations. The ability for Samancor Chrome to generate electricity can also be seen as a means to alleviate pressure on the National Grid that is already severely constrained and can indirectly positively impact the surrounding community as there will be more capacity available in the grid to supply other users.

[6] *Fetakgomo Tubatse Local Municipality. 2020. 2020/21 Integrated Development Plan (IDP) & Budget*

3 Environmental Legislative Requirements and Policy Context

In order to protect the environment and ensure that the development is undertaken in an environmentally responsible manner, there are a number of significant environmental legislation (Table 3-1 and Table 3-2) that need to be considered during this study.

This section outlines the legislation that is applicable to the proposed project and has been considered in the preparation of this report.

Table 3-1: Key legislation considered

Acts	Objectives, important aspects, associated notices and regulations
National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) (as amended)	***Objectives:*** To provide for co-operative environmental governance by establishing principles for decision-making on matters affecting the environment, institutions that will promote co-operative governance and procedures for co-ordinating environmental functions exercised by organs of state. ***Relevant Notices and Regulations:*** ▪ Environmental Impact Assessment Regulations 2014 (GNR 326 in Government Gazette - GG 40772 as amended on 04 April 2017) ▪ Listing Notice 1 (GNR 327) as amended ▪ Listing Notice 2 (GNR 325) as amended ▪ Listing Notice 3 (GNR 324) as amended ▪ National Web-based Environmental Screening Tool (2017). ▪ 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 - NEMA, 1998, when applying for EA in GG 43110, 20 March 2020). ▪ Environmental Impact Assessment (EIA) Regulations 2014 (Government Notice Regulations - GNR 326 in Government Gazette (GG) 40772 as amended on 04 April 2017 and GN 517 in GG 44701 as amended on 11 June 2021. ***Relevance to the proposed project:*** ▪ Development must be socially, environmentally and economically sustainable. ▪ Environmental management must be integrated, acknowledging that all elements of the environment are linked and interrelated; the social, economic and environmental impacts of activities including disadvantages and benefits, must be considered, assessed and evaluated and decisions must be appropriate in the light of such consideration. ▪ 'Polluter Pays' principle. ▪ Any activity that is proposed and which is listed in the NEMA EIA Regulations, requires environmental authorisation. ***Listed activities applied for:*** *Listing Notice 1:* ▪ Activity 11 - The development of facilities or infrastructure for the transmission and distribution of electricity – (i) outside urban areas or industrial complexes with a capacity of more than 33 but less than 275kV; or (ii) inside urban areas or industrial complexes with a capacity of 275kV or more.

Acts	Objectives, important aspects, associated notices and regulations
	Applicability – any new 33kV overhead powerlines between the various sites and the existing Tubatse East and West substation buildings. ▪ Activity 12 – The development of – (ii) infrastructure or structures with a physical footprint of 100m^2 or more; where such development occurs – (a) within a watercourse; or (c) if no development setback exists, within 32m of a watercourse, measured from the edge of a watercourse. *Applicability – development within 32m of an identified watercourse as delineated in the Freshwater Assessment (**Appendix F3**).* ▪ Activity 19 - The infilling or depositing of any material of more than 10m^3 into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10m^3 from a watercourse. *Applicability - development of the PV plant within 32m of a watercourse where material will be removed or infilled.* ▪ Activity 24 – The development of a road- i. for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or ii. with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres. *Applicability – the development of internal access roads associated with the PV plant.* ▪ Activity 28 - Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture on or after 01 April 1998 and where such development will occur outside an urban area, where the total land to be developed is bigger than 1ha. *Applicability - development of the PV plant will involve the transformation of approximately 59,23ha of agricultural land. The project site is located outside an urban area.* ▪ Activity 56 - The widening of a road by more than 6m, or the lengthening of a road by more than 1km – (i) where the existing reserve is wider than 13.5m; or (ii) where no reserve exists, where the existing road is wider than 8m; excluding where widening or lengthening occur inside urban areas. *Applicability – widening or the lengthening of existing access roads.* *Listing Notice 2:* ▪ Activity 1 - The development of facilities or infrastructure for the generation of electricity from a renewable resource where the electricity output is 20MW or more. *Applicability - electricity generation capacity of the PV plant will be 40MW.* ▪ Activity 15 - The clearance of an area of 20ha or more of indigenous vegetation. *Applicability - The construction of the PV plant will require the clearance of approximately 59,23ha of indigenous vegetation.* *Listing Notice 3:* ▪ Activity 12(e)(i) - The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004. *Applicability - clearance of approximately 59,23ha of vegetation in an area designed as a Threatened Ecosystem (Sekhukhune Plains Bushveld).*

Acts	Objectives, important aspects, associated notices and regulations
National Water Act, 1998 (Act No. 36 of 1998) (as amended)	***Objectives:*** The National Water Act (NWA) is a legal framework for the effective and sustainable management of water resources in South Africa. Central to the NWA is recognition that water is a scarce resource in the country which belongs to all the people of South Africa and needs to be managed in a sustainable manner to benefit all members of society. The NWA places a strong emphasis on the protection of water resources in South Africa, especially against its exploitation, and the insurance that there is water for social and economic development in the country for present and future generations. ***Relevance to the proposed project:*** ▪ Sustainable protection, use, development and conservation of water resources – including aquatic ecosystems. ▪ Defines 11 water uses and provides licensing procedures. ***Notices and Regulations:*** ▪ General Authorisation in terms of Section 39 of the National Water Act (Act No. 36 of 1998, Water Uses Section 21 (a) and (b) (GN in GG 40243 of 02 September 2016). ▪ General Authorisation in terms of Section 39 of the National Water Act (Act No. 36 of 1998, Water Uses Section 21 (c) and (i) (GN 4167 in GG 49833 of 08 December 2023). General Authorisation (GA) Reference No. WU22102 issued on 28 March 2022 authorises the following: ▪ Portions of the overhead powerline associated with Sites 3 and 5 within the 100m Zone of Regulation of a watercourse; ▪ Portions of internal access roads associated with Sites 2, 3, 4 and 5 within the 100m Zone of Regulation of a watercourse; ▪ Portion of underground cable associated with Sites 3 and 5 within the 100m Zone of Regulation of a watercourse; ▪ Channelised culvert for Site 5 within the 100m Zone of Regulation of a watercourse; ▪ Solar panels associated with Sites 3 and 5 within the 100m Zone of Regulation of a watercourse; ▪ Storage yards, Site Offices and Guard Houses associated with Sites 3 and 5 within the 100m Zone of Regulation of a watercourse. This GA is valid for a period of 20 (twenty) years from date issued (28 March 2022) until the GA is repealed or the GA period is extended further by a Gazette by order of the NWA. ***Potential water uses:*** ▪ Section 21 (c) - impeding or diverting the flow of water in a watercourse. *Applicable to any infrastructure (e.g. PV arrays, internal access roads, powerlines and underground cables) within the 1:100 year floodline of a river or within 500m to wetlands.* ▪ Section 21 (i) - Altering the bed, banks, course or characteristics of a watercourse. *Applicable to any infrastructure (PV arrays, internal access roads, powerlines and underground cables) within the 1:100 year floodline of a river or within 500m to wetlands.*

Acts	Objectives, important aspects, associated notices and regulations
National Heritage Resources Act, 1999 (Act No. 25 of 1999)	Section 34 - No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority. Section 35 - No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or palaeontological site. Section 36 - No person may, without a permit issued by the South African Heritage Resource Agency (SAHRA) or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. “Grave” is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place. Section 38 (a) - the construction of a road, wall, powerline, pipeline, canal or other similar form of linear development or barrier exceeding 300m in length; (b) the construction of a bridge or similar structure exceeding 50m in length; (c) any development or other activity which will change the character of a site (d) the re-zoning of a site exceeding 10000m^2 in extent. ***Potential permits:*** ▪ A permit issued under Section 35 of the Act that will include, surface collections, test excavations and analysis of recovered archaeological material. A further permit may be required for the destruction of the archaeological resources. ▪ Permit to relocate graves in terms of Section 36 of the Act.
National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004)	***Objectives:*** Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources. ***Notices and Regulations:*** ▪ National Biodiversity Strategy and Action Plan (2005). ▪ National List of Ecosystems that are Threatened and in Need of Protection in terms of Section 52(1)(a) of the National Environmental Management Biodiversity Act (Act No. 10 of 2004), GN 1002 in GG 34809, 09 December 2011. ▪ Threatened or Protected Species (GN 388 in GG 36375, 16 April 2013). ▪ Alien and Invasive Species Regulations (GNR 506 in GG 36683, 19 July 2013). ▪ Publication of Exempted Alien Species (GNR 509 in GG 36683, 19 July 2013). ▪ Publication of National List of Invasive Species (GNR 507 in GG 36683, 19 July 2013). ▪ Publication of Prohibited Alien Species (GNR 508 in GG 33683, 19 July 2013). ▪ Limpopo Conservation Plan (2013). ▪ National Biodiversity Assessment – The Status of South Africa’s Ecosystems and Biodiversity (2018). ▪ Sekhukhune Bioregional Plan (2020) – the Bioregional Plan has been gazetted in Notice 29 of 2020 (GG 3074, 27 March 2020) in terms of Section 40(1) of the National Environmental Management: Biodiversity Act, 2004.

Acts	Objectives, important aspects, associated notices and regulations
	▪ The Revised National List of Ecosystems that are Threatened and in Need of Protection in terms of Section 52(1)(a) of the National Environmental Management Biodiversity Act (Act No. 10 of 2004), No 2747 in GG 47526, 18 November 2022. ▪ The National Biodiversity Offset Guideline (2023).
Limpopo Environmental Management Act, 2003 (Act No. 07 of 2003)	***Objectives:*** a) To manage and protect the environment in the Province; b) To secure ecologically sustainable development and responsible use of natural resources in the Province; c) Generally to contribute to the progressive realisation of the fundamental rights contained in section 24 of the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996); and d) To give effect to international agreements effecting environmental management which are binding on the Province. ***Relevance to the proposed project:*** ▪ Part 2 – Sites of Ecological Importance, Section 18 – 20. ▪ Part 3 – Protected Environmental and Private Nature Reserves, Section 21. ▪ Section 64(c)(iv) – Protection of indigenous plants – no person may without a permit pick any indigenous plant in a Provincial Nature Reserve, a Site of Ecological Importance, a Protected Environment or a Private Nature Reserve. ▪ Chapter 13 – Environmental Pollution. ***Potential permits:*** ▪ Permits issued in terms of Schedules 2 (Specially protected wild animals), 3 (Protected wild animals), 7 (Undesirable animals), 9 (Prohibited aquatics growths), 10 (Invertebrates), 11 (Specially protected plants) and 12 (Protected plants) of the Act to remove, relocate or destroy species listed in the above Schedules.
National Forests Act, 1998 (Act No. 84 of 1998)	Provides for the protection of certain tree species, groups of trees, woodland or forests as declared by the Minister and prohibits the destruction of protected trees without an approval in place. Protected tree species have been confirmed within the study area. ***Regulations:*** List of Protected Tree Species under the National Forests Act, 1998 (GNR 690, 08 September 2017). ***Potential licence:*** ▪ Licence to cut, disturb, damage or destroy any protected tree.

3.1 Other Relevant Acts, Guidelines, Department Policies and Environmental Management Instruments

Table 3-2: Other relevant acts, guidelines, policies and environmental management instruments

Acts/Guideline/Policies/Environmental Management Instruments	Considerations
The Constitution (No. 108 of 1996)	Chapter 2 – Bill of Rights Section 24 – Environmental Rights
National Environmental Management: Waste Act (Act No. 59 of 2008) as amended	Section 17 - Every attempt must be made to reduce, recycle or re-use all waste before it is disposed. Section 25 - All waste (general and hazardous) generated during construction may only be disposed of at appropriately licensed waste disposal sites. All waste management activities (e.g. recycling, treatment) meeting the relevant thresholds should be authorised under the National Environmental Management: Waste Act (Act No. 59 of 2008) [NEM:WA] (as amended) and Government Notice (GN) 921 of 29 November 2013 (as amended in 2015 and 2017). No person may commence, undertake or conduct a waste management activity listed GN 921 (as amended) unless a licence is issued in respect of that activity. A registration in terms of the Norms and Standards for Storage of Waste, 2013 may be required for: ▪ The storage of general waste at a facility that has the capacity to store in excess of 100m^3 of general waste at any one time, excluding the storage of waste in lagoons or temporary storage of such waste. ▪ The storage of hazardous waste at a facility that has the capacity to store in excess of 80m^3 of hazardous waste at any one time excluding the storage of waste in lagoons or temporary storage of such waste.
National Environmental Management: Air Quality Act (Act No 39 of 2004)	Section 32 - Control of dust. Section 34 - Control of noise. Section 35 - Control of offensive odours. National Dust Control Regulations published in GNR 827 in GG 36974, 01 November 2013.
Electricity Regulation Act No. 4 of 2006 as amended by the Electricity Regulation Amendment Act No. 28 of 2007	These regulations regulate the use and generation of electricity.
Occupational Health and Safety Act (Act No. 85 of 1993)	Section 8 - General duties of employers to their employees. Section 9 - General duties of employers and self-employed persons to persons other than their employees.
Construction Regulations (2014)	Contractors must comply with the Construction Regulations which lay out the framework for construction related activities.

Acts/Guideline/Policies/Environmental Management Instruments	Considerations
Other: ▪ Hazardous Substance Act (Act No. 15 of 1973) and Regulations ▪ Conservation of Agricultural Resources Act (Act No. 43 of 1983) ▪ Electricity Act (Act No. 41 of 1987) ▪ National Road Traffic Act (Act No. 93 of 1996) ▪ Civil Aviation Regulations of 1997 ▪ Mineral and Petroleum Resources Development Act (Act No. 28 of 2002 – Section 53(1) ▪ Disaster Management Act (Act No. 57 of 2002, as amended) ▪ White Paper on Renewable Energy (2003) ▪ Electronic Communications (Act No. 36 of 2005) ▪ South African National Standard (SANS) 10103: 2008 – The Measurement and Rating of Environmental Noise with Respect to Annoyance and to Speech Communication ▪ Civil Aviation Act (Act No. 13 of 2009) ▪ National Climate Change Response White Paper (2011) ▪ Limpopo Green Economy Plan (2013) ▪ Spatial Planning and Land Use Management Act (Act No. 16 of 2013) ▪ Environmental Impact Assessment Guidelines for Renewable Energy Projects, GNR 989 of 2015 ▪ Greater Tubatse Municipality Final Integrated Development Plan (IDP) 2016/ 17 – 2020/ 21 ▪ Limpopo Climate Change Response Strategy 2016 - 2020 ▪ Sekhukhune District Municipality Final IDP 2016/ 17 – 2020/ 21 ▪ BirdLife South Africa: Guidelines for Assessing and Monitoring the Impact of Solar Power Generating Facilities on Birds in Southern Africa (2017) ▪ Sekhukhune District Municipality Draft Spatial Development Framework (2018) ▪ National Climate Change Bill (2018) ▪ Relevant Municipal By-laws	

3.2 International Conventions and Agreements

Other relevant environmental and social international conventions and agreements to which South Africa is a party to and noted are presented in Table 3-3.

Table 3-3: Relevant international conventions to which South Africa is a party to

Convention	Summary of Objectives or Relevant Conditions	South African Status
Convention concerning the Protection of the World Cultural and Natural Heritage 1972 (Paris)	Ensuring the identification, protection, conservation, presentation and transmission to future generations of the cultural and natural heritage	Ratification
Montreal Protocol on Substances That Deplete the Ozone Layer (1 January 1989)	Calculated levels of consumption and production of chlorofluorocarbons must not exceed the stipulated thresholds.	Party to

Convention	Summary of Objectives or Relevant Conditions	South African Status
Convention on Biological Diversity (29 December 1993)	The Convention has a bearing on the management of biodiversity at the study area. Countries such as South Africa that ascribe to the Convention must rehabilitate or restore degraded ecosystems through the formulation of appropriate strategies and plans.	Party to
United Nations Framework Convention on Climate Change (21 March 1994)	Protection of the climate system: Operations must protect the climate system by controlling greenhouse gases not controlled by the Montreal Protocol, which cause climate change through anthropogenic interference with the climate system.	Party to
United Nations Convention to Combat Desertification (26 December 1996)	To combat desertification and mitigate the effects of drought through national action programs.	Party to
United Nations Framework Convention on Climate Change - Kyoto Protocol (23 February 2005)	To further reduce greenhouse gas emissions by enhancing the national programs of developed countries aimed at this goal and by establishing percentage reduction targets for the developed countries and through the clean development mechanism (where developed countries can invest in developing country clean technology to offset emissions).	Party to
Paris Agreement adopted on 12 December 2015 at the 21st session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (UNFCCC CoP21)	The Agreement is a comprehensive framework which will guide international efforts to limit greenhouse gas emissions and to meet all the associated challenges posed by climate change. The main objective of the Agreement is to limit the global temperature increase to well below 2 degrees Celsius, while pursuing efforts to limit the increase to 1.5 degrees.	Ratified
Sendai Framework for Disaster Risk Reduction (2015)	The Sendai Framework for Disaster Risk Reduction 2015 - 2030 was adopted at the Third United Nations World Conference in Sendai, Japan, on March 18, 2015. The Sendai Framework is the successor instrument to the Hyogo Framework for Action (HFA) 2005-2015: Building the Resilience of Nations and Communities to Disasters. One of the lessons learned from the HFA is that more dedicated action needs to be focused on tackling underlying disaster risk drivers, such as the consequences of climate change and variability. As such, the Sendai Framework considers the incorporation of disaster risk reduction measures into programmes within and across all sectors, as appropriate, related to, among other things, the adaptation to climate change.	Party to
Sustainable Development Goals (2015)	The Sustainable Development Goals (SDGs), also known as the Global Goals, were adopted by all UN Member States in 2015 as a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity by 2030. The 17 SDGs recognise that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability. SDG 7 requires Affordable and Clean Energy for all. Investing in solar, wind and thermal power, improving energy productivity, and	Party to

Convention	Summary of Objectives or Relevant Conditions	South African Status
	ensuring energy for all is vital if we are to achieve SDG 7 by 2030. Expanding infrastructure and upgrading technology to provide clean and more efficient energy in all countries will encourage growth and help the environment.	

4 Project Alternatives

In terms of the NEMA EIA Regulations 2014 (as amended), feasible alternatives are required to be considered as part of the environmental studies. An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity which may include alternatives to:

- the property on which or location where it is proposed to undertake the activity;
- the type of activity to be undertaken;
- the design or layout of the activity;
- the technology to be used in the activity;
- the operational aspects of the activity; and
- the option of not implementing the activity.

4.1 Site Alternatives

TFC Solar was issued with an EA (DFFE Ref: 14/12/16/3/3/2/2079) for the development of a PV plant with up to 100MW generation capacity over 5 sites namely Sites 1, 2, 3, 4 and 5 adjacent to the TFC Plant in Steelpoort. During the detailed design phase, Site 1 was deemed to be no longer feasible which resulted in Sites 2 – 5 only being able to generate 60MW (Figure 4-1). Portions of the previously authorised Site 2 are also subject to a land swap agreement with the landowners. TFC Solar has now proposed the additional sites of 2B, 3B, 3C, 4B and 5B (Figure 1-1) in order to make up the 40MW that will make up a total electricity output of 100MW.

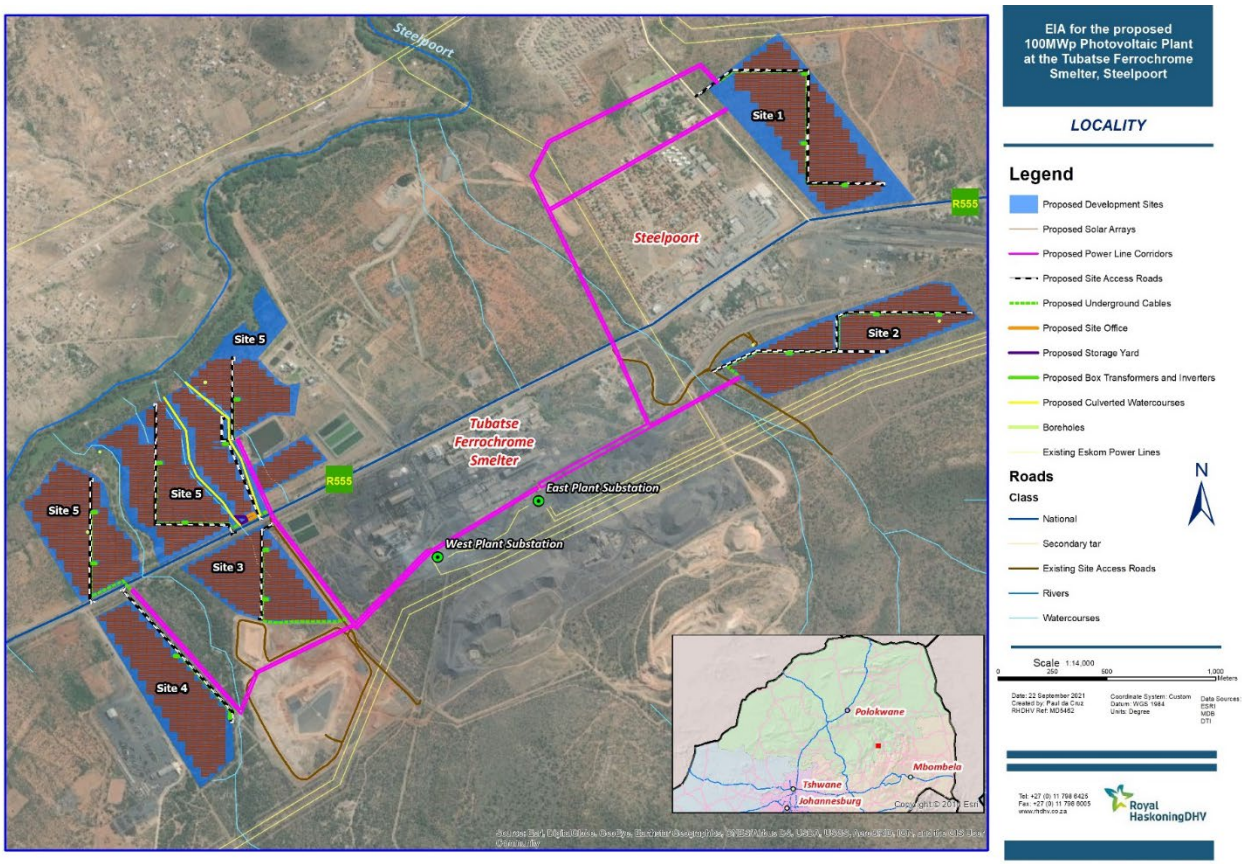


Figure 4-1: Authorised up to 100MW PV plant (DFFE Ref: 14/12/16/3/3/2/2079)

Selecting suitable sites is crucial for the development of a viable PV plant. The site selection process relied on various criteria as presented in Table 4-1.

Table 4-1: Site selection criteria

Criteria	Description
Available area	The proposed PV plant will require approximately 1.5ha of land per 1MW generated. The total extent of all 5 potential sites is approximately 59.23ha, which will be sufficient for the development of the 40MW PV Plant across these sites. The configuration and layout of the solar panels across these sites will be developed during the conceptual design phase to determine the MW output per site making up the 40MW.
Topography	The slope of the project site is considered to be acceptable for the development of a PV plant. This reduces the need for any extensive earthworks or levelling activities.
Land ownership and zoning	All of the sites for the development of the PV plant belong to Samancor Chrome/TFC Solar, except for the western portion of Site 2B that belongs to Goldbroz Investments (Pty) Ltd. TFC Solar have entered into discussions with the private landowner for possible lease/acquisition. The servitudes for the powerlines may have to be acquired if they are not on Samancor Chrome/TFC Solar land.
Accessibility	The sites are easily accessible from the R555.
Grid connection	33kV overhead powerlines will link the PV plant over the various sites to the existing Tubatse East and West substations. There will be an on-site substation and transformer yard at each site which has been authorised in the previous EIA study (DFFE Ref: 14/12/16/3/3/2/2079).
Water availability	The proposed PV plant will require approximately 20kℓ x 60 = 1.2Mℓ per cleaning cycle (based on best-practice and to be confirmed with the concept (envelope) design). The cleaning cycle depends on the type of technology, the pollution at the location as well as the seasonality. Lastly, it also depends on the maintenance regime of the operator. One can assume to allow for two (2) cleaning cycles per month as this is a typical global approach. The water can be provided by the TFC Plant based on the amount of industrial water available and the quality of water required as well as the conditions of the current WUL. The industrial water may need to be demineralized before it can be used on the panels.

Criteria	Description
Environmental sensitivity	The specialist team provided environmental constraints layers which were used by the Engineering Team to design the arrays and ancillary infrastructure out of the very high sensitive areas and buffers.

It is proposed that the PV plant be developed over these 5 additional sites to make up the 40MW shortfall, therefore, these sites are not considered alternatives.

4.2 Design Alternatives

4.2.1 Fixed and Tracking Systems

PV panels/modules must be mounted on a structure to keep them orientated in the correct direction and to provide them with structural support and protection. Mounting structures may either be fixed-angle or tracking (Figure 4-2).

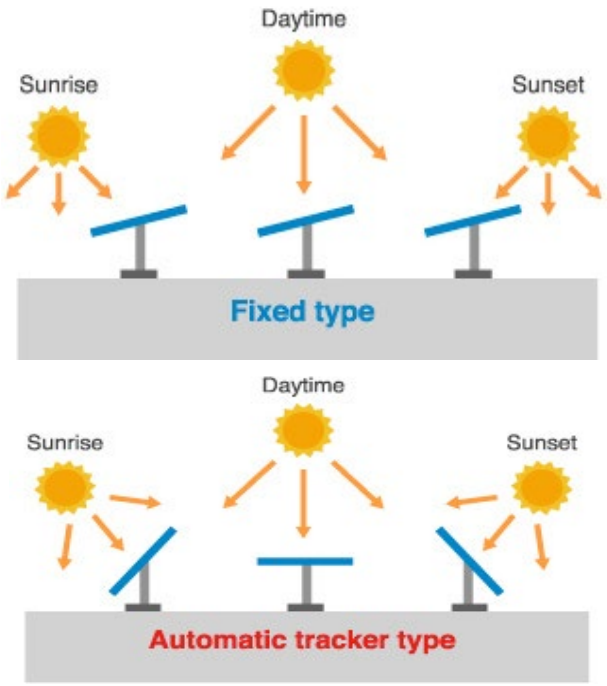


Figure 4-2: Fixed and tracking systems operation [7]

Fixed mounting systems keep the rows of modules at a fixed tilt angle while facing a fixed angle of orientation. Fixed frames are simpler to install, cheaper and require less maintenance. [8]

In locations with a high proportion of direct irradiation, single- or dual-axis tracking systems can be used to increase the average total annual irradiation. Tracking systems follow the sun as it moves across the sky. Single-axis trackers alter either the orientation or tilt angle only, while dual-axis tracking systems alter both orientation and tilt angle. Dual-axis tracking systems are able to face the sun more precisely than single-axis systems. [9] The foundation requirements also differ between these two technology types.

[7] *Source: https://sunbenefit.jp/products/suntracking.html*
[8] *International Finance Corporation. 2015. Utility-scale Solar Photovoltaic Power Plants. A Project Developer's Guide.*
[9] *Ibid.*

Based on the concept engineering the PV panels are proposed to be mounted on single-axis tracking structures capable of tilting within a range of ±60 degrees. Therefore, the preferred alternative is a tracking system.

4.2.2 Monofacial and Bifacial Solar Panels

Bifacial panels produce solar power from both sides of the panel, whereas monofacial panels only use one side for solar energy production. The top solar cells of a bifacial solar panel system face the sun, so they capture incident sun rays directly, absorbing only certain wavelengths. The top solar cells function like those of a conventional solar panel array.[10] The bottom solar cells absorb light that is reflected off the ground (Figure 4-3). The ground reflectance or albedo is highly site-dependent. A higher albedo translates into greater reflection. Fresh grass has an albedo factor of 26%, reducing down to a minimum of approximately 15% when dry.[11] White gravel has an albedo of 27%.[12]

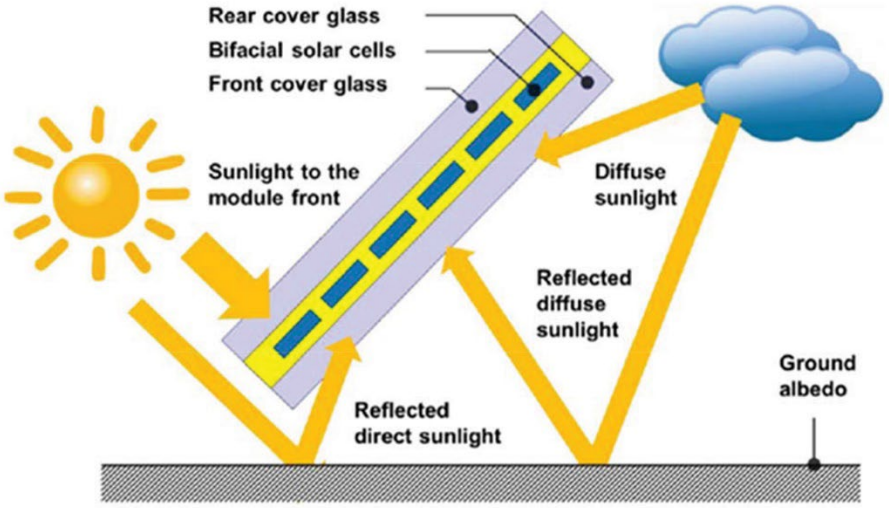


Figure 4-3: Image showing the operation of a bifacial solar panel[13]

The aim of bifacial technology is not to increase the efficiency of the solar module or panel but to capture more solar energy per module. Gains of up to 30% are projected, depending on factors such as the reflectivity of the ground surface, height above ground, tilt angle and several others.[14]

As per the concept engineering, the solar PV panels will be bifacial high efficiency mono-silicon solar panels.

4.2.3 Grid Infrastructure

Either overhead line or underground cable technology can be used for the power evacuation in the power corridors. This will be determined during the detail design, however, this report make recommendations where applicable.

[10] *https://solarmagazine.com/solar-panels/bifacial-solar-panels/*
[11] *International Finance Corporation. 2015. Utility-scale Solar Photovoltaic Power Plants. A Project Developer's Guide.*
[12] *https://www.ee.co.za/article/bifacial-solar-pv-modules-give-increased-power-output-potential.html*
[13] *Source: https://sunbenefit.jp/products/suntracking.html*
[14] *Ibid.*

Underground cables will be single-core cables to accommodate the combined power flow of more than one solar field and will be buried 1m below ground level.

During Phase 1, a powerline route alignment (Figure 4-4) with a 50m corridor was assessed and approved (DFFE Ref: 14/12/16/3/3/2/2079). The power generated from the additional areas (Sites 2B, 3B, 4B and 5B) would then be evacuated into the approved powerline corridor that would then link to the existing Tubatse East and West Substations.

During the concept engineering design for Phase 2, it was determined that the approved powerline route alignment for Site 2A, 3A and 4A was no longer technically feasible due to the clearances required as well as the existing and planned powerlines traversing the study area. A new proposed powerline route alignment was therefore proposed and is being assessed in this EIA study. The new proposed powerline route alignment links Site 2A and 2B to the existing Tubatse East Substation and Site 3A, 3B, 4A, 4B to the existing Tubatse West Substation. Figure 4-4 illustrates the approved powerline route alignment in green and the new proposed powerline route alignment in pink.

There are two additional short sections of overhead powerlines within Site 2B (Section A and Section B). Due to the nature of Site 2B being split into a number of portions and the presence of the episodic drainage line (EDL) and associated 20m development exclusion buffer, an overhead powerline is preferred over underground cables (Figure 4-4). The cabling is likely to be buried and would involve open trenching and resultant disturbance of soils and vegetation within freshwater ecosystems. The monopoles from the overhead powerline can be spanned across the EDL to minimise impacts on the freshwater ecosystem.

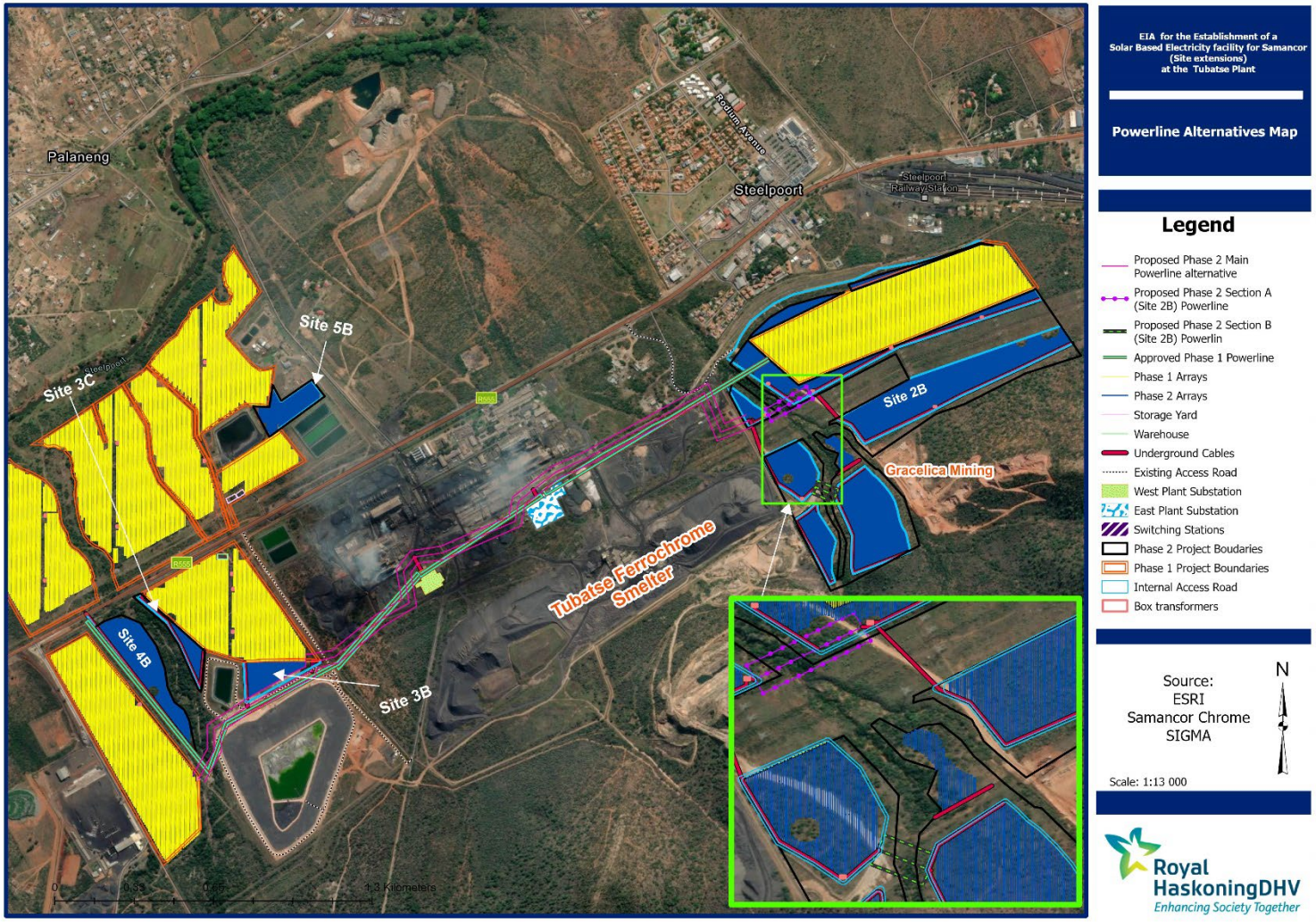


Figure 4-4: Overhead powerline

4.3 No-go

South Africa currently relies almost completely on fossil fuels as a primary energy source with coal providing 75% of the fossil fuel-based energy supply.[15] Coal combustion in South Africa is the main contributor to carbon dioxide emissions, which is the main GHG that has been linked to climate change. An emphasis has therefore been placed on securing South Africa's future power supply through the diversification of power generation sources. Furthermore, South Africa would have to invest in a power generation mix, and not solely rely on coal-fired power generation, to honour its commitment made under the Copenhagen Accord and Paris Agreement to mitigate climate change challenges. Under the Accord, the country committed to reduce its carbon dioxide emissions by 34% below the "business as usual" level by 2020. Under the Paris Agreement, the country is committed to limiting the global temperature increase to well below 2°C.

With an increasing demand in energy predicted and growing environmental concerns about fossil fuel-based energy systems, the development of large-scale renewable energy supply schemes such as PV is strategically important for increasing the diversity of domestic energy supplies and avoiding energy imports in the country.

In the case of Samancor Chrome, the rising electricity tariffs in South Africa, combined with the increasingly severe load shedding patterns experienced across the country, has a negative impact on the production and revenue of Samancor Chrome’s business. This has motivated Samancor Chrome to consider renewable energy generation at their smelter plants. Implementing solar PV generation will result in improved availability of supply and reduced utility bills. It will further reduce the operational Scope 2 GHG footprint.

Without the implementation of this project, the use of renewable options for power supply will not be realised. Therefore, the No-go option is not considered as a feasible option on this proposed project.

[15] *Department of Minerals and Energy. 1999. Digest of South African Energy Statistics, compiled by CJ Cooper.*

5 Description of the Receiving Environment

5.1 Meteorological Conditions

5.1.1 Wind

The wind rose for the project area (Steelpoort used as reference) and presents the number of hours per year the wind blows from the indicated direction. The wind blows predominantly in the north east, east north east, and north north east directions, then more often in the north to east directions. Velocities range from 1km/h to > 19km/h. Precipitation intensity during wind will likely cause precipitation intensity changes on slopes perpendicular to the wind direction throughout the year (Figure 5-1).

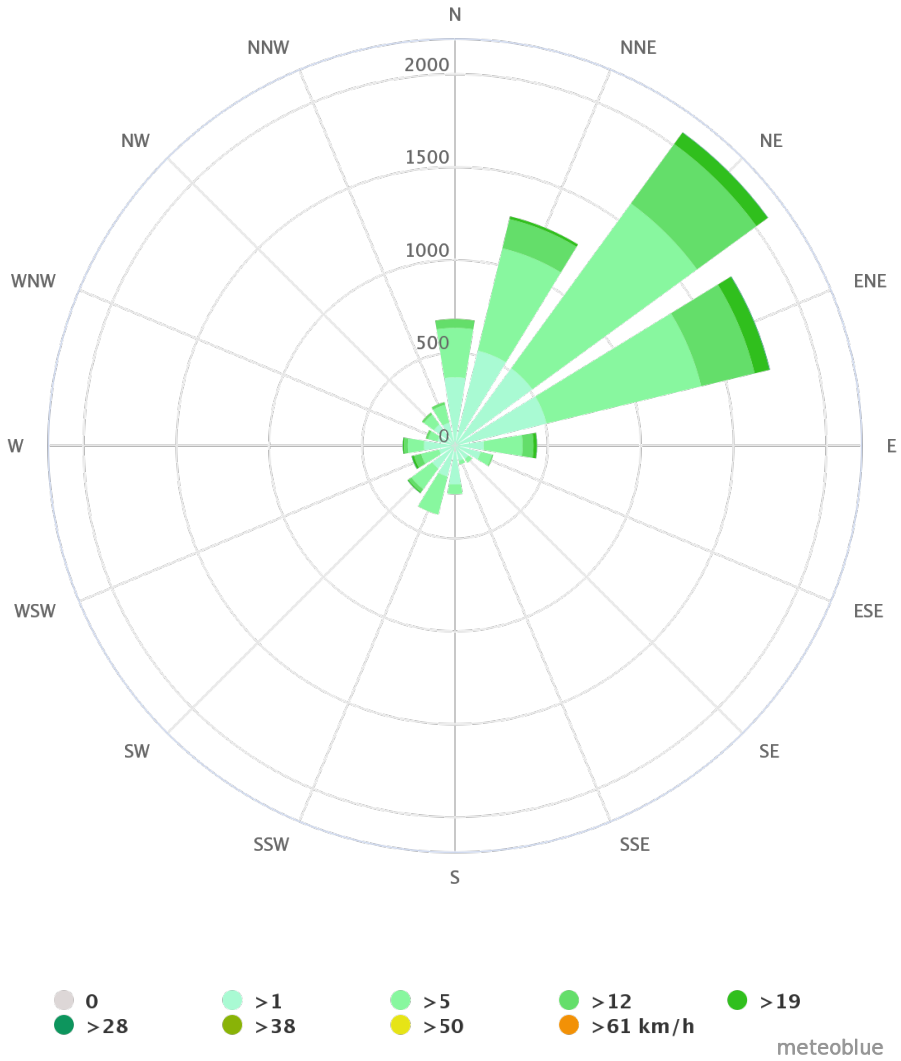


Figure 5-1: Wind rose diagram for Steelpoort[16]

[16] *https://www.meteoblue.com/en/weather/week/steelpoort_south-africa_952681*

5.1.2 Temperature

The average yearly temperature for the project area ranges from 23 to 37°C (high) and 3 to 19°C (low). The study area is situated in a hot semi-arid (steppe) climate (BSh) area with dry winters, as per the Köppen Climate Classification[17] (Figure 5-2).

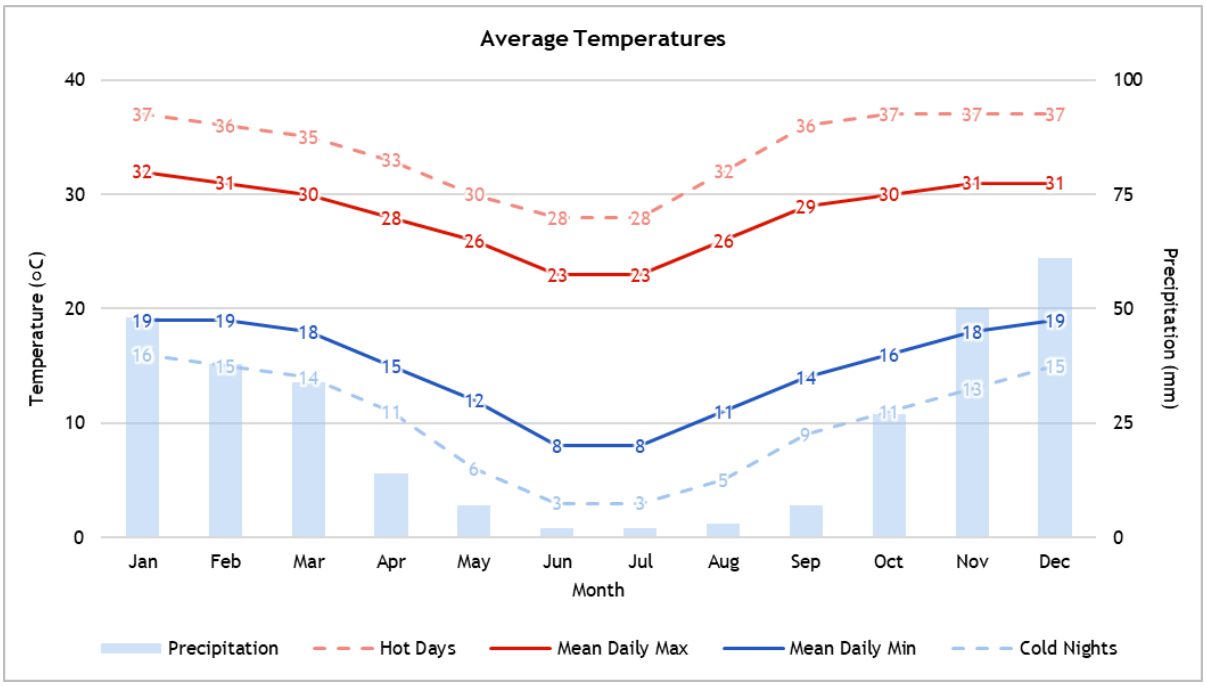


Figure 5-2: Average yearly temperatures[18]

5.1.3 Regional Rainfall

The project area is situated in rainfall zone B4D. The average Mean Annual Precipitation (MAP) for several rainfall stations situated near the site is presented in Table 5-1 below.

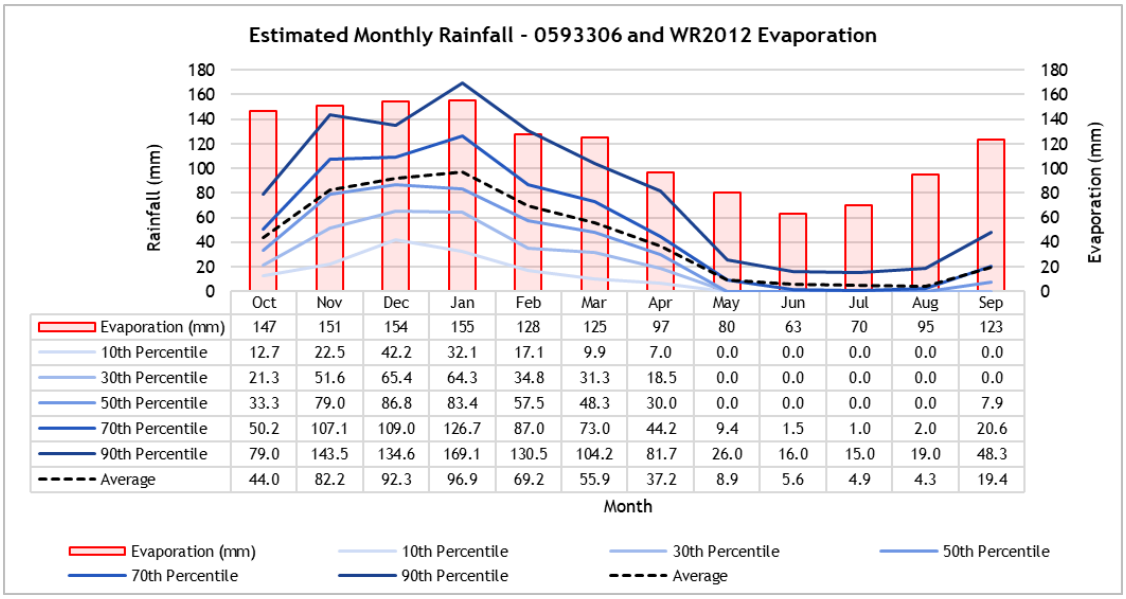
Table 5-1: Summary of MAP of closest rainfall stations

Station Name	Station ID	MAP (mm/yr)
Derdegelid (Pol)	0593306W	582
Burgersfort (Pol)	0593581W	550
Ga-Sekhukhuneland	0593015W	552
De Grootboom	0593586W	551
Maandagshoek	0593126W	624
Martenshoop (Pol)	0593419W	689

The monthly rainfall data used for the area was obtained from rainfall station 0593306W (Derdegelid), situated 12.6km from the site. The rainfall record spans from 1929 to 1989, which is a record length of

[17] *Kottek, M. et al., 2006. World Map of the Köppen-Geiger climate classification updated. Meteorol. Z.15, 259-263. doi:10.1127/0941-2948/2006/0130. s.l.:s.n.*
[18] *https://www.meteoblue.com/en/weather/week/steelpoort_south-africa_952681*

61 years. Available rainfall data suggest a MAP ranging from 287.2mm/a (30th percentile) to 966.9mm/a (90th percentile). The average rainfall is in the order of 520.8mm/a. The project area falls within evaporation zone 4A, of which Mean Annual Evaporation (MAE) ranges from 1 500 to 1 600mm/a. The MAE far exceeds the MAP for the site, which implies greater evaporative losses when compared to incident rainfall. Monthly rainfall and evapotranspiration for the site is likely to be distributed, as shown in Figure 5-3 below.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
Evaporation (mm)	147	151	154	155	128	125	97	80	63	70	95	123
10th Percentile	12.7	22.5	42.2	32.1	17.1	9.9	7.0	0.0	0.0	0.0	0.0	0.0
30th Percentile	21.3	51.6	65.4	64.3	34.8	31.3	18.5	0.0	0.0	0.0	0.0	0.0
50th Percentile	33.3	79.0	86.8	83.4	57.5	48.3	30.0	0.0	0.0	0.0	0.0	7.9
70th Percentile	50.2	107.1	109.0	126.7	87.0	73.0	44.2	9.4	1.5	1.0	2.0	20.6
90th Percentile	79.0	143.5	134.6	169.1	130.5	104.2	81.7	26.0	16.0	15.0	19.0	48.3
Average	44.0	82.2	92.3	96.9	69.2	55.9	37.2	8.9	5.6	4.9	4.3	19.4

Figure 5-3: Average rainfall for station 0593306W & WR2012 evaporation

5.2 Topography

The Steelpoort region is highly mountainous, hence development occurs mostly in valleys, while ridges and mountains form linear dividers between settlements. This is particularly evident from developments and anthropogenic activities along the Steelpoort River. Ridges further divide the municipal areas creating pockets of homogenous compositions, which determine growth and development potential.

The proposed sites are geographically situated on the slightly undulating plains around Steelpoort. Local and minor drainage patterns and topographical features include shallow and incised drainage lines that are often characterised by steep banks. The land generally slopes in a north-western direction towards the Steelpoort River, and the topographical elevation varies between approximately 870m (Site 2B) and 760m (Site 5B) (Figure 5-4). The Steelpoort River drains in an eastern direction.

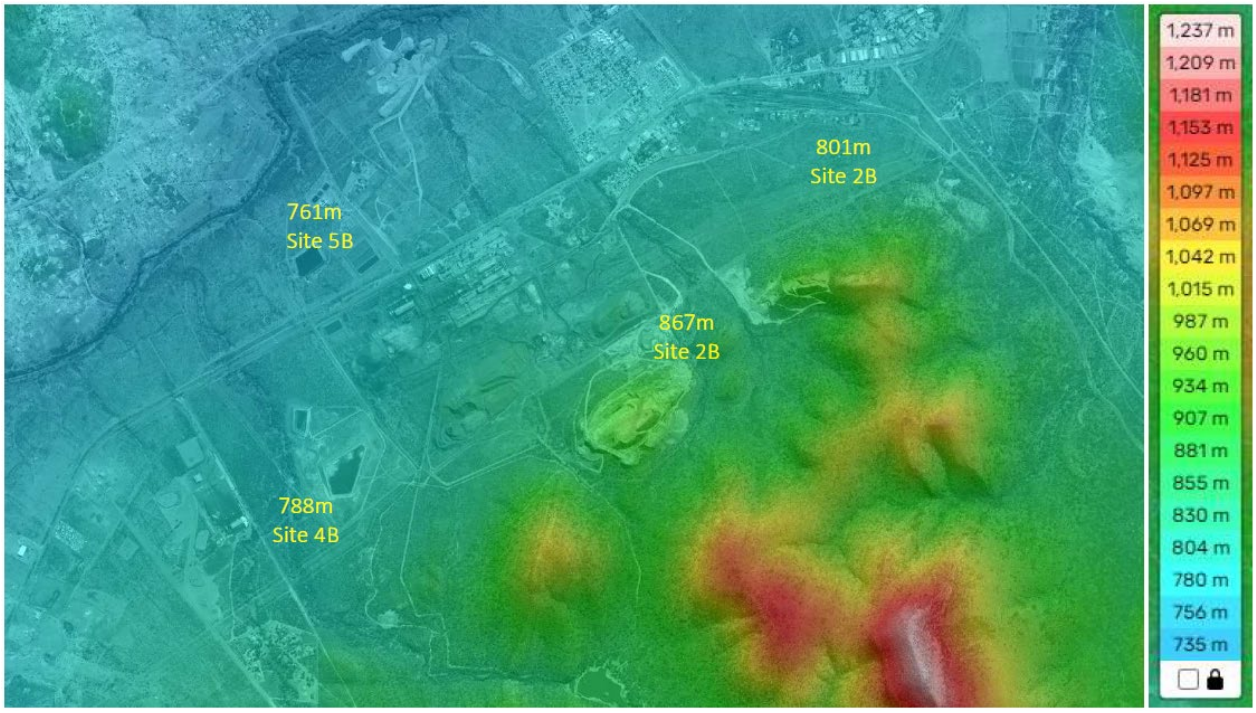


Figure 5-4: Topographical variations on a local scale

5.3 Soils and Geology

The site is located in the Eastern limb of the Bushveld Igneous Complex and is underlain by the rocks of the Rustenburg Layered Suite, largely comprising the Dwars River Norites and Vermont Hornfels (Figure 5-5). Norite is a mafic intrusive igneous rock (magna forced into older rocks at depths) composed largely of the calcium-rich plagioclase labradorite, orthopyroxene and olivine, and is predominantly composed of orthopyroxenes, largely high magnesian enstatite or an iron bearing intermediate hypersthene. The Vermont Formation is composed mainly of hornfels), with subordinate quartzite, dolomitic limestone and chert. Weathering of these geological formations produces soils that are included in the Ae27 and Ea88 land types (Figure 5-6).

Map units A refer to yellow and red soils without water tables and belonging in one or more of the following soil forms: Inanda, Kranskop, Magwa, Hutton, Griffin and Clovelly. The map units refer to land which does not qualify as a plinthic catena and in which one or more of the above soil forms occupy at least 40% of the area. In Ae (red-yellow apedal, freely drained soils, red high base status, >300mm deep, no dunes) yellow soils occupy less than 10% of the area while dystrophic and/or mesotrophic soils occupy a larger area than high base status red-yellow apedal soils.

The Ea88 land type indicates land with high base status, dark coloured and/or red soils, usually clayey, associated with basic parent materials, often described as dark, swelling clays. A land type more than half of which is covered by soil forms with vertic, melanic and red structured diagnostic horizons qualifies for inclusion in unit Ea provided it does not qualify for inclusion in units A, B, or C. Land types in which these soils cover less than half of the area may also qualify for inclusion (i) where duplex soils occur in the non-rock land but where unit Ea soils cover a larger area than the duplex soils, or (ii) where exposed rock covers more than half the land type. The Arcadia soil form predominates in this unit. High variability of soils across the proposed development footprints were noted, ranging between rocky and gravelly soils in upland areas, red, sandy and loamy soils in midland positions and soils of a dark, clayey and structured disposition in bottomland positions.

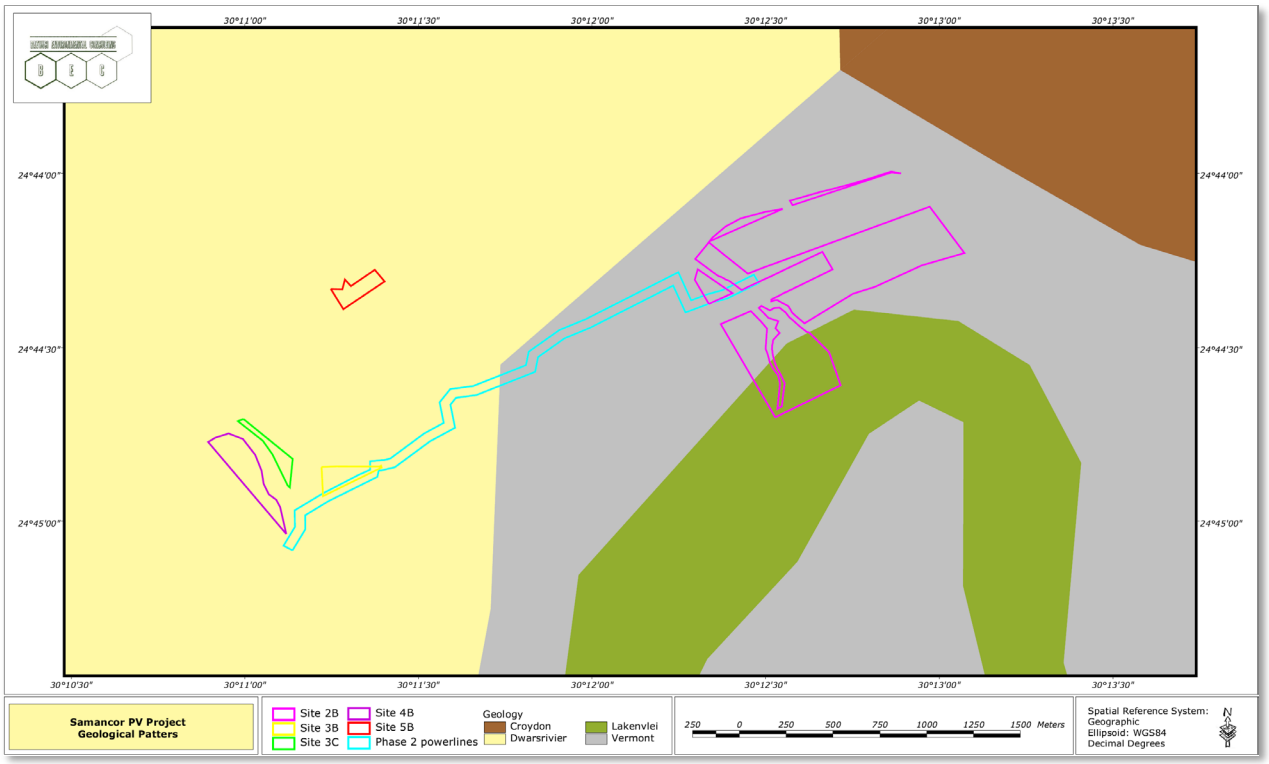


Figure 5-5: Geological patterns of the local region

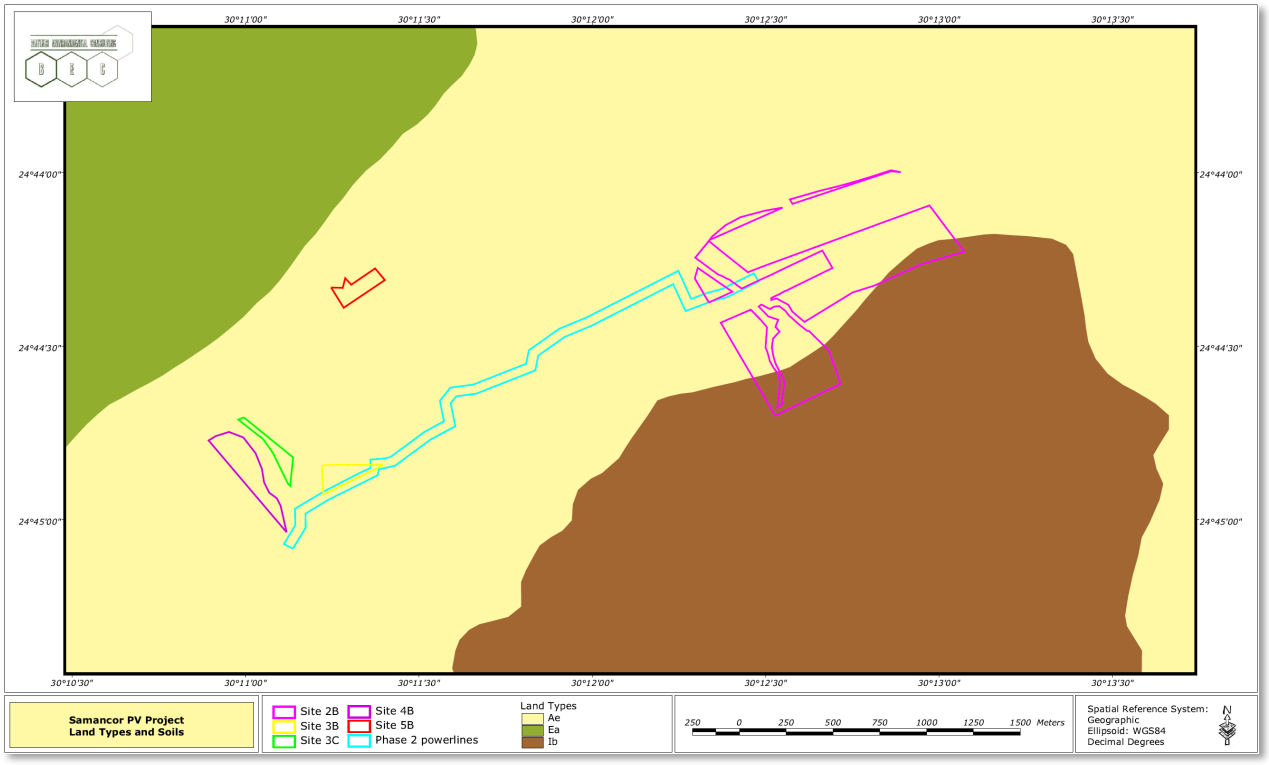


Figure 5-6: Land types of the local region

5.4 Agricultural Potential

The DFFE EST classifies agricultural sensitivity according to two independent criteria, from two independent data sets, both of which may be indicators of the land's agricultural production potential but are limited in that the first is outdated and the second relies on fairly course data. The two criteria are:

a. whether the land is classified as cropland or not on the field crop boundary data set, and
b. its land capability rating on the land capability data set.

All classified cropland is, by definition, either high or very high sensitivity. Land capability is defined as the combination of soil, climate, and terrain suitability factors for supporting rain-fed agricultural production. It is rated by the Department of Agriculture's updated and refined, country-wide land capability mapping, released in 2016. The higher land capability values (≥8 to 15) are likely to indicate suitability as arable land for crop production, while lower values (<8) are only likely to be suitable as non-arable grazing land.

The EST classifies the assessed area as ranging from low to high agricultural sensitivity. None of the land is classified as cropland and the rating of agricultural sensitivity is therefore purely a function of classified land capability. The high sensitivity classification is due to that land being classified with a land capability of 9 and 10.

The classified land capability of the site ranges from 4 to 10. This assessment verifies that the site is not within crop boundaries and verifies that the classified land capability is likely to be accurate. This assessment therefore confirms the high sensitivity rating by the EST, based on natural agricultural resources. However, despite the natural agricultural resources, the site's agricultural potential is limited, and the high sensitivity rating is therefore not relevant to an assessment of the agricultural impact.

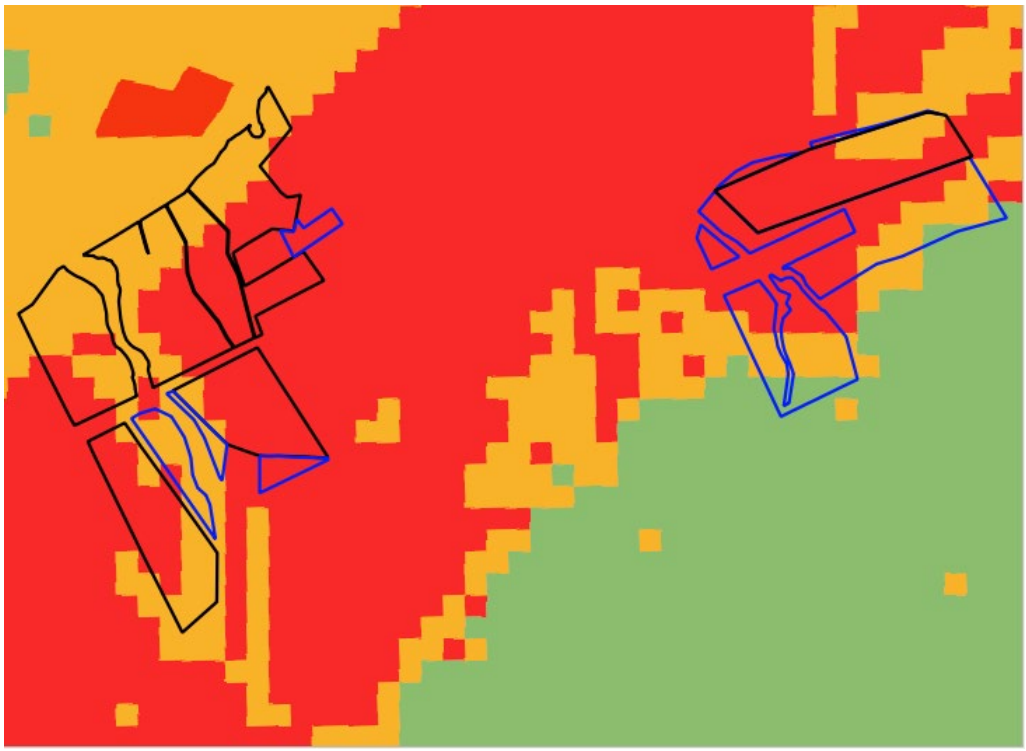


Figure 5-7: Agricultural theme site sensitivity

Figure 5-7 shows that the assessed area (blue outline) and previously authorised area (black outline) overlaid on agricultural sensitivity, as given by the EST (green = low; yellow = medium; red = high; dark red = very high). The EST's high sensitivity is confirmed by this assessment but is not relevant to an assessment of the agricultural impact.

5.4.1 Baseline Description of the Agro-Ecosystem

Agricultural production potential, and particularly cropping potential is one of three factors that determines the significance of the agricultural impact, together with size of footprint and duration of impact. Its agricultural production potential is not limited by natural agricultural resources. The site has a high land capability rating. The terrain and climate are undoubtedly suitable for cultivation and the indications of soil potential from the land type data are that dominant soil types are deep, well-drained Hutton soils that are suitable for cultivation, although shallower soils do also occur.

However, there are other factors, apart from the natural agricultural resources, that limit the agricultural potential of the land on this site. Agriculture is not possible on the sites while Samancor and related industries are operating there. One of the restrictions to agricultural activities is that Samancor utilises boreholes on the sites for their water supplies and therefore have strict controls over land use. The current owners of the land (Samancor) are not interested in using it for agriculture and the land around the sites is broken up by mining and smelting related industry which makes it impractical to use as farmland. The agricultural production potential of the entire assessed area is low because of these limitations.

The site falls outside of an area that is classified as a Protected Agricultural Area. A Protected Agricultural Area is a demarcated area in which the climate, terrain, and soil are generally conducive for agricultural production and which, historically, has made important contributions to the production of the various crops that are grown across South Africa. Within Protected Agricultural Areas, the protection, particularly of arable land, is considered a priority for the protection of food security in South Africa, but the protection of land outside of these areas is generally not considered a food security priority.

5.5 Hydrology

The site is situated in quaternary catchment B41J of the Olifants Water Management Area (WMA). Elevations on the proposed sites typically range from 751 to 821 meters above mean sea level (mamsl). The Steelpoort River valley is steep with slopes of 2.5% in the plain and steep hills with slopes of 23% rising 1 000m to altitudes of 1700mamsl on the sides from approximately 700mamsl along the river. The Steelpoort River has major tributaries of the Tubatsane River which joins it from the north. There are many small non-perennial drainage lines throughout the valley. There are two chrome smelters in the catchment. These are the main centres of development, otherwise, the area is generally undeveloped.

In terms of the greater hydrological area, the site is situated on the south-eastern bank of the Steelpoort River (the closest distance to the river is ±70m), just downstream of the confluence with the Tubatsane River. Drainage from the proposed development area is via four non-perennial tributaries of the Steelpoort River in a north-west direction as presented in Figure 5-8 (run-off from the site). The Steelpoort River flows into the Olifants River approximately 40km from the site, which drains into Mozambique. Drainage from the sites is towards the northwest via non-perennial drainage lines that drain towards the perennial Steelpoort River.

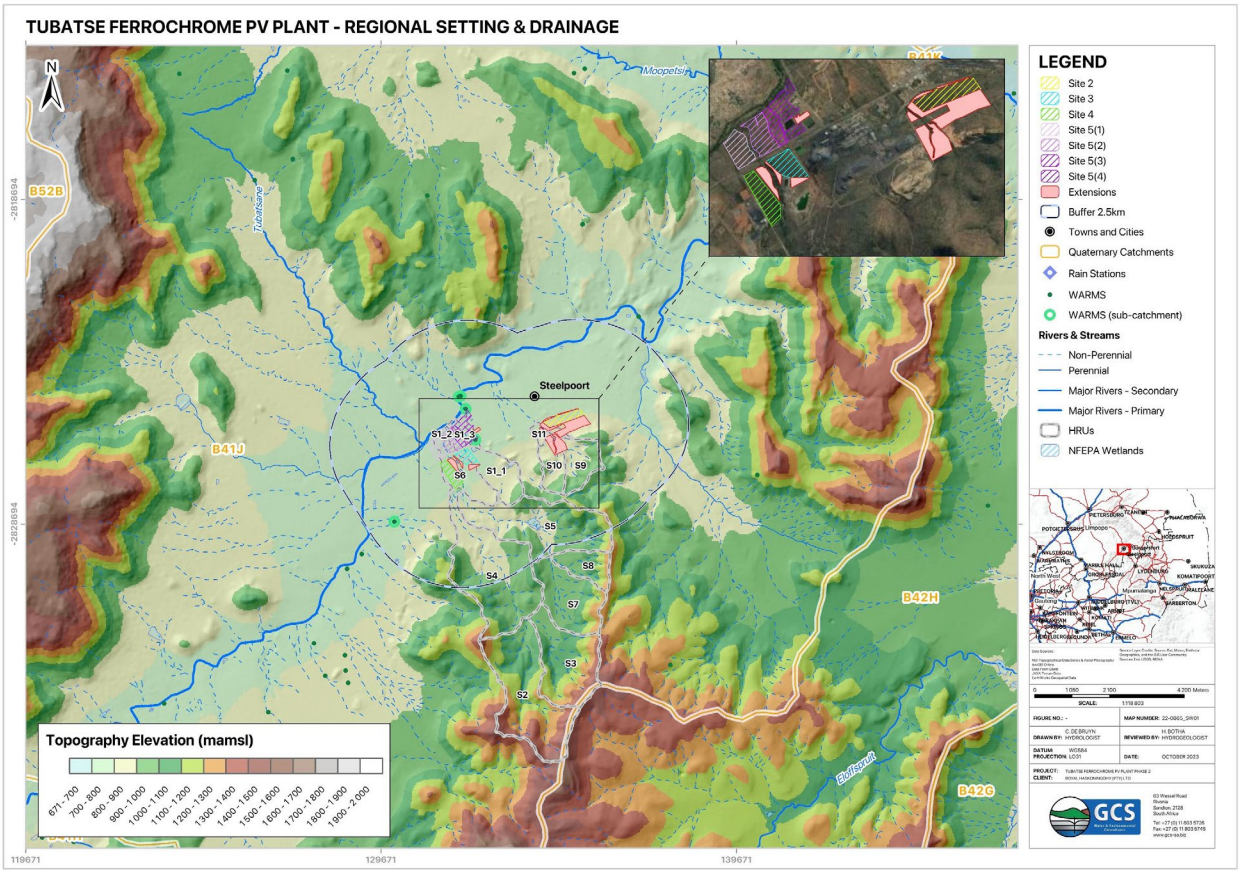
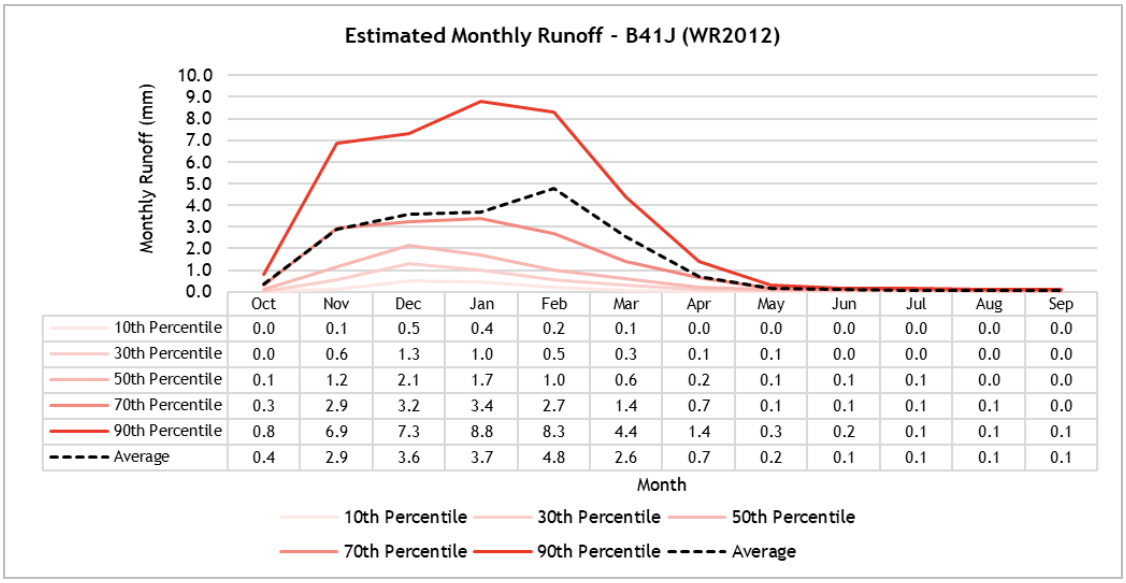


Figure 5-8: Site drainage

5.5.1 Run-off

The average run-off from natural (unmodified) catchments for quaternary catchment B41J is simulated in Water Resources of South Africa 2012 (WRC. (2015)) [19] as being equivalent to 19mm/a (or 4% of the MAP). This is approximately 13.12Mm³/a NMAR (Natural Mean Annual Run-off) average for the surface area.



	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep
10th Percentile	0.0	0.1	0.5	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
30th Percentile	0.0	0.6	1.3	1.0	0.5	0.3	0.1	0.1	0.0	0.0	0.0	0.0
50th Percentile	0.1	1.2	2.1	1.7	1.0	0.6	0.2	0.1	0.1	0.1	0.0	0.0
70th Percentile	0.3	2.9	3.2	3.4	2.7	1.4	0.7	0.1	0.1	0.1	0.1	0.0
90th Percentile	0.8	6.9	7.3	8.8	8.3	4.4	1.4	0.3	0.2	0.1	0.1	0.1
Average	0.4	2.9	3.6	3.7	4.8	2.6	0.7	0.2	0.1	0.1	0.1	0.1

Figure 5-9: Simulated natural (unmodified) average run-off for B41J

5.5.2 Local Hydrogeology and Depth of Groundwater

The site is situated in an area predominantly underlain by mafic intrusive rocks such as diabase, gabbro, dunite, pyroxenite, norite and anorthosite [20]. The aquifer can be referred to as being primarily intergranular and fractured. Yields of approximately 0-5 to 2.0l/s [21] may occur. Groundwater is typically encountered in:

- Shallow alluvium zones associated with the major rivers;
- Basins of weathering occur mostly in igneous rocks; and
- Fractures in transitional zones between weathered and unweathered rocks.

Recharge to the underlying aquifer is estimated to be in the order of 5.1% of the MAP (520.8mm/a), which falls within quaternary catchments B41J [22]. The aquifer's weathered zones are reported to range from approx. 18-38m thick, with the fractured zone ranging from approximately 83-113m thick [23]. The combined aquifer thickness is estimated to range from 122-132m. The aquifers are important contributors to groundwater baseflow to streams and rivers [24].

According to Vegter, 1995 [25] and DWAF, 2006 [26], the groundwater levels within the sub-catchments are expected to range from 17.8 to 18.7mbgl (meters below ground level). The groundwater table is expected to mimic the topography and be shallower closer to perennial streams (i.e., these are prominent groundwater

[19] *WRC. (2015). http://www.waterresourceswr2012.co.za/resource-centre/. Retrieved from Water Resources of South Africa, 2012 Study (WR2012)*
[20] *King, G., Maritz, E. & and Jonck, F., 1998. 3324 PE - 1:500 000 Hydrological Map Series of the Republic of South Africa, s.l.: s.n.*
[21] *Ibid*
[22] *DWAF, 2006. Groundwater Resource Assessment II, s.l.: s.n.*
[23] *Ibid*
[24] *King, G., Maritz, E. & and Jonck, F., 1998. 3324 PE - 1:500 000 Hydrological Map Series of the Republic of South Africa, s.l.: s.n.*
[25] *Vegter, 1995. Groundwater Recharge Map of South Africa, s.l.: s.n.*
[26] *DWAF, 2006. Groundwater Resource Assessment II, s.l.: s.n.*

contributions to baseflow areas or areas where groundwater seepage from the resource into the aquifer units may take place).

5.5.3 Site Hydrological Cycle

A sub-catchment-specific hydrological cycle was developed (Figure 5-10), which takes into consideration the existing groundwater and surface water users, climate, run-off and estimated baseflow to wetland areas, the following is estimated:

- Average rainfall over the surface of the sub-catchments is in the order of 13.94Mm³/a (50% of the total water budget);
- Average run-off accounts for a volume in the order of 0.51Mm³/a (1.8% of the total water budget);
- Average evaporation is in the order of 10.83Mm³/a (38.8% of the total water budget);
- The average groundwater contribution to baseflow to rivers/wetlands/streams is in the order of 0.03Mm³/a (0.1% of the total water budget);
- The average groundwater recharge is in the order of 0.71Mm³/a (2.6% of the total water budget); and
- Groundwater and surface water users account collectively for 1.86Mm³/a (6.69% of the total water budget).

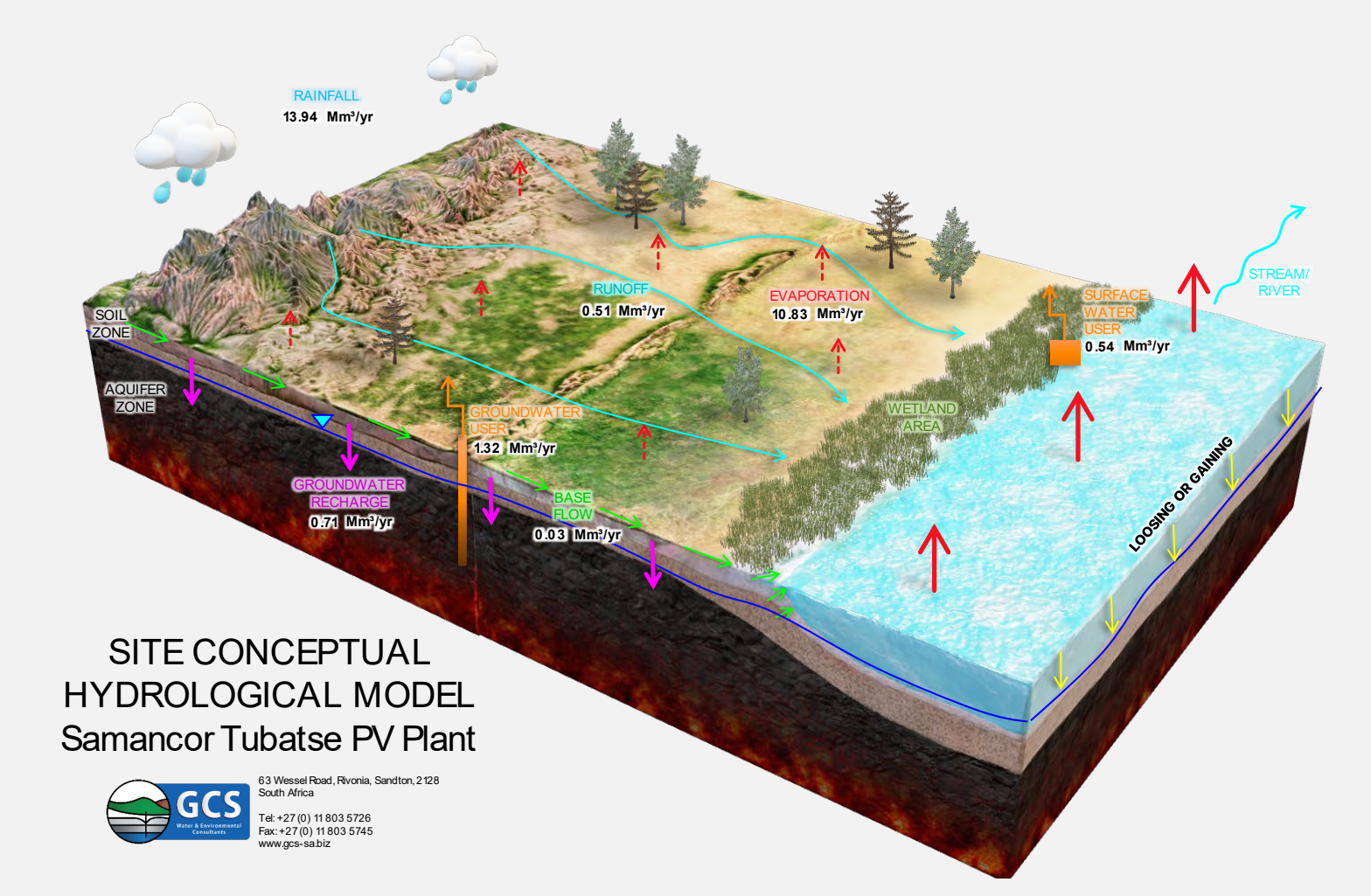


Figure 5-10: Simplified overview of the hydrological cycle at the site

5.6 Freshwater

5.6.1 National Freshwater Ecosystem Priority Area (NFEPA) – Rivers and Wetlands

The National Freshwater Ecosystem Priority Areas (NFEPA) project is a multi-partner project between Council for Scientific and Industrial Research, South African National Biodiversity Institute, Water Research Commission, DWS (Department of Water and Sanitation), DFFE, World Wildlife Fund, South African Institute for Aquatic Biodiversity and SANParks. The NFEPA project aims to:

- Identify FEPAs to meet national biodiversity goals for freshwater ecosystems; and
- Develop a basis for enabling effective implementation of measures to protect FEPAs, including free-flowing rivers.

The project further aims to maximize synergies and alignment with other national level initiatives such as the National Biodiversity Assessment (NBA) and the Cross-Sector Policy Objectives for Inland Water Conservation.

According to the NFEPA database, there are no natural or artificial wetlands situated within the study area however there is one artificial unchanneled valley bottom wetland feature located within the investigation area (Figure 5-11). This wetland is indicated by NFEPA to be heavily to critically modified. During the field assessment for the previous project, this feature was observed to be an impoundment associated with the Tubatse Ferrochrome operations. The study area falls within the Central Bushveld Group 7 WetVeg group, considered Least Threatened.

According to the NFEPA Database the Steelpoort River is located to the north of the investigation area with only a small part of the river's reach being located on the investigation area northern boundary. The Steelpoort River is considered moderately modified (Class C) and considered a fish support area.

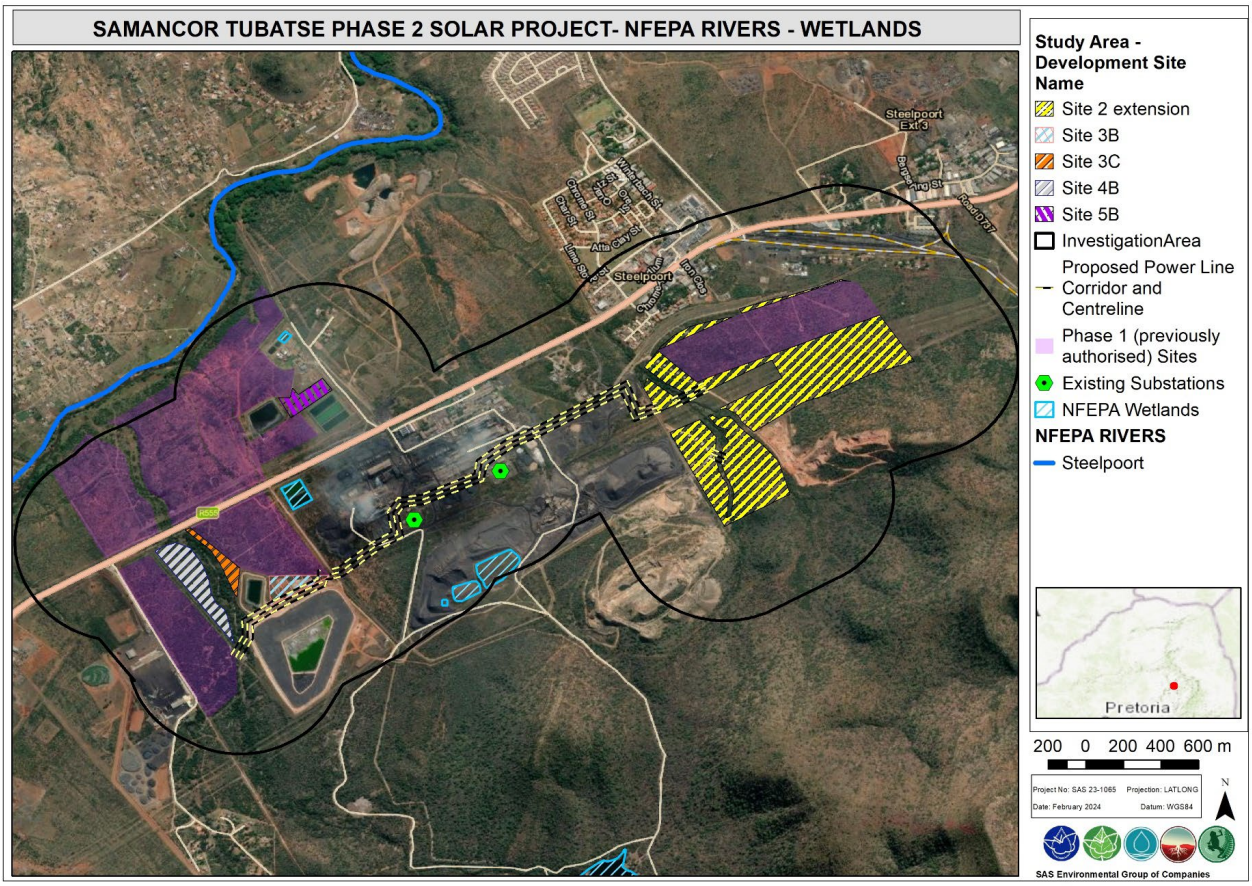


Figure 5-11: Freshwater ecosystems according to the NFEPA (2011) database

5.6.2 National Biodiversity Assessment (NBA) 2018: South African Inventory of Inland Aquatic Ecosystem (SAIIAE)

The NBA is a tool for monitoring and reporting on the state of biodiversity in South Africa. It is used to inform policies, strategies and actions in a range of sectors for managing and conserving biodiversity more effectively. The NBA is a summary of the state of South Africa's biodiversity and is prepared as part of the South African National Biodiversity Institute (SANBI) mandate under the Biodiversity Act, 2004 (NEM:BA, Act No. 10 of 2004). While the NBA is considered the latest (with the current version updated in 2018 and released in 2019) primary tool in monitoring, both NFEPA and NBA projects are considered invaluable and should be considered in tandem as each database supplements the other.

There are no natural wetland features associated with the study area or investigation area, however a number of artificial reservoirs classified as dams and open reservoirs are located in the study area. Two such artificial wetlands are in immediate proximity to Site 5B. According to the NBA Dataset the Steelpoort River is largely modified (Class D), while being currently poorly protected (Ecosystem Protection Level - EPL) and therefore considered endangered (Ecosystem Threat Status - ETS).

5.6.3 Freshwater Ecosystem Characterisation and Delineation

There are nine (9) ecosystems associated with the study areas (Figure 5-12):

- Two (2) episodic drainage lines (EDLs) are located in very close proximity to Site 2B, with parts of the delineated extent of these EDLs extending onto Site 2B, and a further two (2) EDLs are located in the upstream catchment of these EDLs to the south of Site 2B;
- An EDL drains between Sites 3C and 4B, entering the investigation area to the south and drainage northwards into the Steelpoort River;
- A short reach of a tributary EDL to the EDL that drains between Sites 3C and 4B is located in the far south-western part of the investigation area;
- Two EDLs are located in the northern part of the investigation area, to the north of the R555 road; and
- Two small portions of the Steelpoort River's riparian zone are located in the far northern part of the investigation area.

The freshwater ecosystems fall within the Eastern Bankenveld Aquatic Ecoregion and the Central Bushveld Group 7 WetVeg (wetland vegetation) group, classified as "Least Threatened"[27]. Table 5-2 indicates the classification of the freshwater systems at Levels 3 (Landscape Unit) and 4 (Hydrogeomorphic (HGM) Type).

Table 5-2: Characterisation at Levels 3 and 4 of the Classification System[28] of the freshwater ecosystems

Freshwater Ecosystem HGM Type	Level 3: Landscape unit	Level 4: HGM Type
River (including EDLs)	Valley floor—the base of a valley, situated between two distinct valley side-slopes, where alluvial or fluvial processes typically dominate.	Linear landform with clearly discernible bed and banks, which permanently or periodically carries a concentrated flow of water. A river is taken to include both the active channel and the riparian zone as a unit.

[27] *Mbona, N., Job, N., Smith, J., Nel, J., Holness, S., Memani, S and Dini, J. 2015. Supporting better decision-making around coal mining in the Mpumalanga Highveld through the development of mapping tools and refinement of spatial data on wetlands. WRC Report No. TT 614/14. Water Research Commission, Pretoria.*

[28] *Ollis, D.J., Snaddon, C.D., Job, N.M. and Mbona, N. 2013. Classification System for Wetlands and other Aquatic Ecosystems in South Africa. User Manual: Inland Systems. SANBI Biodiversity Series 22. South African Biodiversity Institute, Pretoria.*

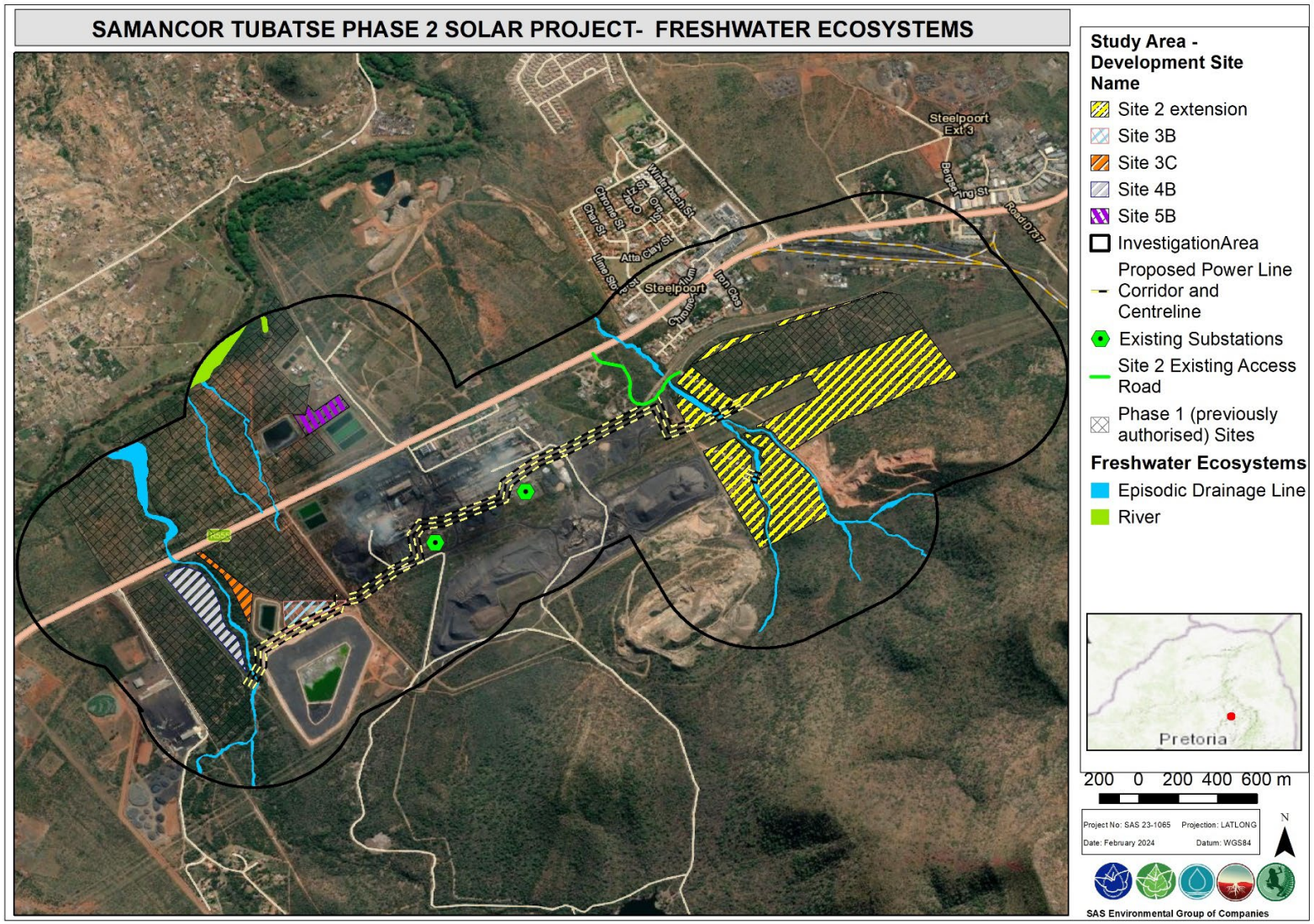


Figure 5-12: Delineated freshwater ecosystems

The development sites and associated investigation area are all located in the context of the wider Steelpoort River valley. The Steelpoort River along with other rivers in this region is generally very steep - steep in river longitudinal profile with a narrow to medium valley cross-sectional profile[29]. Accordingly local drainage lines forming tributaries of the Steelpoort River are generally very short in length displaying relatively small catchments – as is displayed in the investigation area. The nature of slope, substrate (with bedrock outcropping in many areas and relatively shallow soils), along with the relatively dry climate of the area, all entail that these tributary drainage lines are typically episodic, characterised by surface flows only in response to precipitation events of sufficient duration and intensity. Owing to the naturally occurring presence of woodland in the wider area (the study area falls within the Sekhukhune Plains Bushveld terrestrial vegetation type), vegetation within the riparian zones of the EDLs is predominantly woody, comprising of a mix of trees and smaller shrubs with a grassy understorey.

The Steelpoort River has a well-developed riparian zone while the non -perennial tributaries have riparian zones which vary from moderately to weakly developed depending on the position in the landscape as well as the effects of geological characteristics and geomorphological processes at play. Three of the EDLs in the investigation area are first or second order drainage systems – entailing that they form the head of the drainage system at a local scale into which no other streams flow. The EDLs, around which the Site 2B areas are arranged, drain a very small catchment on the northern slopes of the hilly ground to the south of Steelpoort and the EDL to the west of the smelter's brine dams drains an even smaller catchment. The EDL that drains between Sites 3C and 4B is a higher order stream system, draining a small to medium-sized catchment, rising in the mountainous area to the south of the Smelter (Figure 5-13). The EDL is impounded at the Tubatse Dam. This dam is recharged by water piped from the Steelpoort River and at times water from the dam is released into the downstream EDL, resulting in flows within certain reaches that would not otherwise be present.

29 Partridge, T. C, Dollar, E. S. J, Moolman, J. and Dollar, L. H. 2010. The geomorphic provinces of South Africa, Lesotho and Swaziland: A physiographic subdivision for earth and environmental scientists', Transactions of the Royal Society of South Africa, 65: 1, 1 — 47

Figure 5-13: A reach of the EDL that runs between Sites 3C and 4B that is characterised by bedrock outcropping in a part of the reach where the terrain drops steeply

The Steelpoort River is a much larger regional-scale river. The river is naturally characterised by a wooded riparian zone that extends laterally beyond the macro-channel bank of the river. The river channel in the vicinity of the investigation area is characterised by a series of runs with limited bedrock outcropping occurring in the channel (Figure 5-14). Beyond the macro-channel banks, lateral flow channels covered in *Phragmites mauritianus* reedbeds are present in some areas. The southern boundary of the riparian zone of the river typically grades to a band of dense microphyllous thicket or more open woodland, depending on the nature of the underlying substrate. The physical and vegetative structure of the riparian zone of the river is being physically altered in certain reaches within the vicinity of the investigation area by unlawful excavation of sand and associated removal of woody vegetation, particularly on the northern bank of the river.

Figure 5-14: A reach of the Steelpoort River close to the investigation area characterised by a run, with flanking woody riparian vegetation

5.7 Biodiversity

5.7.1 Regional Ecology

The Savannah Biome is the largest biome in southern Africa, covering about 46% of its area, and roughly describes a vegetation with a dominant upper layer of woody plants and a well-developed grassy layer. South African savannahs of nutrient-poor substrates are characteristically broad-leaved and without thorns, while those of nutrient-rich substrates are often fine-leaved and thorny[30], although microphyllous species are encroaching in many areas due to inappropriate management styles and over-exploitation (*pers. obs.).*

The proposed site is spatially situated within the Sekhukhune Centre of Plant Endemism (SCPE). The SCPE comprises a mountainous region with flat to undulating valleys. Sekhukhuneland is known for its parallel belts or rocky ridges and mountains, including the Leolo and Dwars River ranges. The core of the Centre is formed by the surface outcrops of the Rustenburg Layered Suite of the eastern Bushveld Complex.

Many apparent endemic species of the SCPE are awaiting formal description (e.g. in *Acacia, Boscia, Polygala* and *Stylochiton*). The genus *Lydenburgia* (Celastraceae), represented *by Lydenburgia cassinoides* (= *Catha transvaalensis*), is near-endemic to the region, also included in the 'Vulnerable' conservation

[30] *Knobel, J. 1999. The magnificent natural heritage of South Africa. Sunbird Publishing, South Africa.*

category[31]. Succulents abound in the hot, arid valleys of the SCPE. The genus Aloe is particularly prolific, with many of the species being shared with the adjacent Wolkberg Centre. The area around Burgersfort is reputed to have the highest concentration of Aloe species in the world.

5.7.2 Vegetation Type

Vegetation of the study areas are sympatric to ecological types described by Mucina and Rutherford (2006)[32] as the Sekhukhune Mountains Bushveld (Svcb28) and the Sekhukhune Plains Bushveld (Svcb29).

The southern sections of Site 2B comprises Sekhukhune Mountains Bushveld (Figure 5-15), manifesting as open to closed woodland of the mountains and hills to the south of Steelpoort. The Sekhukhune Mountains Bushveld type is situated in the mountains and undulating hills above the lowlands of the Sekhukhune Plains Bushveld, including parts of the steep slopes of the Leolo Mountains, the Dwars River Mountains and Thaba Sekhukhune, as well as a number of isolated smaller mountains (e.g. Phepane and Morone).

This mountain bushveld is part of the SCPE[33], more specifically the Steelpoort Subcentre. Because of comparatively low disturbance factors, the vast range of habitat still harbours high plant diversity with many endemics, many of which still await formal description[34]. In terms of floristic diversity, species richness and vegetation structure, it is related to Sekhukhune Plains Bushveld, Norite Koppies Bushveld and Ohrigstad Mountain Bushveld[35] [36].

Most of the proposed development footprints is situated in the Sekhukhune Plains Bushveld (Figure 5-15) and is encountered on the plains and flat areas around Steelpoort, noticeably with a modified and deteriorated appearance as a result of anthropogenic disturbances and high utilisation factors.

[31] *Plants of Southern Africa (POSA), 2012, Plants of Southern Africa: An online checklist, South African National Biodiversity Institute, viewed July 2016, from http://posa.sanbi.org*
[32] *Mucina, L. & Rutherford, M.C. (eds.). 2006. The vegetation of South Africa, Lesotho and Swaziland. Strelitzia 19. South African National Biodiversity Institute, Pretoria.*
[33] *Van Wyk, A.E. & Smith, G.F. 2001. Regions of Floristic Endemism in Southern Africa: A review with emphasis on succulents. Pretoria, Umdaus Press*
[34] *Siebert, S.J, van Wyk, A.E and Bredenkamp, G.J. (2001). Endemism in the flora of ultramafic areas of Sekhukhuneland, South Africa, South African Journal of Science. 97:529-532*
[35] *Siebert, S.J, van Wyk, A.E and Bredenkamp, G.J. (2002b).Vegetation ecology of Sekhukhuneland, South Africa: Combretum hererorense-Grewia vernicosa Open Mountain Bushveld. South African Journal of Botany. 68: 475-496*
[36] *Siebert, S.J, van Wyk, A.E and Bredenkamp, G.J. (2002c).Vegetation ecology of Sekhukhuneland, South Africa: Kirkia wilmsii-Terminalia prunioides. Closed Mountain Bushveld. South African Journal of Botany. 68: 497-517*

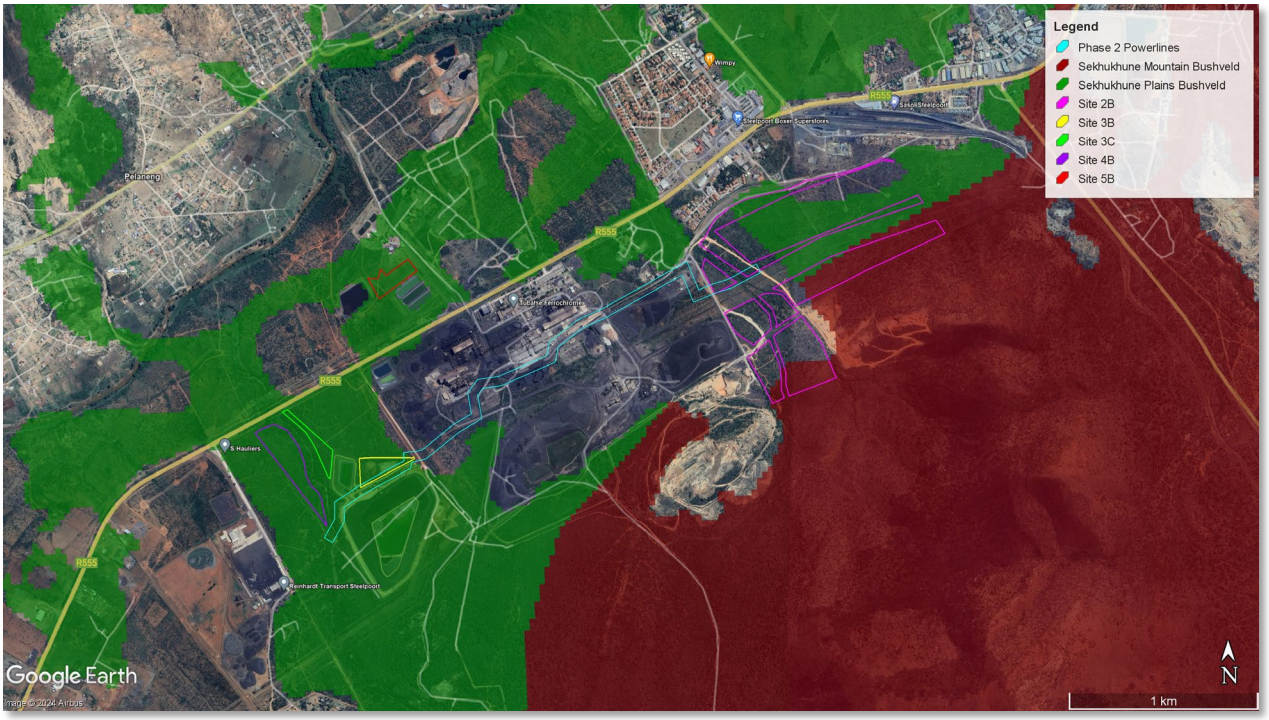


Figure 5-15: Spatial placement of the study site in relation to the remaining extent of Vegmap ecosystems

5.7.3 Threatened Ecosystems

The conservation level of the Sekhukhune Mountains Bushveld is currently set at Least Concern, and while none is conserved in statutory conservation areas, 0.4 % is conserved in Potlake Nature Reserve. This unit is experiencing low rates of natural habitat loss and biotic disruptions, placing the ecosystem at low risk of collapse, although nearly 15% has been irreversibly transformed by cultivation, mining, and urban transformation, notably some portions to the south of the Steelpoort.

The 2021 Ecosystem Status Assessment categorises the conservation level of the Sekhukhune Plains Bushveld as Endangered[37] (previously Vulnerable); with a target of 19%, only 2% is statutorily conserved in Potlake, Bewaarkloof and Wolkberg Caves Nature Reserves. Approximately 25% of this area has already been transformed and is mainly under dry-land subsistence cultivation. A small area is under pressure from chrome and platinum mining activities and associated urbanisation, notably around the Steelpoort area, and depending on commodities, this threat is likely to increase in near future. There is a high level of degradation of much of the remaining vegetation as a result of unsustainable harvesting, utilisation and exploitation.

5.7.4 Limpopo Province Conservation Plan

The purpose of the Limpopo Conservation Plan (C-Plan) v2 (2013) is to develop the spatial component of a bioregional plan – BRP (i.e. map of Critical Biodiversity Areas and associated land use guidelines). The purpose of a BRP is to inform land use planning, environmental assessment and authorisations, and natural resource management, by a range of sectors whose policies and decisions impact on biodiversity[38].

[37] *http://bgis.sanbi.org/Ecosystems/home/Detail/505*
[38] *Desmet, P. G., Holness, S., Skowno, A. & Egan, V.T. 2013. Limpopo Conservation Plan v.2: Technical Report. Contract Number EDET/2216/2012. Report for Limpopo Department of Economic Development, Environment & Tourism (LEDET) by ECOSOL GIS.*

The Limpopo C-Plan categories are presented in Table 5-3.

Table 5-3: Limpopo C-Plan categories

C-Plan Category	Description
Protected Areas (PA)	Declared and formally protected areas under the Protected Areas Act, such as National Parks, Nature Reserves, World Heritage Sites and Protected Environments that are secured by appropriate legal mechanisms. Recommendations for this category include maintaining of the current status or obtaining formal conservation protection.
Critical Biodiversity Areas (CBAs)	The CBAs are sites that are required to meet biodiversity targets for ecosystems and species and need to be maintained in good ecological condition. CBAs in the SDM can be divided into two subcategories, namely *Irreplaceable (CBA 1)* in that there is little choice in terms of areas available to meet targets or *Optimal (CBA 2)* whereby the selected sites are the ones that are best to achieve targets of the systematic biodiversity plan.
Ecological Support Areas (ESAs)	ESAs are required to support and sustain the ecological functioning of CBAs and Protected Areas and for meeting biodiversity targets. *ESA 1* are natural, near natural and degraded areas supporting CBA by maintaining ecological processes. *ESA 2* are areas with no natural habitat that important for supporting ecological processes.
Other Natural Areas (ONA)	Natural and intact but not required to meet targets or identified as CBA or ESA.
No Natural Habitat Remaining (NNHR)	Areas with no significant direct biodiversity value. Not Natural or degraded natural areas that are not required as ESA, including intensive agriculture, urban, industry; and human infrastructure.

Figure 5-16 illustrates the categorisation of the sites as inclusive of CBA1, CBA2, ESA1 and ESA2 categories, Site 2B is located entirely within an ESA1, Sites 3B, 3C and 4B are located in area denoted as a CBA2 and a small section of Site 5B is located within an ESA1 and the majority of the Site 5B is located in a CBA1.

The Ecological Specialist is however not entirely in agreement with the categorisation as the plan does not accurately reflect the level of recent habitat loss and deterioration from the urban and industrial sones around Steelpoort that, which is also prevalent from recent aerial imagery and confirmed from the site inspection. When compared to the more recent information source of the BRP, it is evident that parts of the information appears slightly outdated.

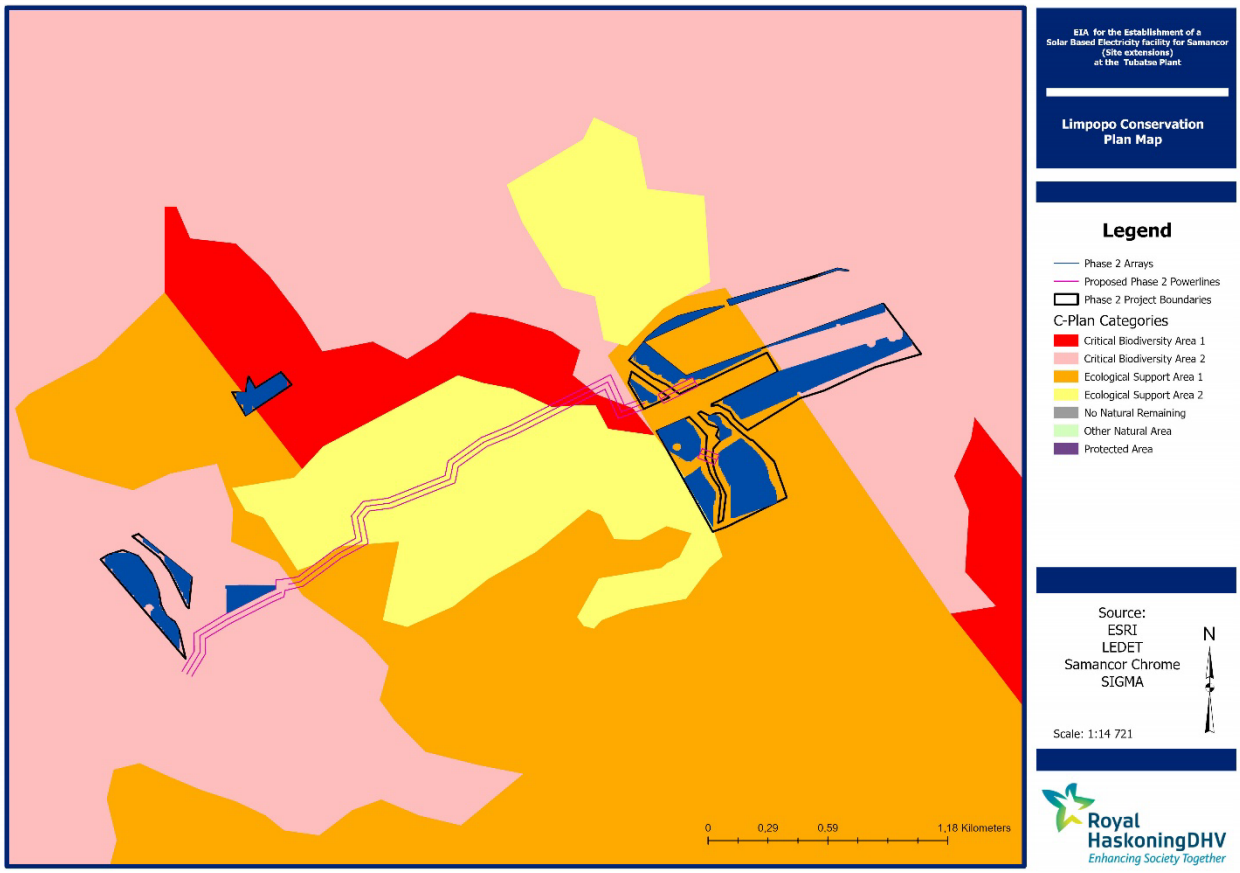


Figure 5-16: Limpopo Province C-Plan illustrating conservation categories and importance

5.7.5 Sekhukhune District Bioregional Plan

This BRP was gazetted in 2020 and is based primarily on datasets and information available at the time, notably from the CBAs and ESAs that were identified and delineated for the Limpopo C-Plan (2013).

The categories of the BRP are the same as those for the Limpopo C-Plan as indicated in Table 5-3. The BRP information source designated the remaining areas of natural habitat within the development footprints and surrounding areas as ESA1 habitat (Figure 5-17). In comparison with the older version (Limpopo Province C-Plan (v2)) that categorised much of the remaining areas as CBA1, CBA2 and ESA1 status, the BRP categorisation is considered a more accurate and appropriate categorisation of remaining areas of natural habitat within the development footprints. It has captured some of the recent land transformation and habitat deterioration that is associated with the fragmented and isolated portions of woodland habitat in the immediate surrounds of Steelpoort. However, as this map is a static representation of a dynamic environment, some discrepancies are evident on finer inspection, which generally is the result of recent changes in land use and activities that have not yet been captured in the latest version.

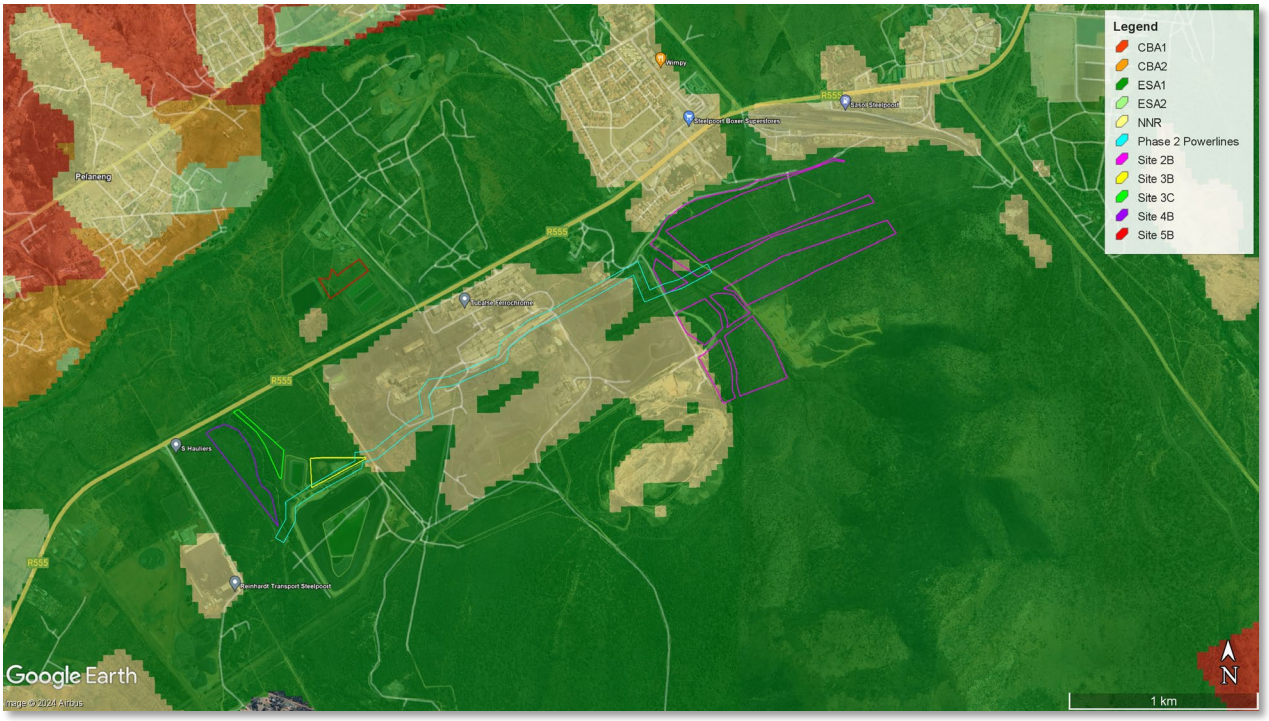


Figure 5-17: Limpopo BRP for the immediate region

5.7.6 Plants of Conservation Concern

Results from the site inspection indicated the noted presence of several plant taxa of conservation concern:

- *Adenia fruticosa* (Limpopo Environmental Management Act - LEMA Schedule 12)
- *Aloe burgersfontensis* (Sekhukhune endemic)
- *Aloe wickensii* (LEMA Schedule 12)
- *Balanites maughamii* (National Protected Tree)
- *Boscia albitrunca* (National Protected Tree)
- *Dicliptera fruticosa (International Union for Conservation of Nature (IUCN))*
- *Elaeodendron transvaalense* (National Protected Tree)
- *Eulophia petersii* (LEMA Schedule 12)
- *Sclerocarya birrea* (National Protected Tree)
- *Spirostachys africana ((*LEMA Schedule 12)
- *Stapelia gettliffei* (LEMA Schedule 12)

5.7.7 Floristic Habitat Types of the Proposed Site and Immediate Surrounds

The development footprints for the proposed activity provides evidence of the range of anthropogenic impacts that resulted from disruptive and transformative industrial and associated activities over an extensive time period. Irremediable changes in vegetatal structure, species abundance, presence, absence, and composition resulted from land clearance activities in some parts, often recent, while other parts comprise natural and pristine bushland and shrubland types.

The following broad-scale habitat types and categories were recognised from the study areas and the immediate surrounds (Figure 5-18 and Figure 5-19):

- Artificial Impoundments;
- Deteriorated Open Shrubland Types;

- Drainage Lines and Variable Shrubland Banks;
- Tall Closed Riparian Bushland;
- Natural Woodland and Bushveld Types, including:
- Closed Mixed Thicket and Bushland;
- Variable Mixed Shrubland – Mountain Bushveld;
- Variable Mixed Shrubland – Plains Bushveld; and
- Transformed Areas, Infrastructure, Industries, Roads, etc.

The proposed development footprints for Phase 2 of the project do not necessarily comprise all of these habitat types, a brief discussion of each site and the habitat types relevant to the site is provided separately in Section 7.3.2.

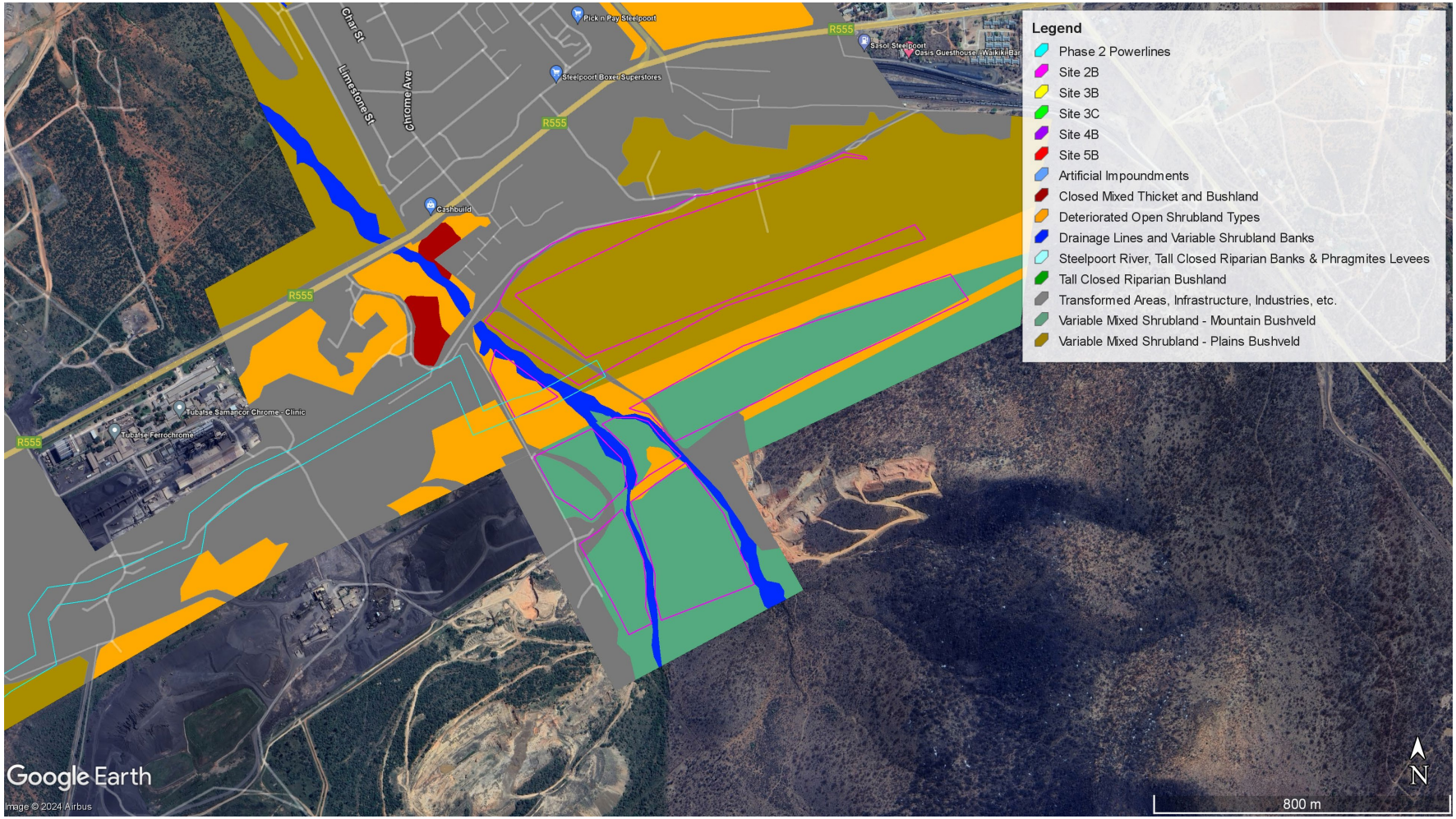


Figure 5-18: Broad-scale habitat types of the study areas (Site 2B)

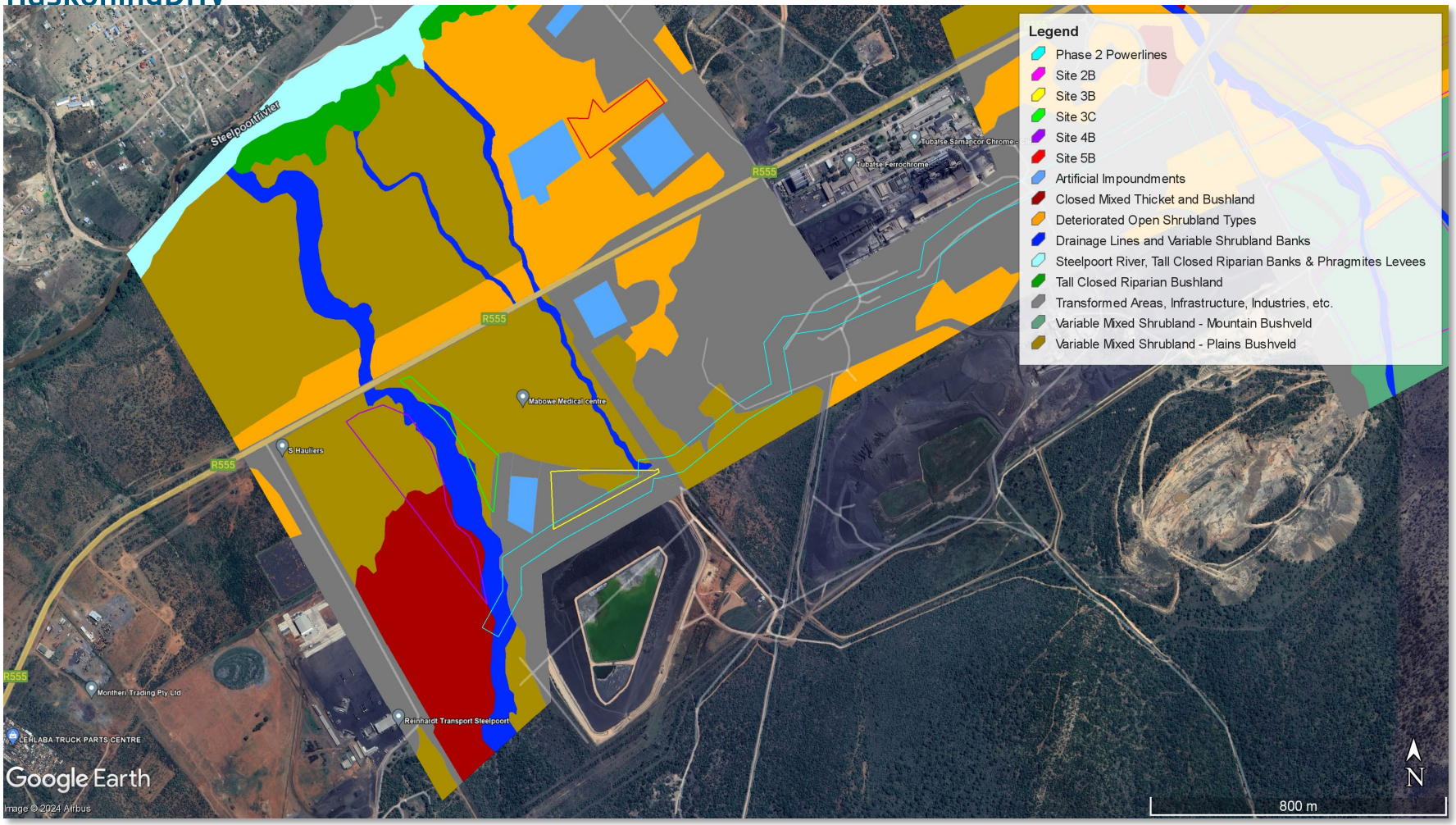


Figure 5-19: Broad-scale habitat types of the study areas (Sites 3B, 3C, 4B & 5B)

5.7.8 Faunal Attributes

Based on habitat availability, status and historic regional reference observations from available information sources, the following Likelihood of Occurrence (LoO) is ascribed to the fauna Species of Conservation Concern (SCC) (excluding avifauna) highlighted in the outcome of the DFFE EST:

- Mammalia - *Crocidura maquassiensis* (Medium)
- Mammalia - *Dasymys robertsii* (Medium)
- Mammalia – *Lycaon pictus* (Medium)
- Reptilia – *Crocodylus niloticus* (Medium)
- Reptilia – *Kinixys lobatsiana* (Medium)
- Invertebrate - *Aroegas fuscus* (Medium)

The potential presence of these species and habitat types and suitability that are typically associated with these species will be further evaluated and discussed in this report.

The faunal attributes of the study area are presented in Table 5-5.

Table 5-4: Faunal attributes of the study area

Component	Attributes
Mammals	Approximately 49 species (78% of the expected richness) have a high probability to be present on the study sites, of which 16 of these species (~33% of species with a high probability of occurrence) were confirmed during the survey, include the following groups: ▪ four (4) rodents; ▪ four (4) bovid antelopes; ▪ one (1) canid (jackals); ▪ one (1) primate (monkeys and baboons); ▪ one (1) herpestid (mongoose); ▪ one (1) viverrid (genet); ▪ one (1) leporid (hares and rabbits); ▪ one (1) orycteropid (aardvark); and ▪ two (2) suids (pigs). One of the confirmed species (c. Southern Mountain Reedbuck *Redunca f. fulvorufula*) is endangered. Thirty (30) mammal species are reasonably expected to be present with the sites and immediate areas. Furthermore, a total of five (5) species were confirmed during the surveys that have not been previously observed within the study area (sensu MammalMap), even though some of these species are considered to be widespread and relatively abundant within their respective distribution ranges. Furthermore, eleven (11) of the expected species indicates a moderate probability of occurrence (17.5 %), of which two species are considered to be regular in the area (c. Serval *Leptailurus serval* and Brown Hyaena *Parahyaena brunnea*), while three (3) of the expected species have a low probability of occurrence (5%). The latter species (species with low probabilities of occurrence) either share distribution ranges peripheral to the study sites or optimal foraging and roosting habitat were absent, thereby rendering their presence on the site as uncertain or questionable. It is worth mentioning that the Leopard (*Panthera pardalis*) could be an occasional foraging visitor to the study area given the high number of MammalMap records for the QDS sympatric to the study area, although it is believed that most of these records stem from remote mountainous areas north and south of the study area.
Amphibians	The amphibian richness of the wider region is low, a total of only 14 species have previously been recorded from the wider study region.

Component	Attributes
	No frog species of conservation concern is expected to be present in the study area.
Reptiles	The Environmental Screening Report highlighted the potential presence of Nile Crocodile (*Crocodylus niloticus*) and Lobatse Hinged Tortoise (*Kinixys lobatsiana*) as potential inhabitants for the local region. Nile Crocodile - Although categorised as Least Concern (IUCN, 2021), it is considered a species of concern in the Environmental Screening Report. This species would be confined to the Steelpoort River and immediate terrestrial surrounds, and because it is a highly opportunistic species, is considered possible, although unlikely, to persist within the Steelpoort River. It is widely distributed across South Africa, with strong, documented populations in many countries in eastern and southern Africa. A low likelihood of occurrence for Phase 2 areas is ascribed to this species. Lobatse Hinged Tortoise - This species is considered a likely inhabitant of, particularly, the variable open woodland on rocky slopes confined to the southern parts of Site 2B and along certain sites where surface outcrops are prominent (mainly variable open woodland along some of the larger drainage lines). This species is categorised as Vulnerable since most of its global distribution corresponds to the Limpopo Province of which already 15% of previously suitable habitat is currently developed or degraded.[39] It is threatened by habitat transformation (e.g., urbanisation, agriculture, and mining) along with inappropriate veld management (many are killed during veld fires).
Invertebrates	No invertebrate species of conservation concern have been recorded from the study area, or are considered likely to occur.

5.8 Avifauna

5.8.1 Important Bird Areas (IBAs)

There are no Important Bird Areas (IBAs) within or in the immediate vicinity of the study area. Three IBAs are located roughly equidistant from the study area – the Wolkberg Forest Belt to the north and north-west, the Blyde River Canyon to the east and north-east and the Steenkamp Berg IBA to the south (Figure 5-20). The closest IBA to the proposed study area is approximately 37km to the north-east – the Blyde River Canyon IBA.

[39] *Hofmeyr MD and Boycott RC. (2018). Kinixys lobatsiana. The IUCN Red List of Threatened Species 2018: e.T163454A115654759*

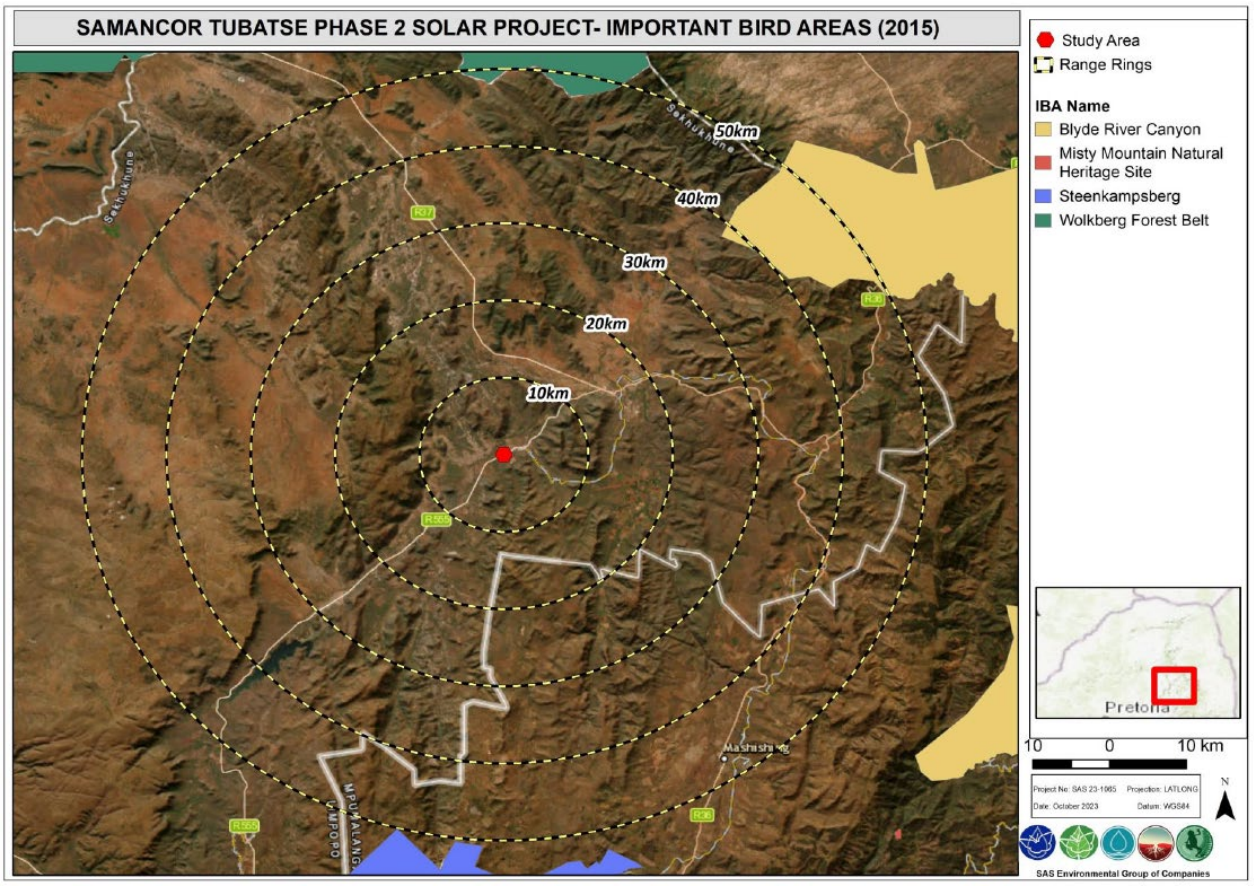


Figure 5-20: The study area in relation to IBAs

5.8.2 Occurrence of Species of Conservation Concern

A number of SCC/Red Data species have either been recorded or could potentially occur within the study area. The latest list of Red Data List bird species is contained within the 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland[40].

Table 5-5 lists the bird species in the study area species list that are designated as SCC. SCC species are very important in the context of the proposed development, as any impacts on these threatened species could be potentially significant at the population level. In addition, certain of these species are large birds that are vulnerable to collisions with infrastructure.

Table 5-5: Red Data list birds recorded or potentially occurring within the study area

Scientific Name	Common Name	Regional Threat Category
Ciconia abdimii	Abdim's Stork	Near Threatened
Ciconia nigra	Black Stork	Vulnerable
Geronticus calvus	Southern Bald Ibis	Vulnerable
Sagittarius serpentarius	Secretarybird	Vulnerable
Gyps coprotheres	Cape Vulture	Endangered

[40] *Taylor M.R., Peacock F. Wanless R.W. (eds) (2015). The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Johannesburg, South Africa.*

Scientific Name	Common Name	Regional Threat Category
Gyps africanus	White-backed Vulture	Endangered
Aquila rapax	Tawny eagle	Endangered
Polemaetus bellicosus	Martial Eagle	Endangered
Falco biarmicus	Lanner Falcon	Vulnerable
Hydroprogne caspia	Caspian Tern	Vulnerable
Alcedo semitorquata	Half-collared Kingfisher	Near threatened
Coracias garrulus	European Roller	Near threatened

5.8.3 Occurrence of Endemic Species

Table 5-6 lists the endemic species have been recorded or could occur within the study area. Endemic species are of importance due to their limited distribution and impacts on their populations (especially at cumulative level) could be significant It should be noted that species endemic to the southern African sub-region have been listed. A distinction has been drawn between birds completely endemic to the sub-region, as well as those species whose distributions mostly fall within the sub-region (near endemic).

Table 5-6: Endemic or near endemic species recorded or potentially occurring within the study area

Scientific Name	Common Name	Endemism Status
Geronticus calvus	Southern Bald Ibis	Endemic
Gyps coprotheres	Cape Vulture	Endemic
Buteo rufofuscus	Jackal Buzzard	Endemic
Pternisits natalensis	Natal Spurfowl	Near Endemic
Lophotis ruficrista	Red-crested Korhaan	Near Endemic
Pterocles bicinctus	Double-banded Sandgrouse	Near Endemic
Centropus burchellii	Burchell's Coucal	Near Endemic
Tockus leucomelas	Southern Yellow-billed Hornbill	Near Endemic
Tricholaema leucomelas	Acacia Pied Barbet	Near Endemic
Mirafra sabota	Sabota Lark	Near Endemic
Anthoscopus minutus	Cape Penduline-Tit	Near Endemic
Monticola rupestris	Cape Rock Thrush	Endemic
Cossypha humeralis	White-throated Robin-Chat	Endemic
Cercotrichas paena	Kalahari Scrub-Robin	Near Endemic
Parisoma subcaeruleum	Chestnut-vented Tit-Babbler	Near Endemic
Bradornis mariquensis	Marico Flycatcher	Near Endemic
Sigelus silens	Fiscal Flycatcher	Endemic
Laniarius ferrugineus	Southern Boubou	Endemic
Laniarius atrococcineus	Crimson-breasted Shrike	Near Endemic

Scientific Name	Common Name	Endemism Status
Cinnyris afer	Greater Double-collared Sunbird	Endemic
Cinnyris chalybeus	Southern Double-collared Sunbird	Endemic
Passer melanurus	Cape Sparrow	Near Endemic
Passer motitensis	Great Sparrow	Near Endemic
Sporopipes squamifrons	Scaly-feathered Finch	Near Endemic
Amadina erythrocephala	Red-headed Finch	Near Endemic
Uraeginthus granatinus	Violet-eared Waxbill	Near Endemic
Vidua regia	Shaft-tailed Whydah	Near Endemic
Emberiza impetuana	Lark-like Bunting	Near Endemic
Emberiza capensis	Cape Bunting	Near Endemic
Zosterops virens	Cape White-eye	Endemic

5.9 Socio-Economic Baseline

The FGTM is a Local Municipality (Category B4) within the SDM, in the Limpopo Province. It was established after the August 2016 local elections by the merging of Fetakgomo and Greater Tubatse Local Municipalities. The Municipality borders Makuduthamaga Local Municipality in the south, Elias Motsoaledi Local Municipality in the east, Fetakgomo Local Municipality, Lepelle-Nkumpi Local Municipality in Capricorn District, Maruleng Local Municipality in Mopani District and Mpumalanga's Thaba Chweu Local Municipality. It is situated about 150km from Polokwane, and 250km from Mbombela. Geographically the Municipality is the biggest of the five (5) local municipalities in SDM, constituting 34.3% of the area with 4 550km^2 of the District's 13 264 km^2.

5.9.1 Population

The population size is 566 757. The population in the Municipality is constituted by 98.42% Black, 0.94% White, with other population groups making up the remaining 0.6% (Figure 5-21). The sex ratio in the Municipality is 92, meaning that for every 100 women there are 92 men. Languages spoken in the Municipality include Sepedi (78.6%), Tsonga (6.9%), *isi*Ndebele (3.8%), *isi*Zulu (2.1%) and other languages make up 8.6%. Of those aged 20 years and older, 30.8% have completed matric and 6.5% have some form of higher education.[41]

[41] Statistics South Africa. 2022 Census.

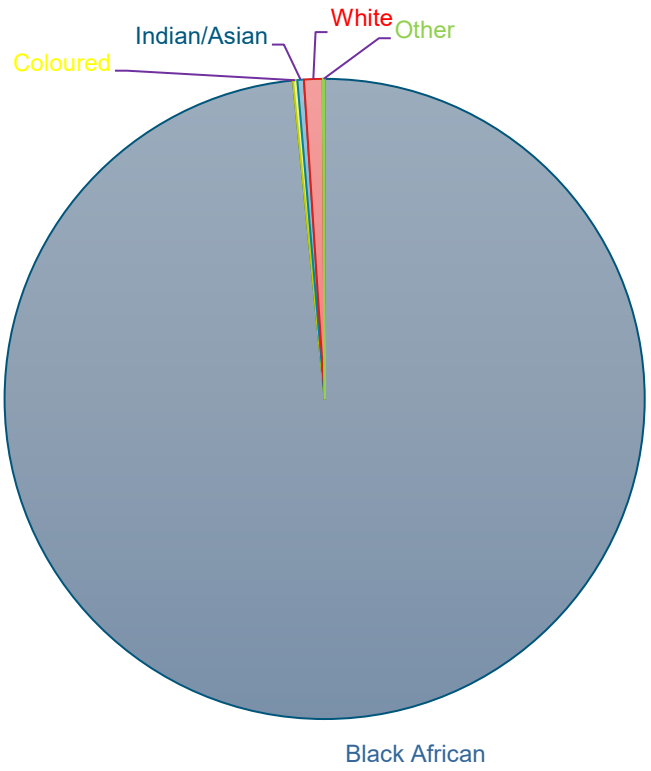


Figure 5-21: Population groups[42]

5.9.2 Settlement Types

94% of the settlements are formal with informal and traditional settlements constituting 3% and 2% respectively and other making up the remaining 1% (Figure 5-22).

[42] *Ibid*

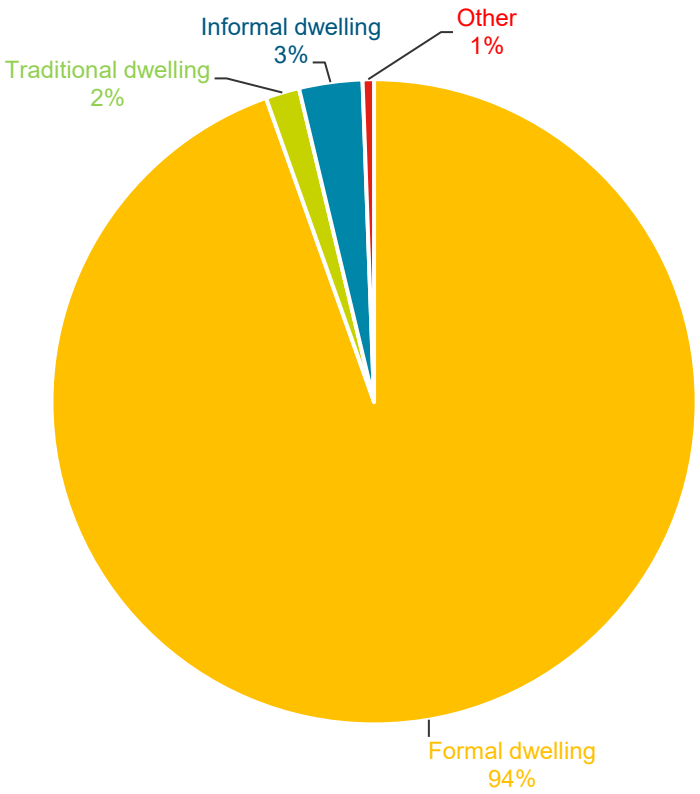


Figure 5-22: Settlement type[43]

5.9.3 Water Scenario

The water sources found in the SDM include groundwater, wells, rivers, pools, and dams (20 small dams and 2 major dams i.e. Flag Boshielo and De Hoop Dams). The SDM relies on two major rivers where the two large dams are located within its jurisdiction. The Flag Boshielo Dam located on the Olifants River has, at full storage capacity, 185.2 million cubic metres (110%) as at January 2020. The De Hoop Dam located on the Steelpoort River has, at full storage capacity, 348.7 million cubic metres (81, 2%) as at January 2020.[44]

The SDM is currently providing full water services in the main towns of Burgersfort (12 815 people), Marble Hall (4 025 people), Groblersdal (6 312 people), Steelpoort (3 374 people) and Ohrigstad (1 520 people). These areas have access to other high-level services such as refuse removal and roads infrastructure.

5.9.4 Electricity[45]

The FGTM is not the electricity authority or provider for the Municipality, this is the sole responsibility of Eskom. Basic electricity infrastructure has been provided by Eskom, but many of the rural communities have inadequate access to electricity. This further supports the need for Samancor Chrome to develop alternative sources of electricity as this would enable the Municipality and Eskom to use more resources in ensuring that these communities can have improved access to electricity.

[43] *Ibid.*
[44] *Source: DWS in Final DDP-IDP Budget 2020*
[45] *Fetakgomo Tubatse Local Municipality. 2020. 2020/21 Integrated Development Plan (IDP) & Budget.*

5.9.5 Sanitation[46]

Sanitation services are a function of the SDM, the Municipality currently has a large backlog in terms of sanitation provision. Industrial consumers such as Samancor Chrome that operate in more urban areas discharge their effluent in existing wastewater treatment works via the municipal system. The FGTM IDP (2020) has stated that the Steelpoort sewerage plant has undergone a refurbishment to cater for the development in the area but the system is still overloaded due to the chemical toilets and septic tank discharges at the plant. It is important to note that there is proposed sewage works planned downstream for Steelpoort and Winterveld, the exact location and details has not been provided in the IDP but this does highlight the importance of the Steelpoort area and ensuring that the communities in this area have access to some form of services.

5.9.6 Economy

The Municipality has a weak economic base and high poverty levels with 15.7% with no income (Figure 5-23). The Burgersfort town in the Municipality has been identified as a growth point in the province because of its mining activities. A potential to grow the economic base in the Municipality, through tourism, has been brought by the availability of natural resources. Poverty alleviation projects implemented by the Municipality have improved the socio-economic conditions.

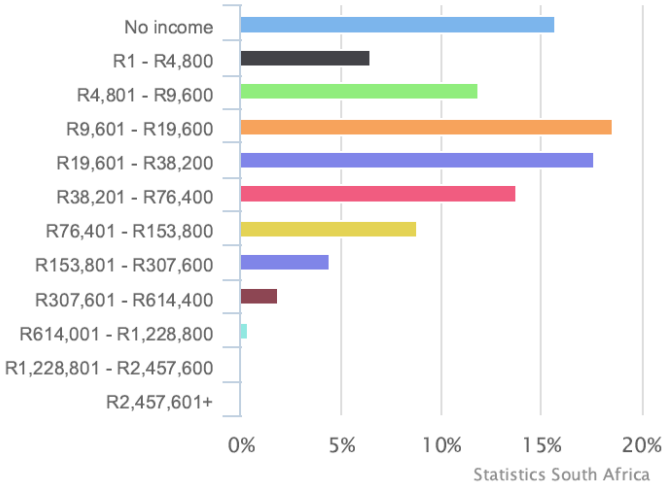


Figure 5-23: Average household income[47]

5.9.7 Sekhukhune District Development Plan 2020-2021

The SDM accounts for a total population of 1.2 million, or 20.4% of the total population in the Limpopo Province, with Vhembe being the most populous region in the Limpopo Province in 2018.

The increase in the population annual growth rate is attributed to the increasing number of the mining developments (particularly in the FGTM) which serve as an attraction of people for job opportunities, especially the male population.

[46] *Ibid.*
[47] *Statistics South Africa. 2011 Census.*

5.9.8 Special Economic Zones (SEZs)

The Fetakgomo Tubatse Special Economic Zone (SEZ) is proposed in the province (Figure 5-24). The Fetakgomo Tubatse SEZ is in a mining zone area which has been designated for mineral beneficiation. Currently the Limpopo Economic Development Agency has secured 1200ha of land where the SEZ will be located and the processes such as EIA and licensing are being undertaken. The challenges affecting the smooth inception of the SEZ include amongst others, the licensing, Eskom capacity for electricity provision and water provision.[48]

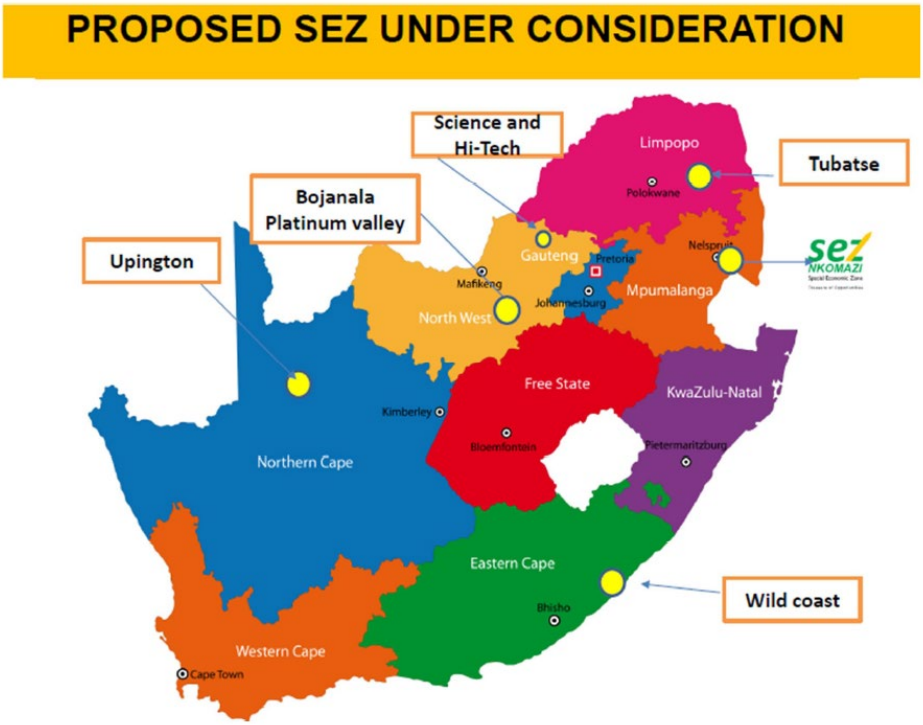


Figure 5-24: Map showing the proposed SEZs in South Africa[49]

5.9.9 Land Use

Land use within the larger region is decidedly rural, characterised by commercial agriculture and extensive livestock farming. Numerous small villages are sprawled across the landscape, notably along the Steelpoort River and major roads, characterised by deteriorated and transformed areas in the immediate surrounds. Mining and associated beneficiation industries account for major industrial type of land uses of the immediate region, which is particularly prevalent in the Steelpoort area. Steelpoort town comprises mainly mining (inclusive of mineral processing and beneficiation plants) and other industrial land use types as well as medium density housing (peri-urban) and a small retail/ commercial component.

Aerial imagery of the immediate region (Figure 5-25 and Figure 5-26) reflects the severity of habitat transformation and deterioration that are typically associated with intensive industrial and mining land use activities around Steelpoort, as well as loss of habitat and associated impacts that are evident from rural villages and intensive utilisation of natural resources for subsistence purposes. Impacts associated with

[48] *SDM. District Development Plan 2020-2021.*
[49] *Department of Trade and Industry. 2018. Annual Performance Plan 2018/19.*

subsistence agriculture and persistent and high grazing pressure to the north of the site is evident from the absence of a woody component of the area and a poorly developed and depauperate herbaceous stratum is often present. Commercial agricultural practices are strongly correlated with the Steelpoort River, Speekboom and other smaller, perennial rivers from which water is extracted for irrigation purposes (mainly citrus). Severe erosion patterns are noted from drainage channels, nearby banks and floodplains, notably to the northwest of the sites, exhibiting severe erosion and the effects of persistent and inappropriate utilisation.

The proposed sites comprise mostly natural and semi-natural woodland habitat, but because of proximity to the Steelpoort town area, exhibit a moderate level of habitat deterioration that stems from typical and surrounding land use activities. Anthropogenic impacts that cause deterioration and transformation habitat include severe and persistent grazing pressure, inappropriate fire regimes, typical pressures and effects from industrial land uses (surface mining, beneficiation plants, industrial activities, ponds and impoundments, spoils heaps, etc.), roads and railway lines, informal and illegal sand mining activities, residential areas and rural townships and associated commercial activities. However, most of the remaining natural woodland from the wider surrounds, notably to the south, exhibit ecological attributes that correspond to the regional ecological type.

Figure 5-25: Aerial imagery of the site and immediate surrounds (Sites 3B, 3C, 4B and 5B)

Figure 5-26: Aerial imagery of the site and immediate surrounds (Site 2B)

5.10 Visual Landscape

The portion of the Steelpoort valley in which the proposed development is located has a strong industrial component to the visual environment and thus has experienced significant landscape change from a natural visual baseline. The industrial inputs are due primarily to the presence of the TFC Plant and adjacent mining operations which comprises of several extremely large (multi-storey) structures as well as infrastructure such as slag dumps and large areas of land that have been cleared of natural vegetation.

The greater region is characterised by increasingly expanding open-cast mining operations in the undulating terrain on the northern side of the valley and a cluster of commercial and residential land uses are in the vicinity of the town of Steelpoort. Furthermore, large peri-urban settlements are located along the northern side of the Steelpoort River, extending up to the base of the undulating terrain that flanks the northern side of the valley. The remaining natural landscape features consists of mostly undeveloped undulating terrain that flanks the northern and southern sides of the valley.

The proposed solar development would thus occur in the context of the strong industrial visual influences of the anthropogenically-driven landscape change. It is worth noting that authorisation has been received for the development of the Phase 1 Tubatse Solar Project, which although not yet developed will lead to the physical transformation of large areas of land around the smelter from residual natural woodland vegetation to solar PV arrays. This factor will further enhance the degree of anthropogenic change to the baseline visual environment.

Figure 5-27: The TFC plant as viewed from the R555 road to the north-east of the smelter

5.10.1 Visual Character

The visual character of the study area is defined by a combination of both natural landscape features and anthropogenic alterations to the landscape, mainly urban development and mining activities. The TFC Plant (around which the proposed solar development sites are located) and the small town of Steelpoort, which is in close proximity to the TFC Plant are located within the valley of the Steelpoort River. The valley is aligned in a north-east/south-west orientation and is flanked on its eastern and western sides by tall hills. Apart from some mining activities in the valley slopes, these hilly areas flanking the valley are largely undeveloped and provide the Steelpoort valley with a strong natural visual component.

Within the valley floor, flatter topography has allowed development and transformation of the natural woodland vegetation to occur. The wider valley in the surrounds of the smelter and the town is characterised by a combination of land uses and landcover, including peri-urban, mining, industrial, commercial, and other land uses. These land uses have all been transformative in the context of removal of natural vegetation, with the establishment of large structures in many areas. The Steelpoort valley located to the west of the river are largely characterised by rural or peri-urban settlements that consist of formal houses on small plots of land, located in a wider context of open land consisting of veld that has been highly degraded through communal land tenure and livestock grazing. Conversely the eastern side of the valley consists of mining and industrial developments and residual undeveloped land, with some areas of human settlement, most notable the small town of Steelpoort.

The TFC Plant consists of several vast structures, with a height that equates to multistorey buildings. The structures of the smelter thus dominate the surrounding area due to their massive size and form part of the skyline. This visual prominence of the smelter is enhanced by the presence of the large slag dump located adjacent to the plant. The slag is dark black, thus providing a high visual contrast with the natural colours of the surrounding undulating woodland vegetation. The areas immediately adjacent to the TFC Plant consist of parcels of vacant land (some of which comprise the proposed solar development sites) that are

characterised by natural woodland of varying levels of degradation due to woody vegetation removal and livestock grazing, as well as ancillary infrastructure such as water treatment works, wastewater dams and a mining area located to the north of the TFC Plant. The parts of the Steelpoort valley located to the south-west of the TFC Plant and Sites 3B, 3C, 4B and 5B consist of a combination of vacant undeveloped land and developed areas which include two smelters, truck depots and the golf course and residential areas located in the vicinity of the Tubatse Chrome Club.

The small town of Steelpoort is located immediately to the north-east of the TFC Plant. The town consists of two primary components that are bisected by a large rail shunting yard, which are commercial land uses in the form of small retail and commercial complexes, and relatively recently constructed housing complex-type formal residential areas. Much of the vacant land in the vicinity of the town and the TFC Plant is bisected by multiple electricity transmission line servitudes, radiating from the Merensky Substation which is located to the north of the town of Steelpoort.

As a result of the above, the visual character can be described as partly rural with strong natural and industrial elements. The economy of the Steelpoort valley in the wider vicinity of the plant is very much focused on mining and industrial development, and it can be stated with a reasonably high level of confidence that the Steelpoort area is perceived as a prominently mining and industrial-related area by those who inhabit or visit the area. This perception is likely to influence the visual sensitivity of the area, especially in the context of new proposed industrial developments, resulting in a lowered visual sensitivity.

5.11 Heritage and Archaeology

Heritage resources are unique and non-renewable and as such, any impact on such resources must be seen as significant. The Heritage Impact Assessment (HIA) has shown that the study area and surrounding area has some heritage resources situated within the proposed development boundaries.

Site significance classification standards used is based on the heritage classification of Section 3 in the National Heritage Resources Act and developed for implementation keeping in mind the grading system approved by SAHRA for archaeological impact assessments. The update classification and rating system as developed by Heritage Western Cape (2016) is implemented in this assessment (Table 5-7).

Table 5-7: Rating system for archaeological and built environment resources

Grading	Description of Resource	Heritage Significance
Archaeological Resources		
I	Heritage resources with qualities so exceptional that they are of special national significance. Current example: Mapungubwe Cultural Landscape	Highest Significance
II	Heritage resources with special qualities which make them significant, but do not fulfil the criteria for Grade I status. Current example: Schoemansdal, Louis Trichardt, Soutpansberg District	Exceptionally High Significance
III	Heritage resources that contribute to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.	
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. Current examples: Koni ruins, Lydenburg	High Significance

Grading	Description of Resource	Heritage Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree.	Medium Significance
IIIC	Such a resource is of contributing significance.	Low Significance
Not Conservation Worthy (NCW)	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No research potential or other cultural significance
Built Environment Resources		
I	Heritage resources with qualities so exceptional that they are of special national significance. Current examples: Robben Island	Highest Significance
II	Heritage resources with special qualities which make them significant in the context of a province or region, but do not fulfil the criteria for Grade I status. Current examples: Moorddrift Monument, Potgietersrus	Exceptionally High Significance
III	Such a resource contributes to the environmental quality or cultural significance of a larger area and fulfils one of the criteria set out in section 3(3) of the Act but that does not fulfil the criteria for Grade II status. Grade III sites may be formally protected by placement on the Heritage Register.	
IIIA	Such a resource must be an excellent example of its kind or must be sufficiently rare. These are heritage resources which are significant in the context of an area.	High Significance
IIIB	Such a resource might have similar significances to those of a Grade III A resource, but to a lesser degree. These are heritage resources which are significant in the context of a townscape, neighbourhood, settlement, or community.	Medium Significance
IIIC	Such a resource is of contributing significance to the environs. These are heritage resources which are significant in the context of a streetscape or direct neighbourhood.	Low Significance
NCW	A resource that, after appropriate investigation, has been determined to not have enough heritage significance to be retained as part of the National Estate.	No research potential or other cultural significance

During the fieldwork a total of twelve heritage features and resources where identified (Figure 5-28). These consist of three potential burial grounds (BGG) with approximately five graves (TFC001), two graves (TFC004) and three graves (TFC005), one locality with recent and historic structures (TFC002-1 – TFC002-8) and one medium significance archaeological site (TFC003).

Figure 5-28: Identified heritage resources within the development area

5.12 Palaeontology

The proposed development is underlain by Quaternary alluvium and scree while the south and south-eastern margins is underlain by the Magaliesberg Formation of the Pretoria Group (Transvaal Supergroup). According to the Palaeo-sensitivity Map available on the South African Heritage Resources Information System database (SAHRIS), the Palaeontological Sensitivity of the proposed development area is rated as low (blue) for superficial deposits (Figure 5-29). No paleontological studies are required but a chance finds procedure is included in the Environmental Management Programme (EMPr) (Almond and Pether 2008[50], SAHRIS website[51]).

However, the small portion of Site 2B's southern section is within the Magaliesberg Formation of the Pretoria Group (Transvaal Supergroup) which has a high palaeontological sensitivity. (Almond and Pether 2008[52])

[50] *Almond, J.E. & Pether, J. 2008. Palaeontological heritage of the Northern Cape. Interim SAHRA technical report, 124 pp. Natura Viva cc., Cape Town*
[51] *https://sahris.sahra.org.za/map/palaeo*
[52] *Almond, J.E. & Pether, J. 2008. Palaeontological heritage of the Northern Cape. Interim SAHRA technical report, 124 pp. Natura Viva cc., Cape Town*

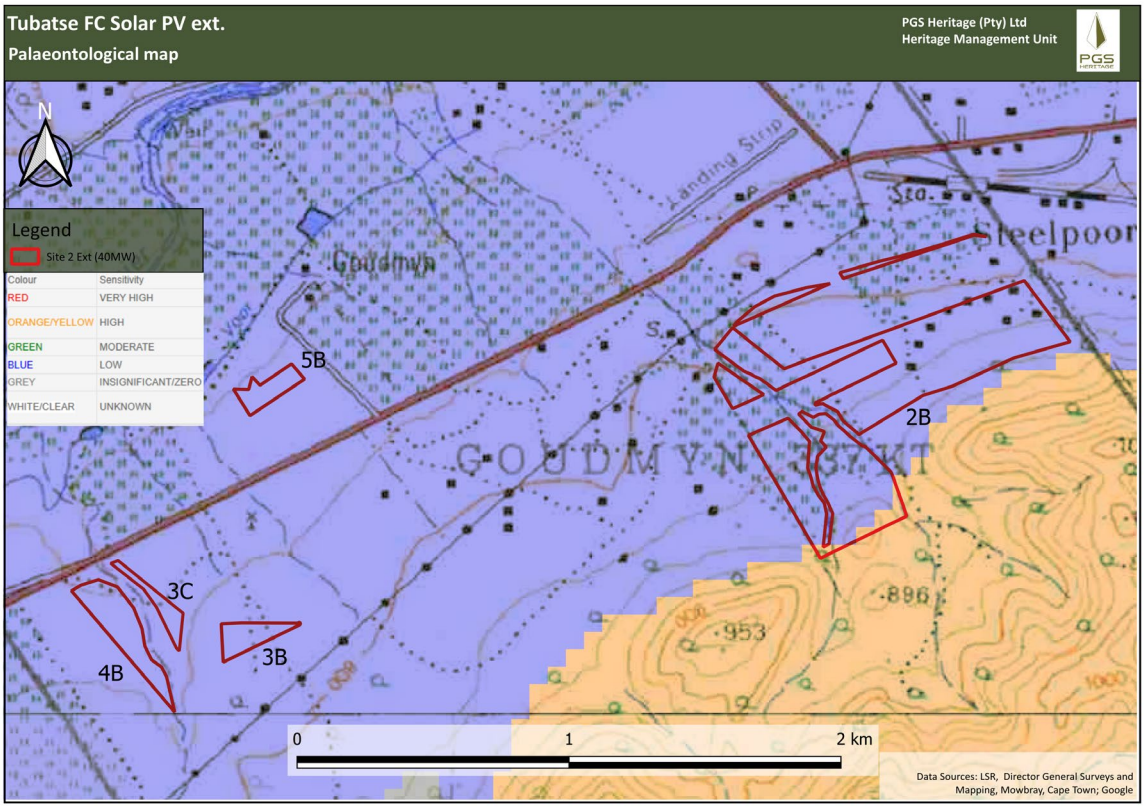


Figure 5-29: The proposed additional areas superimposed upon the palaeontological sensitivity of the area

6 Public Participation

The Public Participation Process (PPP) is a process that is designed to enable all interested and affected parties (I&APs) to voice their opinion and/or concerns which enables the EAP to evaluate all aspects of the proposed development, with the objective of improving the project by maximising its benefits while minimising its adverse effects.

The primary aims of the PPP are:

- to inform I&APs and key stakeholders of the proposed application and environmental studies;
- to initiate meaningful and timeous participation of I&APs;
- to identify issues and concerns of key stakeholders and I&APs with regards to the application for the development (i.e. focus on important issues);
- to promote transparency and an understanding of the project and its potential environmental (social and biophysical) impacts (both positive and negative);
- to provide information used for decision-making;
- to provide a structure for liaison and communication with I&APs and key stakeholders;
- to ensure inclusivity (the needs, interests and values of I&APs must be considered in the decision-making process);
- to focus on issues relevant to the project, and issues considered important by I&APs and key stakeholders; and
- to provide responses to I&AP queries.

The PPP must adhere to the requirements of Regulations 41 and 42 (GNR 326). Furthermore, a Public Participation guideline in terms of NEMA was issued by the DFFE in 2017, of which provisions will also be implemented.

The PPP for proposed project was undertaken according to the steps outlined in Figure 6-1 below.

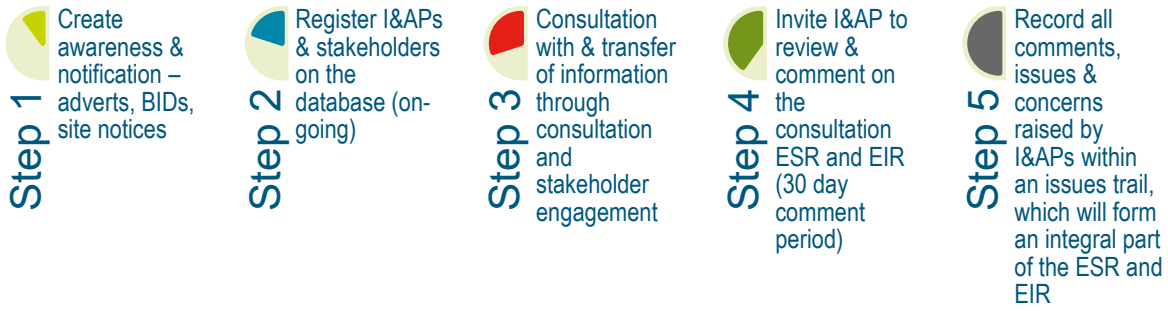


Figure 6-1: Steps in the public participation process

In order to achieve a higher level of engagement, a number of key activities have taken place and will continue to take place. These included the following:

- The identification of stakeholders is a key deliverable at the outset, and it is noted that there are different categories of stakeholders that must be engaged from the different levels and categories of government, to relevant structures in the non-governmental organisation (NGO) sector, to the communities of wards of residential dwellings as well as Traditional Authorities which surround the study area;
- The development of a living and dynamic database that captures details of stakeholders from all sectors;

- The fielding of queries from I&APs and others, and providing appropriate information;
- The convening of specific stakeholder groupings/forums as the need arises; and
- The preparation of reports based on information gathered throughout the EIA study via the PPP and feeding that into the relevant decision-makers.

The proposed project PPP has entailed the following activities as described in the subsequent sections.

6.1 Authority Consultation

The Competent Authority, the LEDET, is required to provide an EA (whether positive or negative) for the project. The LEDET was consulted from the outset of this study and has been engaged throughout the project process.

Authority consultation included the following activities:

- Pre-application meeting held on the 06th of September 2023; and
- Submission of an application for environmental authorisation in terms of Section 26 of the EIA Regulations 2014 (as amended).
- Site visit conducted on 10 April 2024 with Ms J Mukhari and Ms M Malema from LEDET.

6.2 Consultation with Other Relevant Stakeholders

Consultation with other relevant key stakeholders will be undertaken through telephone calls and written correspondence in order to actively engage these stakeholders from the outset and to provide background information about the project during the Scoping and EIA process.

All relevant stakeholders were allowed an opportunity to comment on the draft consultation ESR and draft EIAR.

6.3 Site Notification

The EIA Regulations 2014 (as amended) require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates and at points of access or high through traffic. The purpose of this is to draw people's attention to the project and make them aware that they are able to play a role in the project.

A number of notices were placed at various noticeable locations (i.e. Steelpoort Post Office, Mapodile Library, Entrance to Sites 3B, 3C & 4B next to the R555, Site 5B fence next to the R555, Entrance to Site 2B, AGS Steelpoort Church and Tubatse Chrome Club) in the study area on 05 October 2023. (***Appendix E***).

6.4 Identification of Interested and Affected Parties

I&APs were identified utilising an existing database developed as a result of previous environmental studies undertaken in the study area and this database is being updated on an on-going basis. E-mails were sent to key stakeholders and other known I&APs on 05 October 2023, informing them of the studies for the project and indicating how they could become involved in the project.

The contact details of all identified I&APs were updated on the project database, which is included in ***Appendix E***.

6.5 Briefing Paper

A Background Information Document (BID) for the proposed project was compiled in English (***Appendix E***) and distributed to key stakeholders and prospective I&APs.

The aim of this document is to provide a brief outline of the application and the nature of the development. It is also aimed at providing preliminary details regarding the environmental study and explains how I&APs could become involved in the project.

The BID was distributed to all identified I&APs and stakeholders, together with a registration/comment sheet inviting I&APs to submit details of any issues, concerns or inputs they might have with regards to the project.

6.6 Open Day

A public open day was held on 09 April 2024 at the Tubatse Chrome Club, Steelpoort.

6.7 Advertising

An advert for the commencement of the public review of the draft consultation EIAR and meeting was advertised in the *Steelburger* on 21 March 2024 (***Appendix E***).

6.8 Comments and Responses Report

A Comments and Response Report (CRR) has been compiled with all comments and issues received and responded to, to date (***Appendix E***).

6.9 Public Review of the draft Consultation EIAR

The draft consultation EIAR was made available for authority and public review for a total of 30 days from 27 March – 30 April 2024.

The report was available at the following public locations within the study area, which are all readily accessible to I&APs:

- Mapodile Public Library;
- Burgersfort Public Library;
- The TFC Plant offices; and
- Electronically on the Royal HaskoningDHV Website: https://www.royalhaskoningdhv.com/en/countries/south-africa/environmental-reports

6.10 Final EIAR

The final stage in the EIA study entails the capturing of responses and comments from I&APs in order to refine the EIAR and ensure that all issues of significance are addressed. An electronic copy of the final EIAR will be sent to all registered I&APs.

7 Specialist Findings

The specialist assessment indicated in Table 7-1 have been undertaken as part of this EIA study.

Table 7-1: Specialist input into the EIR

Specialist Assessment	Reference
Agriculture	***Appendix F1***
Hydrology	***Appendix F2***
Freshwater	***Appendix F3***
Biodiversity	***Appendix F4***
Avifauna	***Appendix F5***
Heritage and Palaeontology	***Appendix F6***
Visual	***Appendix F7***

7.1 Hydrology

7.1.1 Floodline Assessment

7.1.1.1 Estimated Flood Return Periods

Flood peak flow for the non-perennial stream portion associated with the sub-catchments was estimated with the Rational Method[53] (RM) alternative 3, Standard Design Flood[54] (SDF) and Midgley & Pitman[55] (MIPI) Method. The SDF and Rational Method produced slightly higher flood peaks than the MIPI method, The geometric average of the methods was applied to the Hydrologic Engineering Centre's River Analysis System[56] (HEC-RAS) model. The floodline assessment is aimed at providing a worst-case inundation scenario to evaluate potential flooding risks. The peak flows presented are for the existing project setting are presented in Table 7-2 and Figure 7-1.

[53] *The rational method was developed in the mid-19th century and is one of the most widely used methods for the calculation of peak flows for small catchments (< 15 km^2). The formula indicates that Q = CIA, where I is the rainfall intensity, A is the upstream runoff area and C is the runoff coefficient. Q is the peak flow.* The third alternative uses the Design Rainfall software for South Africa.

[54] *The Standard Design Flood method was developed specifically to address the uncertainty in flood prediction under South African conditions. The runoff coefficient (C) is replaced by a calibrated value based on the subdivision of the country into 26 regions or Water Management Areas (WMAs). The design methodology is slightly different and looks at the probability of a peak flood event occurring at any one of a series of similarly sized catchments in a wider region, while other methods focus on point probabilities.*

[55] *The Midgley and Pitman method is an empirical method that relates peak discharge to catchment size, slope, and distance from the drainage point to the centroid of the catchment (Campbell, 1986). The MIPI method uses 10-unit hydrographs for 10 zones in South Africa. The method does not consider overland flow as a component separate from streamflow but considers only the total longest flow path.*

[56] *Hydrologic Engineering Centre's River Analysis System is a hydraulic programme designed to perform one-dimensional hydraulic calculations for a range of applications, from a single watercourse to a full network of natural or constructed channels.*

Table 7-2: Summary of design peak flows for the delineated sub-catchment (m³/s)

	Catchment	S1_1	S1_2	S1_3	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11
Method	**Return Period**	**Peak flow (m³/s)**												
RM (3)	1:20 year	0	0	0	93	82	68	73	25	66	52	26	2	8
	1:50 year	1	0	0	117	104	86	93	32	84	66	33	28	11
	1:100 year	1	0	0	140	124	102	110	38	100	78	40	34	13
SDF	1:20 year	0	0	0	46	37	38	38	13	30	18	18	15	7
	1:50 year	0	0	0	66	54	55	55	19	43	26	27	22	10
	1:100 year	0	0	0	83	97	70	70	24	54	33	35	29	13
MIPI	1:20 year	0	0	0	31	24	29	28	11	20	12	13	13	6
	1:50 year	1	0	0	43	34	41	39	15	28	16	18	16	9
	1:100 year	1	0	0	54	41	52	49	20	35	21	23	20	11
Geometric Mean	**1:20 year**	**0**	**0**	**0**	**51**	**41**	**42**	**43**	**16**	**34**	**22**	**18**	**16**	**7**
	1:50 year	**0**	**0**	**0**	**69**	**57**	**58**	**58**	**21**	**46**	**30**	**25**	**22**	**10**
	1:100 year	**1**	**0**	**0**	**86**	**71**	**72**	**72**	**26**	**57**	**38**	**32**	**27**	**12**

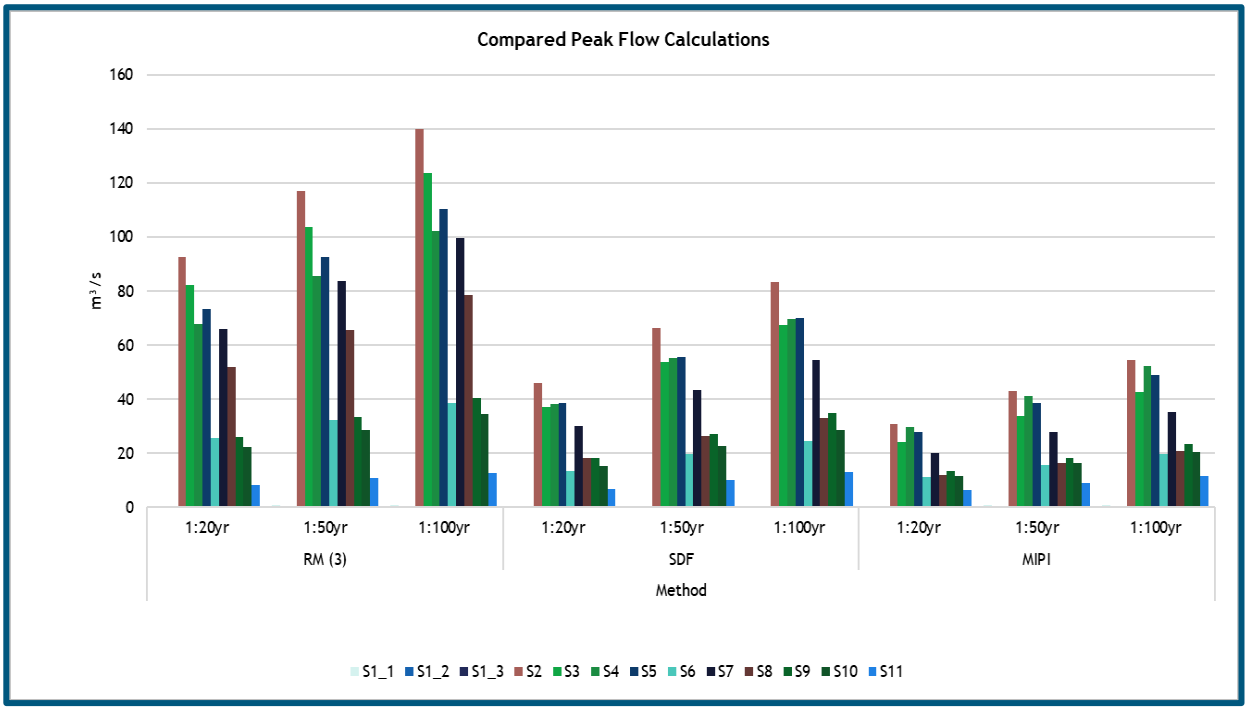


Figure 7-1: Comparison between three design peak flow methods

7.1.1.2 Post-development Peak Flows

Post-development peak flows will be higher due to the changes that will occur to the surface of the sub-catchments due to impervious arrays could lead to a higher concentrated runoff which would potentially increase the peak runoff to the nearest watercourse. The sub-catchments that will be impacted include S1_1-3, S6, S10 and S11. Table 7-3 summarises the change in peak flow after development.

Table 7-3: Summary of design peak flows for the delineated sub-catchment (m^3/s)

Catchment	S1_1	S1_2	S1_3	S6	S10	S11
Est. Impermeable/Permeability Area Change (%)	30	60	50	30	17	26
1:20 Year						
Initial Peak Flow (m^3/s)	0.44	0.09	0.10	25.38	15.72	7.13
Post Development Peak Flow (m^3/s)	0.58	0.15	0.16	33.00	18.39	8.34
1:50 Year						
Initial Peak Flow (m^3/s)	0.56	0.12	0.13	32.12	21.71	9.84
Post Development Peak Flow (m^3/s)	0.73	0.19	0.20	41.75	25.40	11.51
1:100 Year						
Initial Peak Flow (m^3/s)	0.67	0.14	0.16	38.33	27.16	12.31
Post Development Peak Flow (m^3/s)	0.87	0.22	0.24	49.83	31.78	14.40

7.1.1.3 Floodline Results

The Site 2 expansion areas are somewhat encroached upon by flood waters, especially in the area bordering a nearby quarry. The flood waters are mostly contained within the deep watercourse geometry and do not flow substantially wider than the channel banks. Floodlines associated with sites 3 to 5 indicate that the site 4 expansion is at a greater risk of flooding. This is due to the flood plain topography present and the R555 (and associated bridge) preventing faster flow. A small section of the site 3 expansion will also be affected by flood waters. Figure 7-2 and Figure 7-3 indicates the delineated floodlines for the project.

It is recommended that development is avoided within the 1:100-year floodline. Should development continue within the delineated floodlines, flood risk measures should be taken. Measures will be described in the stormwater management plan in section 7.1.2. Due to the space constraints of the project, the layout of the infrastructure has been placed within the 1:100 year floodline and is unavoidable, the stormwater interventions described in Section 7.1.2 have been proposed to be included in the detailed design to ensure that this risk is mitigated should a flood event occur.

Figure 7-2: Simulated floodlines for the tributary flowing adjacent to Site 2 and expansion sites

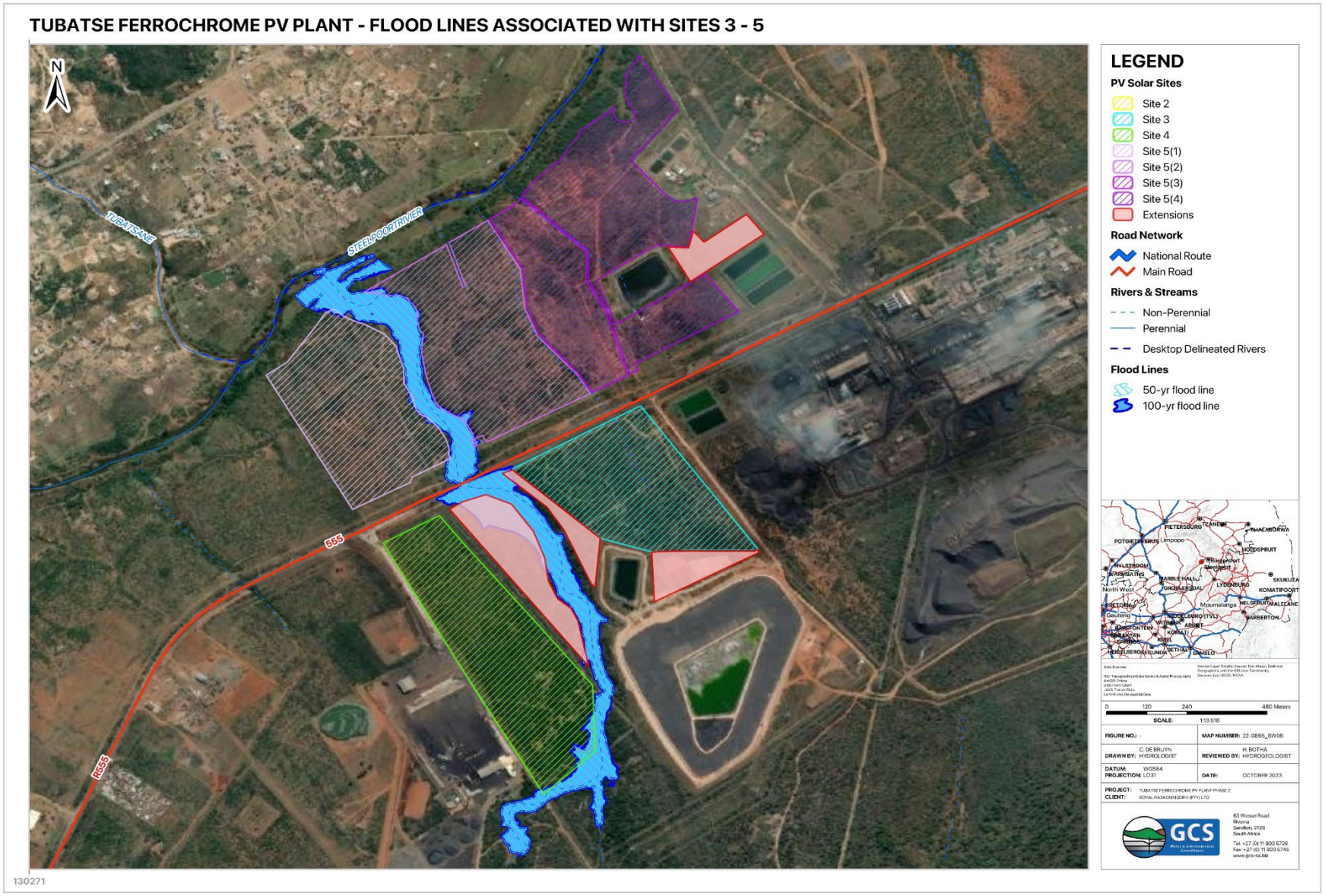


Figure 7-3: Simulated floodlines for the tributary flowing adjacent to Sites 3 to 5 and expansion sites

7.1.2 Conceptual Stormwater Management Plan

In accordance with the Best Practice Guideline - G1: Stormwater Management (2006)[57] the conceptual stormwater management plan (CSWMP) for the site will seek to achieve certain objectives based on a philosophy of protecting the environment from impacts. This is of utmost importance as the sedimentation of drainage streams should be minimised. This can be achieved using the following general guidelines:

- Clean and dirty water should be separated, and it should be ensured that all stormwater structures are designed to keep dirty and clean water separate and can accommodate a defined precipitation event.
- The clean water catchment area should be maximised, and clean water should be routed to a natural watercourse with minimal damage to that watercourse in terms of quantity and frequency of discharge.
- Dirty areas should be minimised, and runoff from these areas should be contained and treated for either reuse or release. Natural watercourses and the environment should be protected from contamination by dirty areas by ensuring that the dirty water cannot enter the clean water system by spillage or seepage.

A CSWMP generally aims to:

- Illustrate likely stormwater sub-catchments and preferential overland runoff flow paths.
- Determine likely dirty and clean water Hydrological Response Units (HRU).
- Provide water containment and diversion systems to prevent the mixing of clean and dirty water and prevent soil erosion and flooding.
- Attenuate stormwater back to the natural environment; and
- Maintain the downstream water quantity and quality requirements.

It should be noted that PV plants are generally considered to be clean areas as they do not introduce any contaminants to the surface which may pollute surface runoff. Therefore, all areas are deemed to be clean.

The CSWMP recommendations as laid out in the section below should be implemented as far as possible for the operational phase of the project:

- It should be emphasised that the CSWMP is intended for informational and planning purposes only. It is not a detailed engineering design and should not be used for construction or regulatory compliance purposes. The accuracy and effectiveness of the plan may be limited by assumptions, data availability, and site-specific conditions.
- The recommendations made in this report should be taken into account during the detailed design phase and water use authorisation process and should consult a qualified professional engineer or stormwater management specialist to finalise the SWMP.
- The stormwater measures are recommendations and are not strict requirements if an option is not deemed viable by the End Client or Competent Authority.

7.1.2.1 Site 2B Conceptual Stormwater Management Plan

Site 2 is located across the outflow of the catchments S9-11 with water courses running through the site. Therefore, the runoff will mostly flow towards the watercourse and be channelled via the non-perennial tributary towards the Steelpoort River. Overland runoff or sheet flow will occur from higher elevation to the south, in a general north to north-west direction. Nine (9) sub-catchments characterise the runoff generated upstream from the site that will create overland flow, and eventually flow towards the watercourse (Figure

[57] *DWAF, 2006. Best Practice Guideline G1 Storm Water Management, s.l.: s.n.*

7-4). These catchments are overall deemed clean in terms of pollutants, carrying only sediment from soil and bare areas such as roads as well as sediment from small-scale surface mining operations.

Flow directions in stormwater catchments

- Catchments S2_1 to S2_4:
  - These catchments characterise runoff generated for the area east to the non-perennial water course.
  - Runoff generated on these catchments will flow overland in a northern to north-western direction towards the dirt roads and railway north of the site.
- Catchment S2_5:
  - This catchment characterises runoff generated on the area between the two non-perennial streams and upstream of their confluence.
  - Runoff generated in this catchment will flow overland in a north-to-north-western direction towards the confluence.
  - The runoff will be captured by the watercourse.
- Catchments S2_6 to S2_9:
  - These catchments characterise runoff generated for the area west of the non-perennial watercourse.
  - Runoff generated on these catchments will flow overland in a general north-to-north-westerly direction and runoff will flow into the watercourse before it flows underneath the road and railway.

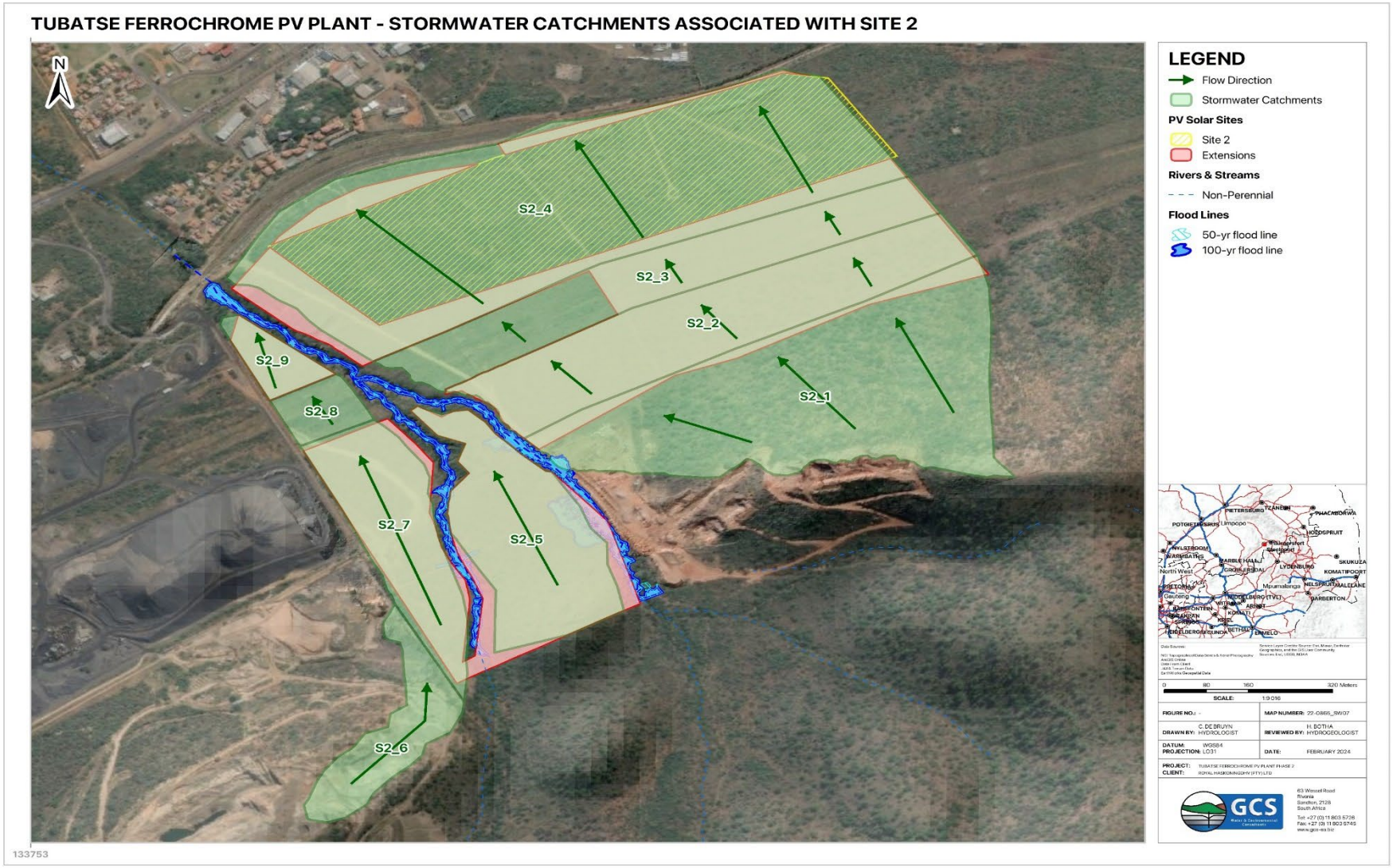
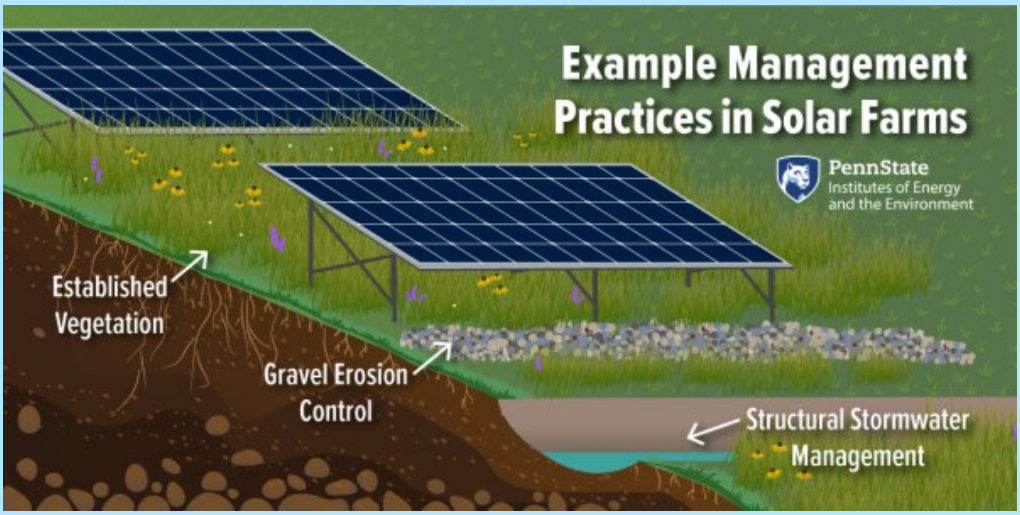


Figure 7-4: Stormwater catchment areas for Site 2B and expansion areas

Table 7-4 provides a description of the stormwater interventions for Site 2 and expansion areas.

Table 7-4: Stormwater interventions for Site 2 and expansion areas

Aspect	Description
Vegetated berm	The placement of vegetated berms with an upstream vegetated channel (trapezoidal) is recommended between catchments S2_1 and S2_2, as well as catchment S2_3 and S2_4 (Figure 7-6). This will ensure that runoff is routed away from internal access roads and release the runoff back into the environment. Release points should be equipped with riprap pads, to prevent erosion and dissipate the velocity of runoff. Depending on changes to the existing access road for the nearby quarry, the flow in the channel between S2_1 and S2_2 will have to be routed underneath the road to release runoff into the watercourse. A culvert is proposed to route water underneath the road, with a riprap pad or gabion mattress at the outlet.
Earth berm	Catchment S2_5 is susceptible to flooding near the eastern section. It is suggested that an earth berm of approximately 0.5m be constructed to ensure access road and panel mounting stability. The berm will ensure that the access road will not flood or create conditions which will disintegrate the integrity of the road. If this measure is implemented, the access road does not have to be moved out of the floodline (Figure 7-6).
Diversion berm	Diversion berms (vegetated) are suggested to the west of catchments. This will ensure that runoff generated upstream of the area will be routed along a road to the west of the site and prevent any sediment from this runoff (generated on stockpile areas) from entering the site. Flow routed along these berms and roads will be allowed to run into the watercourse before it flows underneath the railway (Figure 7-6).
Overhead Powerline	The engineering layout indicates that overhead powerlines will span the drainage lines from these catchments. It is not expected that the powerlines should have any adverse effects on the drainage lines. Depending on the distance the pylons are placed from the drainage lines and the associated river banks, care should be taken during construction to ensure that the pylons do not hinder the flow of water in the drainage line and that flow be sufficiently diverted, if necessary, until construction is completed. The base of the pylons should be protected against erosion from a possible flooding event (Figure 7-6).
Revegetation	Revegetation of areas underneath and around the panel arrays will greatly reduce the velocities of run-off prevent erosion and reduce sedimentation. It is also recommended that a gravel erosion control strip be placed underneath the lowest section of the panel where water will runoff as illustrated in Figure 7-5. This will ensure no erosion of the soil takes place and ensures stability at the base of the panel mounting. This should be in place while vegetation is in the process of establishing.

Aspect	Description
	 *Figure 7-5: Concept of gravel erosion control strips (McPhillips, 2023)*[58]

[58] *McPhillips, L., 2023. Maximizing hydrological and environmental benefits of solar farms. [Online] Available at: https://iee.psu.edu/news/blog/maximizing-hydrological-and-environmental-benefits-solar-farms*

Figure 7-6: Proposed stormwater infrastructure for Site 2 and expansion sites

7.1.2.2 Site 3 and Expansion Areas Conceptual Stormwater Management

Site 3 and expansion areas (3B and 3C) is located on the watershed between HRUs S1_1 and S6, seeing runoff flow bilaterally off the site. The western section of the site will flow towards the non-perennial watercourse, and the eastern section of the site will flow towards the R555 and be routed by culverts underneath the road. Overland runoff or sheet flow will occur from higher elevation in the south, in a general northwest direction. Five (5) sub-catchments characterise the runoff generated on the site that will create overland flow, and eventually flow towards the watercourse and road stormwater infrastructure. These catchments are overall deemed clean in terms of pollutants, carrying only sediment from soil and bare areas such as roads.

Flow directions in stormwater catchments

- Catchment S3_1:
  - This catchment characterises runoff generated on the eastern section of the site that will flow towards the R555.
  - Runoff will flow to the northeastern corner of the site and flow through two culverts underneath the R555 downstream to Site 5(3).
- Catchment S3_2:
  - This catchment characterises runoff generated in the area between the two dams present.
  - Runoff generated in this catchment will flow overland into the dam around which Site 3 is located and be captured.
- Catchments S3_3 to S3_4:
  - These catchments characterise runoff generated on the western section of the site that will flow west towards the non-perennial watercourse.
  - Runoff generated on these catchments will flow overland in a general north-to-north-westerly direction and runoff will flow into the watercourse before it flows towards the bridge on the R555.
- Catchment S3_5:
  - This catchment characterises the runoff generated upstream from the site to the east of the dam, which will flow via roads along the eastern boundary of the site towards the R555.

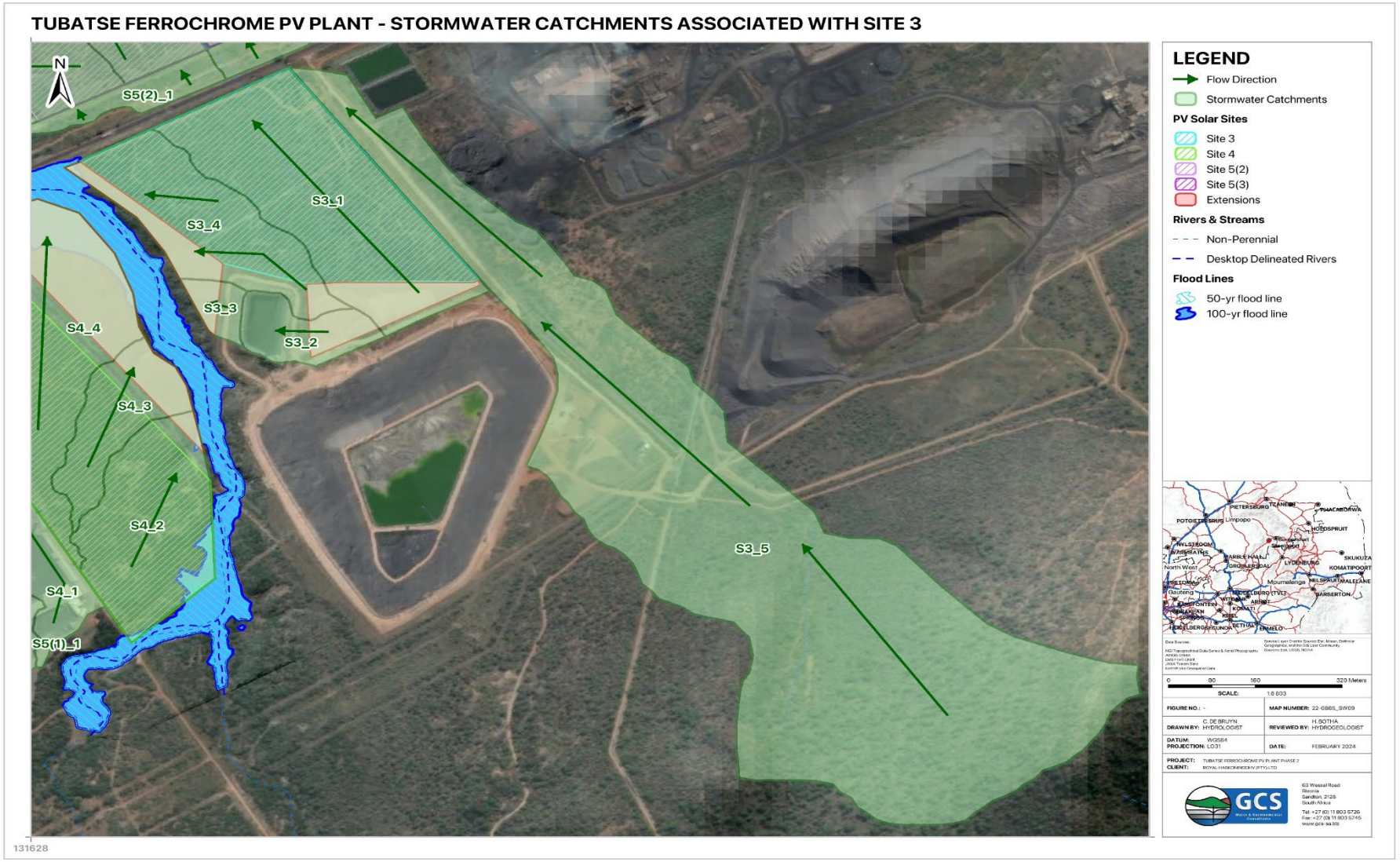


Figure 7-7: Stormwater catchment areas for Site 3 and expansion areas

Table 7-5 provides a description of the stormwater interventions for Site 3 and expansion areas.

Table 7-5: Stormwater interventions for Site 3 and expansion areas

Aspect	Description
Vegetated berm	The placement of a vegetated berm with an upstream vegetated channel (trapezoidal) is recommended along the eastern boundary of the site between catchments S3_1 and S3_5 (Figure 7-8). This will ensure that runoff is routed away from internal access roads and towards the culverts underneath the R555. Release points should be equipped with riprap pads, to prevent erosion and dissipate the velocity of runoff. During the previous study, the culverts were observed to be heavily silted, and it is recommended that they be cleared and maintained that way to ensure efficient performance during storm events. The culverts were less silted at the time the last site visit was conducted, but a sand mound was observed downstream of the culverts which would inhibit flow. The outflow should also be cleared along with any waste present.
Flood protection berm	A flood protection berm (Figure 7-8) of approximately 1m is suggested at the north-west corner of the site near the R555, the simulated floodlines indicated that during a 1:50-year and 1:100-year flood event, the water will likely inundate the southern bank of the road before flowing through. The berm will ensure that the access road will not flood or create conditions which will disintegrate the integrity of the road. If this measure is implemented, the access road does not have to be moved out of the floodline.
Panel arrays	Revegetation of areas underneath and around the panel arrays will greatly reduce the velocities of run-off prevent erosion and reduce sedimentation. It is also recommended that a gravel erosion control strip be placed underneath the panel arrays.

Figure 7-8: Proposed stormwater infrastructure for Site 3 and expansion areas

7.1.2.3 Site 4 and Expansion Areas Conceptual Stormwater Management

Site 4 and expansion areas is located in HRU S6 downstream of the confluence of two non-perennial drainage lines, seeing runoff flow in a general north to northeastern direction off the site towards the non-perennial watercourse. Four (4) sub-catchments characterise the runoff generated on the site and upstream that will create overland flow, and eventually flow towards the watercourse and R555 bridge (Figure 7-9). These catchments are overall deemed clean in terms of pollutants, carrying only sediment from soil and bare areas such as roads.

Flow directions in stormwater catchments

- Catchment S4_1:
  - This catchment characterises runoff generated upstream from the site on the adjacent operation to the southwest.
  - Runoff will flow in a north-western direction via dirt roads located along the south-western boundary of the site.
- Catchments S4_2 to S4_4:
  - These catchments characterise runoff generated on the site that will flow northeast towards the watercourse via overland flow.

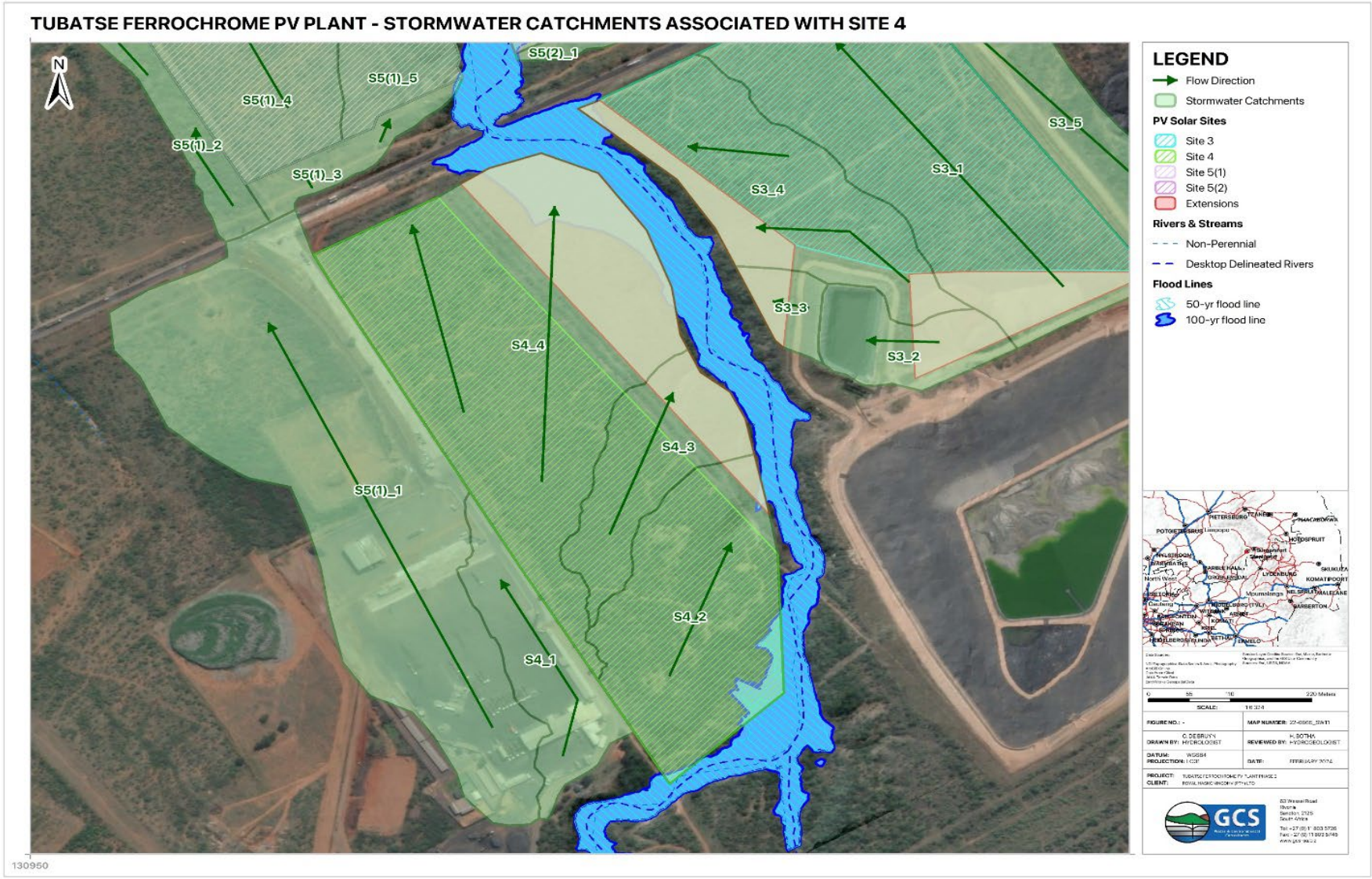


Figure 7-9: Stormwater catchment areas for Site 4 and expansion areas

Table 7-6 provides a description of the stormwater interventions for Site 4 and expansion areas.

Table 7-6: Stormwater interventions for Site 4 and expansion areas

Aspect	Description
Vegetated berm	The placement of a vegetated berm is recommended along the south-western boundary of the site to divert upstream runoff as illustrated in Figure 7-10, this will ensure that runoff is routed away from internal access roads.
Flood protection berm	A flood protection berm is suggested at the southeastern corner of the site near the confluence of the two non-perennial streams xx, the simulated flood lines indicated that during a 1:50-year and 1:100-year flood event, the water level will rise into the site. The berm should reach an elevation of approximately 783 mamsl, this will translate to a berm height ranging from 1.5m to 2m. Otherwise, the terrain should be lifted to form a platform for the panels to rise above the water course.
Concrete flood wall	The site 4 extension area is located within a large section of the inundation zone south of the bridge. A more robust approach will be required to protect the panels from flood damage. Something more akin to a concrete flood wall will be more viable as the structure should be approximately 3.5 to 4m in height or at an elevation of 779.21 mamsl and a berm of this size is not viable within the space constraints. The wall should have outlets to ensure that stormwater generated on-site can be released to the water course. An alternative recommendation would be to raise the panels higher on the mounting structures above the 1:50 or 1:100-year flood water elevation level to protect the panel face from waterlogging and to prevent debris within flood waters to damage the panel components. Proper insulation of other components should be ensured that may be exposed to flood waters.
Powerlines	The engineering layout indicates that overhead powerlines will span the drainage line starting from catchment S4_2 to S3_2. It is not expected that the powerlines should have any adverse effects on the drainage lines. Depending on the distance the pylons are placed from the drainage lines and the associated riverbanks, care should be taken during construction to ensure that the pylons do not hinder the flow of water in the drainage line and that flow be sufficiently diverted, if necessary, until construction is completed. The base of the pylons should be protected against erosion from a possible flooding event.
Panel arrays	Revegetation of areas underneath and around the panel arrays will greatly reduce the velocities of run-off prevent erosion and reduce sedimentation. It is also recommended that a gravel erosion control strip be placed underneath the panel arrays as previously discussed.

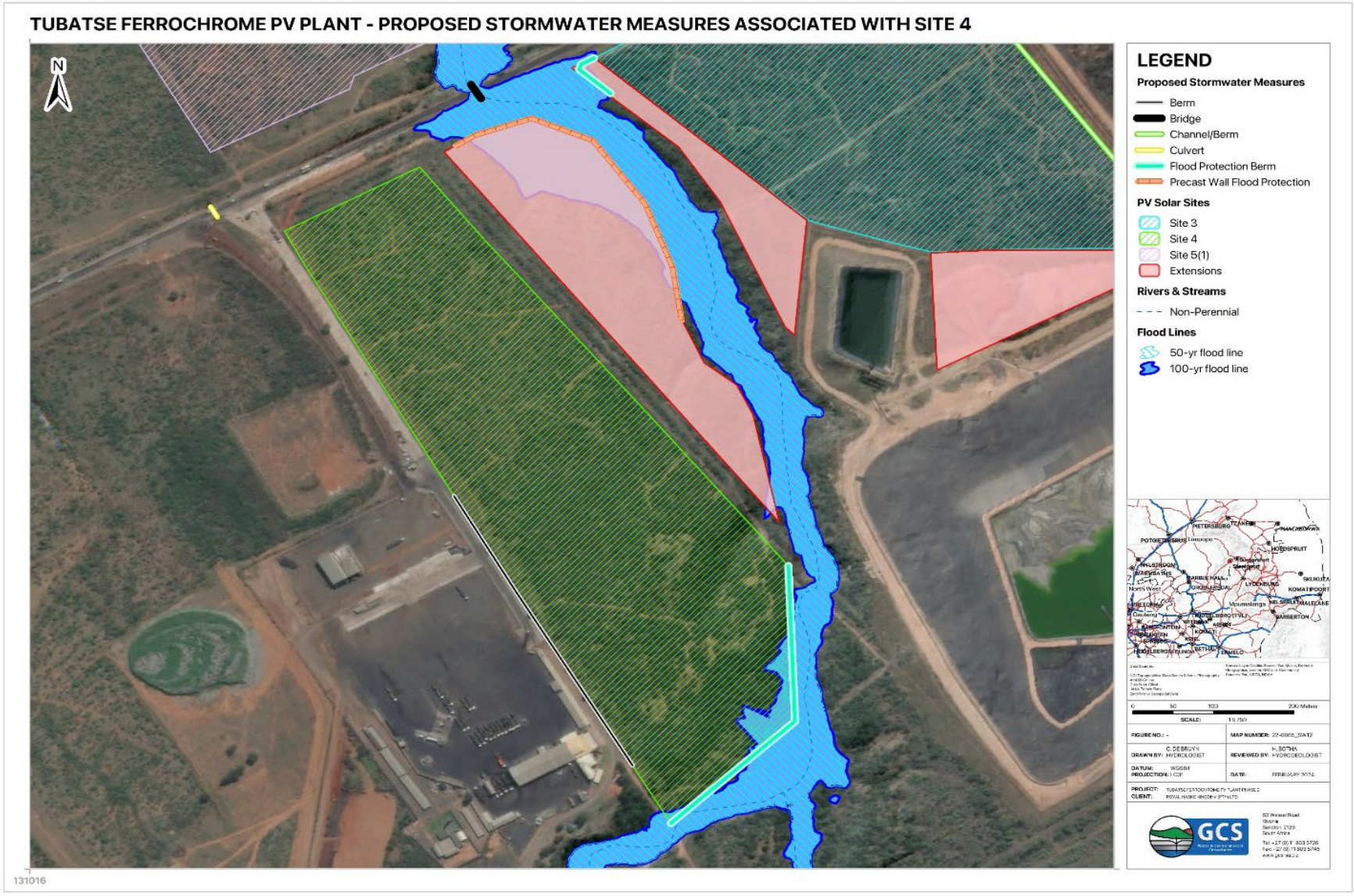


Figure 7-10: Proposed stormwater infrastructure for Site 4 and expansion areas

7.1.2.4 Site 5 and Expansion Areas Conceptual Stormwater Management

Site 5 and expansion areas is located between the R555 and the Steelpoort River, and west of the TFC Plant operation. The site will see drainage via the non-perennial water course, and overland runoff will flow in a general north-to-north-west direction.

Within the site boundaries, four drainage lines have been identified:

- Moving from the west side to the east is firstly the watercourse identified in the flood lines. This is a significant feature that comes into the site through a bridge on the R555 road.
- Then there is a minor drainage line that is only visible from 250 m upslope from the Steelpoort River.
- There is then a third drainage line that originates in Site 3 and crosses the R555 via a culvert and flows through Site 5 to the Steelpoort River.
- Finally, there is a drainage line originating at the existing water treatment facility and then running through the site to the Steelpoort River.

None of these drainage lines are perennial, all streams present with defined channels and the proposed conceptual SWMP will have to factor this into the design thereof.

Twenty-seven (27) sub-catchments characterise the runoff generated on the site and upstream that will create overland flow, and eventually flow towards the various drainage lines and Steelpoort River. These catchments are overall deemed clean in terms of pollutants, carrying only sediment from soil and bare areas such as roads (Figure 7-11).

Flow directions in stormwater catchments

- Catchment S5(1) _1 & S5(1)_2:
  - This catchment characterises runoff generated upstream from the site south of the R555, that will flow underneath the R555 via a culvert.
  - Runoff will then flow paradelle along the western boundary of Site 5(1) where it will flow into the site before discharging into the Steelpoort River.
- Catchment S5(1)_3 & S5(1)_4:
  - These catchments characterise runoff generated upstream and on the site that will flow northwest towards the Steelpoort River.
- Catchment S5(1)_5:
  - This catchment characterises runoff generated on the western section of the site that will contribute overland flow into the watercourse, before discharging into the Steelpoort River.
- Catchment S5(2)_1:
  - This catchment generates runoff upstream from the site north of the R555.
- Catchment S5(2)_2:
  - This catchment will have runoff flowing into the watercourse to the west.
- Catchments S5(2)_3 & S5(2)_5:
  - These catchments will generate runoff that will flow overland towards the Steelpoort River.
- Catchments S5(2)_4 & S5(2)_6:
  - These catchments will have runoff flowing into the drainage line to the east.
- Catchment S5(3)_1:
  - This catchment characterises the area between the R555 and Site 5(3).
  - Runoff generated upstream at Site 3 (S3_1 and S3_5) will flow via the R555 culverts onto the site and into the drainage line to the east.
- Catchments S5(3)_2 & S5(3)_3:
  - These catchments will have runoff flow towards the Steelpoort River.
- Catchments S5(4)_1 & S5(4) _2:

    - These catchments will generate runoff that will flow into the dam present on site.
- Catchments S5(4)_3 to S5(4)_5:
    - These catchments will generate runoff that will flow towards the expansion site between the two dams on site.
- Catchments S5(4)_6 - to S5(4)_13:
    - These sites will all see runoff flowing towards the Steelpoort River.

Figure 7-11: Stormwater catchment areas for Site 5 and expansion areas

Table 7-5 provides a description of the stormwater interventions for Site 5 and expansion areas.

Table 7-7: Stormwater interventions for Site 5 and expansion areas

Aspect	Description
Culverted watercourse	As per the original stormwater management plan conducted for the already authorised sites in Phase 1, most of the site will be left to drain freely into the nearest watercourse. It was concluded that the third drainage line should be augmented and formalised with a trapezoidal culvert.
Formalised channel	The fourth drainage line has a small catchment and is therefore predicted to receive small flows. This channel should be formalised into a trapezoidal-shaped cross-section, lined with grass. The grass lining is essential to prevent erosion. The channel will be 0.5 m deep, 0.5 m bottom width, with 1:2 side slopes.
Main channel	Due to the lower flood risk in the main channel than upstream from the bridge, no flood protection berms are recommended. This will allow runoff to freely drain into the watercourse as per natural conditions.
Revegetation	Revegetation of areas underneath and around the panel arrays will greatly reduce the velocities of run-off prevent erosion and reduce sedimentation. It is also recommended that a gravel erosion control strip be placed underneath the panel arrays as previously discussed.

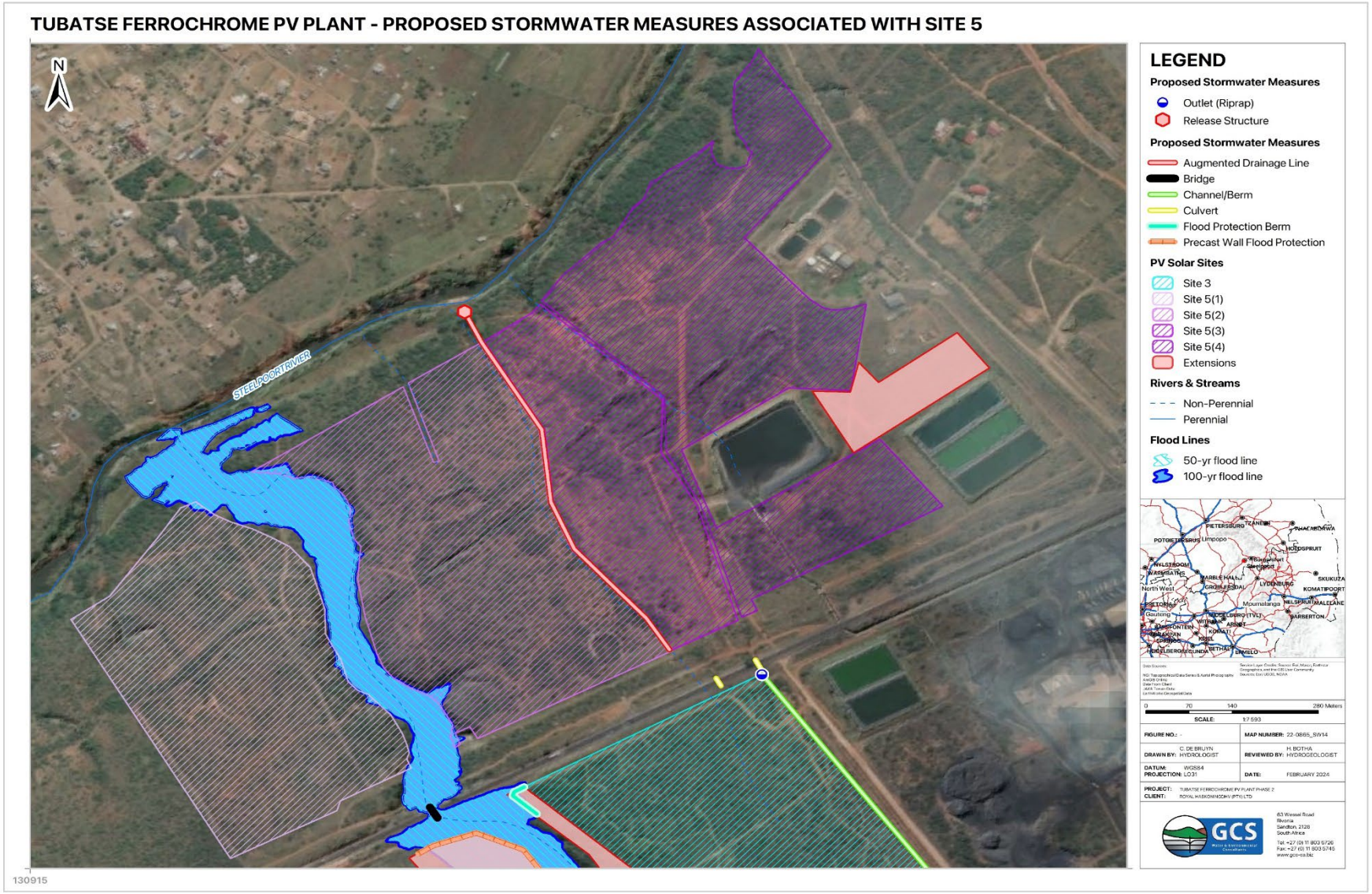


Figure 7-12: Proposed stormwater infrastructure for Site 5 and expansion areas

7.2 Freshwater

The dashboard-style tables (Table 7-8 and Table 7-9) below summarises the findings of the field verification in terms of relevant aspects (hydrology, geomorphology, and vegetation components) of freshwater ecology of the potentially directly affected freshwater ecosystems.

Table 7-8: Summary of the assessment of the drainage line and tributary in the vicinity of Site 2B

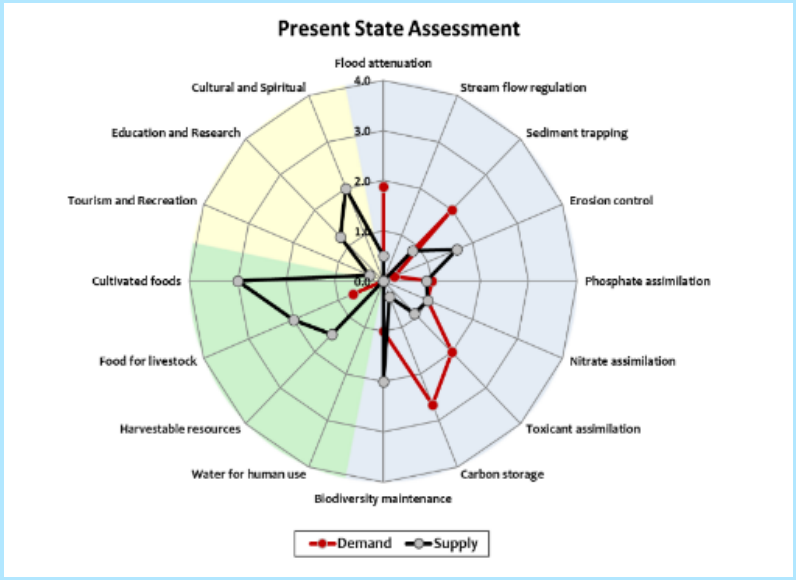


Figure 7-13: Ecological and socio-cultural service provision graph

Figure 7-14: Representative photographs of the non-perennial rivers with riparian vegetation

Top left: A shallow channel within the upper part of the reach that has incised into the underlying bedrock;
Top right: View into the deeply incised macro channel in the lower parts of the reach that support areas of dense woody riparian vegetation;
Bottom left: Vegetation clearing from the non-marginal parts of the riparian zone along the multiple powerline servitudes that has left the substrate exposed and vulnerable to erosion; and

	Bottom right: the furthest downstream part of the reach of the drainage line just upstream of the road and rail servitude that displays a high density of alien invasive plants.
Ecoservice provision	**Present Ecological State (PES) Discussion**
Cultivate Foods– Moderately Low, All other services – Low to Very Low The reach of the drainage line and its tributary that have been assessed display a generally very low degree of ecological service provisioning. The only service provisioned to more than a low degree is cultivated foods, but this relates to supply more than demand. The overall low degree of ecosystem service provisioning is due to the highly channelised nature of the drainage line and its tributary, and the nature of the hydrology of the features which through their highly episodic nature offer little to no hydrological regulating services. The drainage lines are not designated as significant freshwater features in a bioregional conservation planning context. The drainage lines act as local movement corridors in a relatively largely transformed landscape but the hard barrier presented by the road and railway servitude at the downstream end of the reach significantly affects the links between the reach and the further downstream reaches. The wetland is in an area that is accessible and thus may be locally important for livestock grazing of cattle owned by nearby communities, but this is the only measurable socio-economic function provided.	PES Category: C The catchment of the drainage line and the tributary are overall in a natural condition, being located a hilly terrain that is naturally covered in dense woodland, however significant parts of the catchment area have been transformed by either mining activities or by slag dumps associated with the smelter. Thus, the patterns and timing of flows from the catchment into the drainage lines are expected to be partly modified with a certain loss of catchment yield expected. Much of the reach of the drainage line and its tributary in the area assessed appears to consist of natural vegetation, with the steep vertical banks of the drainage line prohibiting access of people and livestock, but a large part of the reach assessed has been significantly vegetatively altered by the removal of all woody vegetation from the non-marginal parts of the riparian zone, resulting in exposure of substrate and subsequent development of rill and gulley erosion in these areas. At the furthest downstream parts of the reach the drainage line flows under an access road and a railway servitude, with the freshwater habitat in the footprint of these two linear features having been completely transformed.
Ecological Importance and Sensitivity (EIS) discussion	**Recommended Ecological Class (REC) Category, Recommended Management Objective (RMO) and Best Attainable State (BAS)**
EIS Category: Low The EIS of the reach of the drainage line and its tributary in the study area has been assessed to be “Low”, with the only notable aspect of EIS being its ecological importance in a biodiversity support context, by acting as a local faunal and biota movement corridor. Hydro-functional importance (i.e., provisioning of services such as flood attenuation, sediment trapping, phosphate, nitrate and toxicant assimilation and erosion control) as supplied by the drainage lines is of much lower significance due to their hydrological characteristics as highly episodic features and as exacerbated by the highly incised channel. The reaches are largely limited in terms of socio-cultural services with only cattle grazing along parts of the reach being noted in terms of socio-economic service provision.	REC Category: C RMO: Maintain BAS: C (Maintain) Since the reach has been assessed to be in a partly modified state with a low EIS rating, the ecological condition of the drainage lines must be maintained. This entails that land use change in the catchment of the reach and within the reach itself should carefully consider the impact on the drainage lines to ensure that the ecological state does not become further degraded. Accordingly, the recommendations made in Section 7 of the Freshwater Assessment (*Appendix F3*) are important to ensure that realisation of the REC.

Watercourse drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota)	
The drainage line and its tributary represent one of the larger tributary drainage lines of the Steelpoort River in the wider area surrounding the TFC plant having a slightly smaller catchment than the drainage line located to the south-west that drains between Sites 3 and 4. Like that drainage line, the Site 2B drainage line and its tributary rise in the hilly terrain to the east of the plant. Due to the relatively low rainfall and highly rocky nature of the substrate, overland flows that feed the drainage lines are only expected to generate episodic flows of short duration within the local drainage features in the landscape. The drainage line and its tributary are both highly incised, with the lower parts of the reach being characterised by very steep banks and a deep channel that has cut into the underlying bedrock. The dual factors of the elevated moisture levels associated with the drainage line and the protection offered by the steep macro channel sides has allowed the development of dense woody thickets that persist along parts of the reach. Where the channel could be accessed in the less incised upper parts of the reach, the channel bed was noted to be characterised by gravelly alluvial material. The reach was noted to be mostly geomorphologically stable with the only areas of erosion noted being along the powerline servitudes that cross the drainage line as well as the downstream reaches of the tributary. Rill and gulley erosion have developed due to the exposure of substrate to sunlight and to livestock due the removal of woody vegetation by Eskom in the powerline servitudes. In other parts of the reach assessed the combination of bedrock outcropping and a dense covering of woody vegetation prevent the further development of erosion. No surface water was present to assess surface water quality. As there is no wetland or aquatic habitat present within the reach no biota that is dependent on wetland or aquatic habitat is likely to be present within the reach. Rather the riparian vegetation is expected to be characterised by a similar biotic assemblage to the residual areas of thicket vegetation in the catchment of the reach.	
Extent of modification anticipated	The proposed solar arrays will encroach on the immediate catchment of the reach assessed, although the proposed 20m development exclusion buffer will remain undeveloped. Although not yet developed, the Phase 1 solar layout will be developed in part of the catchment of the lower part of the reach and thus it can be assumed that runoff and recharge from this part of the drainage line's catchment will be altered. While not physically affecting the drainage line and its delineated riparian habitat the Phase 2 development parcels that are located close to the drainage line will potentially further affect runoff and recharge to the drainage line. In this context the management of stormwater in both the construction and operation phases will be key to mitigating the impact of the proposed Phase 2 solar arrays as indicated in Section 7.1.2 above. An overhead powerline is proposed to cross the drainage line and its tributary in two locations, but the drainage line should be able to be singly spanned, thus ensuring no direct impacts on the drainage line.
Risk Assessment Outcome & Business Case	
LOW	As no part of the delineated extent of the riparian zone of the drainage line, its tributary and their associated 20m non-development buffer areas are proposed to fall within the solar array footprint, no direct impacts are envisaged, hence a low degree of risk is associated on these freshwater ecosystems with the development of the Site 2B land parcels. Due the nature of solar array development and construction that entails the likely complete clearing of all vegetation and in many cases bulk earthworks for levelling terrain, the runoff from the areas in the area footprint is likely to be permanently altered and the correct management and mitigation of stormwater is important to ensuring that indirect stormwater-related impacts do not adversely affect the downgradient drainage lines. Additionally, it is vitally important that the integrity of the non-development buffer area outside of the delineated riparian boundaries be kept intact with an appropriate vegetation basal cover throughout the lifespan of the development.

Table 7-9: Summary of the assessment of the drainage line and tributary in the vicinity of Site 3B, 3C and 4B

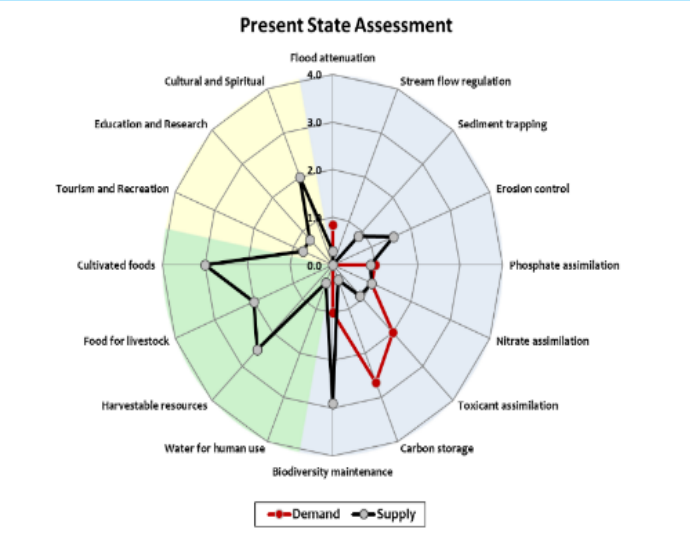


Figure 7-15: Ecological and socio-cultural service provision graph

Figure 7-16: Representative photographs of the non-perennial rivers with riparian vegetation

Top left: The channel and riparian zone in the northern, furthest downstream parts of the reach near the R555 road;
Top right: View downstream along a part of the reach where bedrock outcrops in the riparian zone;
Bottom left: Cobble bed channel bed with flanking riparian vegetation; and
Bottom right: Flow within the channel in October 2022 emanating from the discharge from the upstream Tubatse Dam.

Ecoservice provision	PES Discussion
Biodiversity Maintenance – Moderate Cultivated Foods – Moderately Low Harvestable Resources – Low all other services – Very Low	PES Category: B/C The catchment of the drainage line is largely natural, being located in mountainous undeveloped terrain in which the natural vegetation has been largely retained. Thus, the patterns and timing of flows from the catchment into the drainage line is expected to be largely natural. However, the Tubatse Dam is located upstream of the reach

The most important aspect of the ecoservice provision relates to biodiversity maintenance. Although not assessed to be provisioned to more of a moderate degree, the reach and the wider drainage line provides an important local ecological movement corridor between the downstream Steelpoort River and the hilly largely undeveloped terrain to the south. Freshwater-related biodiversity maintenance is limited by the absence of perennial flows in the drainage line. The supply of most provisioning services (e.g. food for livestock and harvestable resources) is much greater than the demand. Conversely the demand for certain regulating services is greater than the ability of the drainage line to provide these due to the absence of palustrine wetland habitat and the generally episodic nature of the drainage line.	and accordingly prevents natural runoff from reaching the downstream reaches. The Tubatse Dam is fed by water extracted from the Steelpoort River and water is periodically released from the dam, as observed at the end of the dry season in early October 2022. This management of flow releases from the dam has altered the natural seasonal profile of the drainage line. The reach of the drainage line in the study area is located within an access restricted area and accordingly the riparian vegetation has not been altered by land use-related degrading factors such as overgrazing and woody vegetation removal The riparian vegetative state of the drainage line is accordingly largely natural, however the marginal zone of the drainage line is expected to reflect a slightly altered vegetative composition in line with the altered hydrological regime with a suspected increase in the abundance of hydrophytes, in particular the sedge *Cyperus sexangularis.* The geomorphological state of the drainage line was noted to be highly stable with no active erosion noted.
EIS discussion	**REC, RMO and BAS**
EIS Category: Low The EIS of the reach of the drainage line and in the study area has been assessed to be “Low”, with the only notable aspect of EIS being its ecological importance in a biodiversity support context and at a landscape scale, by acting as a local faunal and biota movement corridor and being located in an access restricted area with riparian vegetation in a largely natural state. Hydro-functional importance (i.e., provisioning of services such as flood attenuation, sediment trapping, phosphate, nitrate and toxicant assimilation and erosion control) as supplied by the drainage line is of lower significance due to its hydrological characteristics as a naturally highly episodic feature, but the reach provides an important local source of water to biota during periods in which flows are released from the upstream Tubatse Dam. The reach is largely limited in terms of socio-cultural function due to its location in an access restricted area.	REC Category: B/C RMO: Maintain BAS: B/C (Maintain) Since the reach has been assessed to be in a largely natural to partly modified state with a low EIS rating, the ecological condition of the drainage line must be maintained. This entails that land use change in the catchment of the reach and within the reach itself should carefully consider the impact on the drainage line to ensure that the ecological state does not become further degraded. Accordingly the recommendations made in Section 7 of the Freshwater Assessment (*Appendix F3*) are important to ensure that realisation of the REC.
Watercourse drivers and receptors discussion (hydraulic regime, geomorphological processes, water quality and habitat and biota)	
The drainage line is characterised by a relatively large catchment that extends into the mountainous undeveloped area to the south of the plant complex. Due to the relatively low rainfall and highly rocky nature of the substrate, overland flows that feed the drainage lines are only expected to generate episodic flows of short duration. As detailed above the Tubatse Dam located upstream of the reach has altered the hydrology of the reach assessed by capturing flows from the upper catchment and then by being associated with periodic discharges of abstracted water into the downstream reach. These factors have altered the hydrology of the reach by creating extended periods of flow in the naturally episodic system that do not correlate to periods of rainfall.	

	The drainage line drops sharply in elevation from the Tubatse Dam to the lower-lying reaches in the vicinity of the study area at the interface between the Steelpoort Valley footslopes and the valley bottom. The reach assessed occurs in this setting and although it is characterised by a shallower longitudinal profile than the upstream reaches is nonetheless characterised by steep drops in elevation along parts of the reach, particularly where the drainage line runs across an outcropping of highly resistant bedrock that forms a small waterfall when the drainage line is flowing. Most of the reach of the drainage line is characterised by a bedrock base and in many places the sides of the narrow thread channel that characterises the reach are comprised of rock. Despite the prevalence of bedrock along the reach a narrow channel bed is present that is characterised by a mix of gravel and cobbles. The dominance of bedrock largely limits erosion which is absent along the reach. The reach is naturally characterised by a woody riparian zone with large trees located along the entire length of the reach. As described above the marginal zone is largely characterised by graminoids with a dense grassy understorey and *Cyperus sexangularis* being dominant along pools and on the margins of the active channel. At the time of the original assessment of the drainage line (in support of the Phase 1 Solar Development EIA) no surface water was present to assess surface water quality, but observations at other times when the drainage line was flowing revealed a high degree of algal growth in the flowing water which is suggestive of a very high nutrient load and low levels of oxygen in the water discharged from the dam. As there is no permanent wetland or aquatic habitat present within the reach no biota that is dependent on wetland or aquatic habitat is likely to be present within the reach. Rather the riparian vegetation is expected to be characterised by a similar biotic assemblage to the residual areas of thicket vegetation in the catchment of the reach.
Extent of modification anticipated	The proposed solar arrays on Sites 3B, 3C and 4B will encroach on the immediate catchment of the reach assessed, although the proposed 20m development exclusion buffer will remain undeveloped. Although not yet developed, the Phase 1 solar layout (in the form of the already approved Sites 3 and 4) will be developed in part of the immediate catchment of the reach and thus it can be assumed that runoff and recharge from this part of the drainage line's catchment will be altered. While not physically affecting the drainage line and its delineated riparian habitat the Phase 2 development parcels that are located close to the drainage line will potentially further affect runoff and recharge to the drainage line and will further reduce a natural buffer of vegetation that would have been retained in the Phase 1 development. In this context the management of stormwater in both the construction and operation phases will be key to mitigating the impact of the proposed Phase 2 solar arrays as indicated in Section 7.1.2 above. An overhead powerline is proposed to cross the drainage line and its tributary in two locations, but the drainage line should be able to be singly spanned, thus ensuring no direct impacts on the drainage line.
Risk Assessment Outcome & Business Case	
LOW	As no part of the delineated extent of the riparian zone of the drainage line, its tributary and their associated 20m non-development buffer areas are proposed to fall within the solar array footprint, no direct impacts are envisaged, hence a low degree of risk is associated on these freshwater ecosystems with the development of the Site 2B land parcels. Due the nature of solar array development and construction that entails the likely complete clearing of all vegetation and in many cases bulk earthworks for levelling terrain, the runoff from the areas in the area footprint is likely to be permanently altered and the correct management and mitigation of stormwater is important to ensuring that indirect stormwater-related impacts do not adversely affect the downgradient drainage lines. Additionally, it is vitally important that the integrity of the non-development buffer area outside of the delineated riparian boundaries be kept intact with an appropriate vegetation basal cover throughout the lifespan of the development.

7.2.1 Freshwater Buffers

In 2023 Scientific Aquatic Services was appointed by Royal HaskoningDHV on behalf of Samancor Chrome Ltd to undertake an assessment/refinement of the freshwater ecosystem buffers on certain of the PV Plant development sites at the Tubatse Solar PV Plant (Phase 1). SAS accordingly applied the Buffer Zone Guidelines for Wetlands, Rivers and Estuaries (MacFarlane and Bredin, 2017)[59] to determine whether an altered freshwater buffer could be accommodated. The scientific buffer Guideline tool was applied to the two freshwater ecosystems that are located on or in close proximity to three (3) of the Phase 1 development sites – Sites 3,4 and 5:

- The Steelpoort River which drains to the north of the northern boundary of Site 5; and
- The non-perennial drainage line that drains northwards between Sites 3 and 4, and to the north of the R555 provincial road through Site 5 (before flowing into the Steelpoort River).

The results of the study designated a 20m development exclusion buffer to the two freshwater systems. The outcomes of the study can be applied to the current Phase 2 EIA phase freshwater study. Whilst not located in close proximity to any of the Phase 2 development sites, the Steelpoort River is partly located in the investigation area, but the non-perennial drainage line that runs between Sites 3 and 4 is located in relatively close proximity to Sites 3B, 3C and Site 4B. Accordingly the buffers can be applied to this study. The drainage line and tributary draining to the south-west of the Phase 1 Site 2 and which drains between certain of the newly proposed Site 2B development parcels was not assessed in the buffer refinement study, but as detailed in Section 4.2 above, these drainage lines have very similar characteristics to the drainage between Sites 3 and 4 and thus the 20m non-development buffer has been extrapolated to the Site 2 drainage lines.

Table 7-10 details the results of the refined buffer assessment.

Table 7-10: Development exclusion buffers as recommended by the buffer tool for the Steelpoort River and the Site 3,4 and 5 drainage line

Freshwater Ecosystem	Construction phase buffer	Operational phase buffer	Final aquatic impact buffer
Steelpoort River	20m	20m	20m
Drainage Line – Sites 3,4 and 5	20m	20m	20m

The non-development buffers are indicated in Figure 7-17 and Figure 7-18 below.

[59] *Macfarlane, D. & Bredin, I., 2017) Buffer Zone Guidelines for Wetlands, Rivers and Estuaries. Part 1: Technical Manual.*

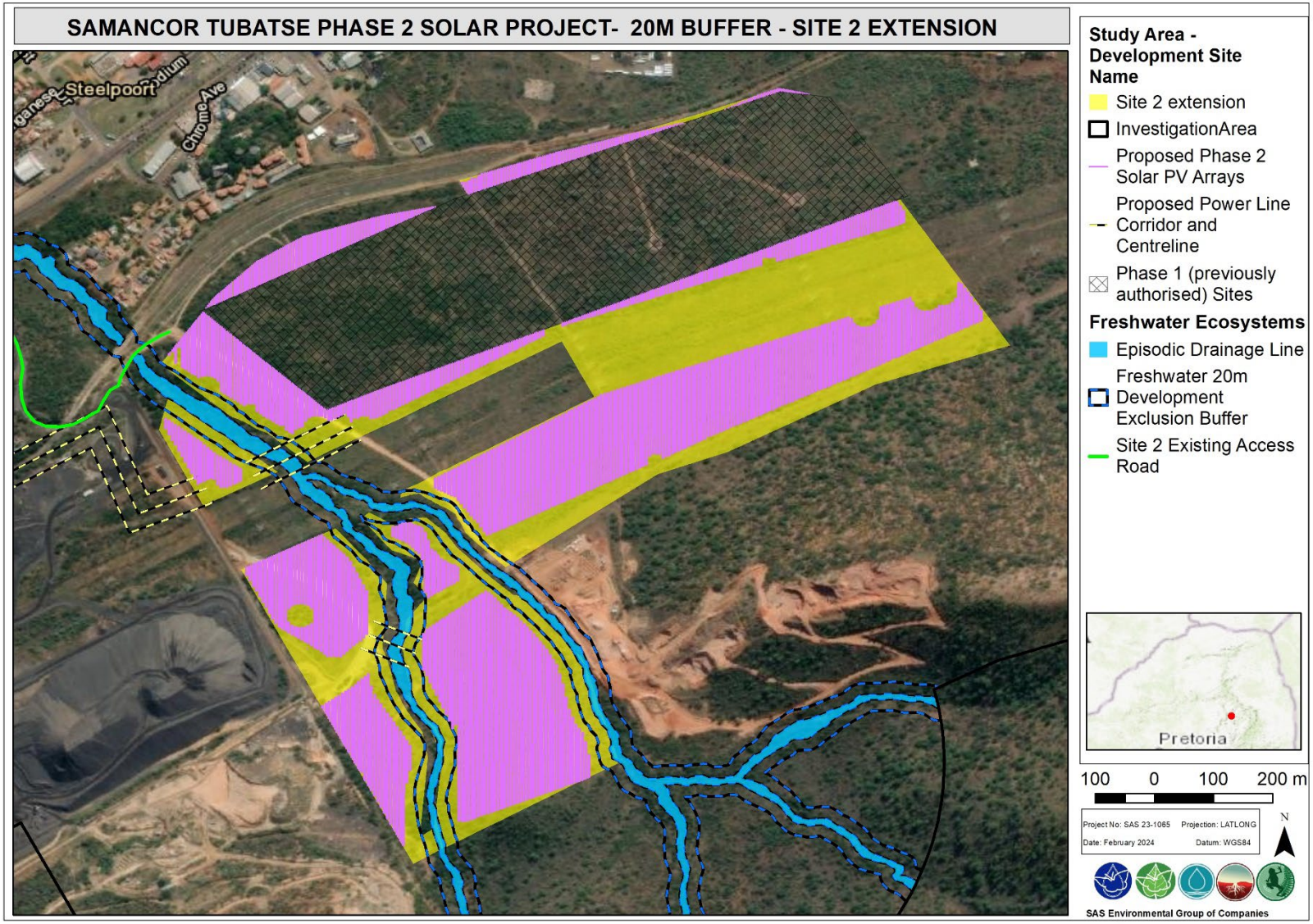


Figure 7-17: 20m development exclusion buffer of freshwater ecosystems in the vicinity of Site 2B

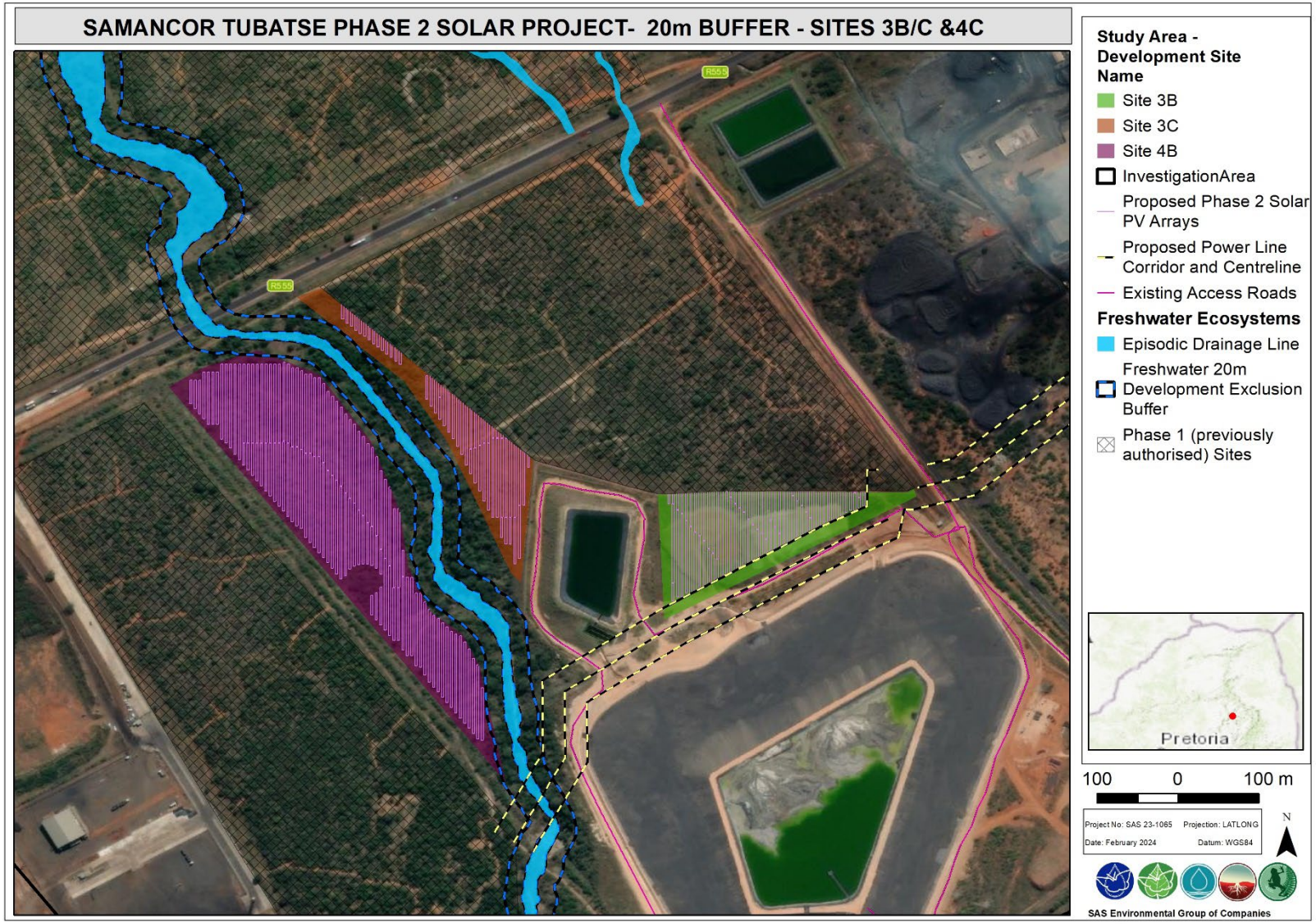


Figure 7-18: 20m development exclusion buffer of freshwater ecosystems in the vicinity of Sites 3B/C and 4B

7.3 Biodiversity

7.3.1 Floristic Sensitivity

Section 5.7.7 indicates the broad-scale habitat types noted within the site, the following section provides a description of the habitat types and the corresponding floristic sensitivities.

7.3.1.1 Artificial Impoundments

A number of artificial impoundments were constructed as part of the existing operations. As these areas comprise no natural vegetation, they were excluded from the surveys and a low floristic sensitivity was ascribed.

7.3.1.2 Deteriorated Open Shrubland Types

The various types of (anthropogenic) land use activities represent the major developmental force for this habitat type, typically causing immediate direct as well as medium-term indirect impacts that affected the status of extensive portions of the regional shrubland types, both compositionally as well as structurally. Most of these areas are situated in the Sekhukhune Plains Bushveld and is geographically accessible from the nearby settlements and therefore intensively uses for harvesting of natural resources as well as for grazing purposes. The dominant floristic attributes of these parts therefore no longer correlate to the regional ecological types, although a measure of correlation in terms of composition is still noted. Activities such as bush clearance within powerline servitudes and recent and historic surface disturbances from industrial and residential land use activities resulted in an altered and dynamic/ transitional floristic status, ultimately rendering the floristic status of these parts compromised and poor.

The floristic nature of these parts is highly variable, varying between areas where the woody layers appear depleted and shrubby, generally conforming to (deteriorated) open savannoid types, to areas where a secondary development of the woody layer is present, but with a composition that comprises mostly microphyllous (*Acacia* and *Dichrostachys*) type indigenous encroacher species and not the typical broad-leaf species that are encountered in natural shrubland of the immediate regions. Similarly, the herbaceous and grass layers exhibit a low species richness and diversity and is generally dominated by poor quality *Aristida* species. The depleted and deteriorated nature of the herbaceous stratum also strongly reflects the severity and persistently high grazing pressure to which these parts are often subjected. Coupled with a poor fire management regime, the poor (and atypical) composition of the herbaceous and woody strata ultimately renders the floristic sensitivity of these parts' medium-low (Figure 7-19 and Figure 7-20). It was also noted that conservation of important species occur at considerably lower abundance levels in these parts.

7.3.1.3 Drainage Lines and Variable Shrubland Banks

Apart from the prominent Steelpoort River that is situated further to the north of the sites, several small and medium sized (non-perennial) drainage lines are noted in the study area. These features generally drains northwards into the Steelpoort River. Although these areas are generally excluded from the proposed development, minor (indirect) impacts could potentially result in adverse effects on these features, such as erosion, siltation, etc.

The drainage line situated between Sites 3 and 4 and across Site 5 is a significant feature; the width is in excess of 50m in places and the depth may exceed 5m. This drainage line is characterised by deeply incised (sometimes eroded) banks and a wide, flat and clayey stream bottom from which the overlying sandy

layers have been removed. Vegetation of the banks reflect the surrounding (terrestrial) variable woodland types and not necessarily a mesic type, while the wide streambed is characterised by a secondary and transitional climax sere that features prominent and diverse herbaceous and woody species, comprising of trees and shrubs that is able to survive periodic flooding. It is thought that anthropogenic development of the wider area has resulted in severe alteration of the flow patterns within this area; ultimately ameliorating the severe nature of flood events and therefore facilitating the formation of a transitional climax vegetation layer. Evidence of erosion is noticeable from the banks of this feature. *Spirostachys africana* (Tamboti) is a characteristic tree species that is strongly associated with only the streambanks, corresponding to the temporary wet conditions of the streambanks, and parts where soils are characterised by slightly higher clay content.

The flora of these drainage features strongly reflect the surrounding variable shrublands, appearing locally deteriorated, notably the larger drainage line between Sites 3 and 4. Although likely to be ecologically more significant, particularly the larger drainage line, the floristic sensitivity is not considered to be high and was ascribed a medium-high floristic sensitivity (Figure 7-19 and Figure 7-20). No specific floristic feature of importance or sensitivity is associated with these features, and protected and conservation important species only occur sporadically within these features at lower abundance values compared to the surrounding variable shrubland.

7.3.1.4 Steelpoort River, Tall Closed Riparian Banks and *Phragmites* Levees

The perennial Steelpoort River and associated tall and dense wooded banks, as well as the seasonally inundated *Phragmites* levees, form a distinctive topographical and ecological feature of the area. While macro elements of this unit, such as the large trees and (southern) riverbanks, are considered comparatively natural, the undergrowth, levee areas, and smaller topographical features exhibit significant evidence of deterioration from high utilisation and resource plundering (informal sand mining practices). Numerous and prominent weeds and invasive species, poor water quality, high grazing pressure and poor fire management resulted in a moderately deteriorated status of this unit.

The Steelpoort River ecosystem represents a system that has restricted presence on a wider scale and could therefore be considered ecologically sensitive. However, no floristic aspects of particular importance, and or species of conservation importance was recorded from this unit, a medium-high floristic sensitivity is thus ascribed (Figure 7-19).

7.3.1.5 Tall Closed Riparian Bushland

Terrestrial woodland habitat that is situated in proximity to the Steelpoort River is characterised by a prominent and dense layer of tall '*Acacia'* vegetation, but also comprising other woody species as well as a well-developed herbaceous stratum that includes a high occurrence of species that are strongly correlated to the wider terrestrial habitat types (variable woodland), such as *Aloe* species and the grasses *Aristida diffusa, A. rhiniochloa, Digitaria eriantha, Eragrostis capensis, Perotis patens* and *Stipagrostis hirtigluma.*

The prominent *Vachellia* component reflects a higher clay content of the deeper soils on lower topographical positions, ultimately rendering the vegetation 'sweet' and more palatable compared to surrounding habitat that comprise more sandy soils. The dense nature of the vegetation results in poor access for grazing animals, providing some protection against severe grazing pressure, although the ground layer appears depleted and open in parts of this unit, mostly attributed to periodic flooding and localised surface erosion.

The sporadic presence of the protected tree *Balanites maughamii* is noted in this unit, and also because of the association with the nearby riparian habitat and a comparatively natural status, albeit not pristine, a medium-high floristic sensitivity is ascribed to these parts of the site (Figure 7-19).

7.3.1.6 Closed Mixed Thicket and Bushland

Isolated parts of the sites comprise particularly dense (closed) thickets and bushland where the cover of shrubs and trees often exceed 60% and is mostly situated in the Sekhukhune Plains Bushveld type, with a species composition that, although variable, correlates to the regional type.

The reason for the excessive densification of the woody layer is unclear and is possibly attributed to variation in management or exclusion of fire for a prolonged period. Despite some structural differences between this and the nearby Variable Mixed Shrubland types, the species composition is comparatively similar, providing some evidence that these types were historically similar types, generally correlating to the regional Sekhukhune Plants Bushveld type.

A relative high abundance of protected and conservation important species were recorded in this unit, including the vulnerable *Adenia fruticosa,* and the protected trees *Balanites maughamii, Boscia albitrunca* and *Sclerocarya birrea*. As a result, and despite a moderate level of deterioration, a medium-high floristic sensitivity is ascribed to these parts' (Figure 7-19 and Figure 7-20).

7.3.1.7 Transformed Areas, Infrastructure

Parts of the region where natural habitat has been entirely replaced by infrastructure, mining and industrial areas, residential areas, etc. No, or minimal natural, vegetation remains in these parts. No surveys have been conducted in these parts and a low floristic sensitivity is ascribed to these parts' (Figure 7-19 and Figure 7-20).

7.3.1.8 Variable Mixed Shrubland

This type represents the natural and dominant habitat bushveld/ shrubland types within the wider area, manifesting as variable shrublands with woody cover ranging between 20% and 65% and the average height of shrubs and trees between 3 m and 10 m. Two major types are recognised, representing the regional types of Sekhukhune Plains Bushveld and Sekhukhune Mountain Bushveld.

The Plains Bushveld type conforms to an admixture of open to closed microphyllous and broad-leafed variation and is situated on the plains where soils are most often deeper and where surface rock occur only highly sporadically. Because of a high utilisation factor, significant deterioration in the flora is noted. Typically, the local species composition is highly variable, ranging between areas of dense grass layers, dominated by tall grass species but mostly to an open and sparse grass cover that signify a deteriorated status caused by high utilisation factors. Similarly, the woody layer is dominated by a range of species; the species composition and structure often reflecting management history and utilisation/ harvesting practices, thus varying between comparatively natural to moderately deteriorated. Locally the extensive presence of invasive species is also noted, specifically the succulent *Agave sisalana.*

The herbaceous stratum is particularly diverse, comprising numerous succulents, the floristic status of this type varies considerably. Portions of the study north of the R555 is generally considered moderately deteriorated due to harvesting practices and inappropriate grazing practices and poor fire regimes, while areas that are protected by security fences exhibit more natural attributes, albeit highly moribund with extremely high biomass.

Localised infestation by *Agave sisalana* and *Opuntia* species and isolated surface disturbances detract from the ecological integrity and status of these parts, although the notable presence of protected trees *Sclerocarya birrea, Balanites maughamii,* and *Boscia albitrunca,* as well other (provincially) protected species such as *Eulophia petersii, Stapelia* species and the vulnerable (IUCN) *Adenia fruticosa* ultimately renders the floristic sensitivity of these areas medium-high (Figure 7-19 and Figure 7-20).

Because of dissimilar topographic, edaphic and moisture related attributes, a distinct separation is recognised between the plains and mountain woodland types of the local region. While the Sekhukhune Plains Bushveld generally comprises the plains areas where deeper soils prevail, the Sekhukhune Mountain Bushveld is found in the southern parts of Site 2B, situated on the footslope of the low mountains, and comprising topographically complex areas where rocks and shallow, sandy soils prevail. Distinct floristic differences are noted between these units, which are also considered partly a factor of the higher deterioration of the plains areas, while flora of the mountain areas were found to exhibit a higher status and integrity.

Also occurring in this variation are *Croton gratissimus* and *Pouzolzia mixta*, both of which appear to be associated with high rockiness, but also occurring in rocky streambed of the large non-perennial drainage line between Sites 3 and 4. The grass component, because of steeper slopes, shallow soils and high rockiness is lower in diversity compared to the woodland plains. These areas, based on a high integrity and floristic status, as well as a high connectivity to pristine natural woodland further south and the presence of protected plant species, are considered floristically as high sensitivity (Figure 7-20).

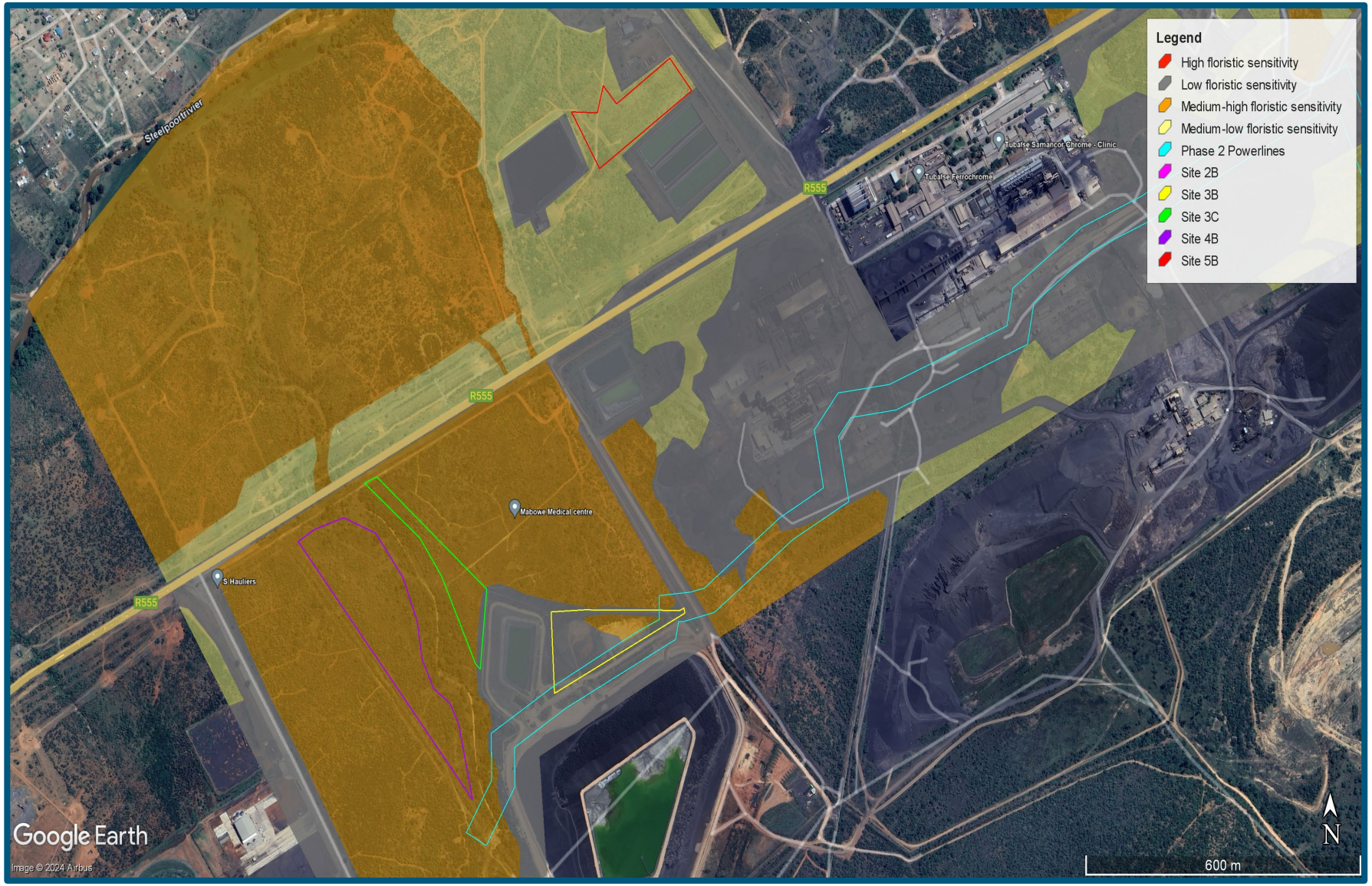


Figure 7-19: Floristic sensitivity of the study areas and immediate surrounds (Sites 3, 4 & 5) and powerline servitude

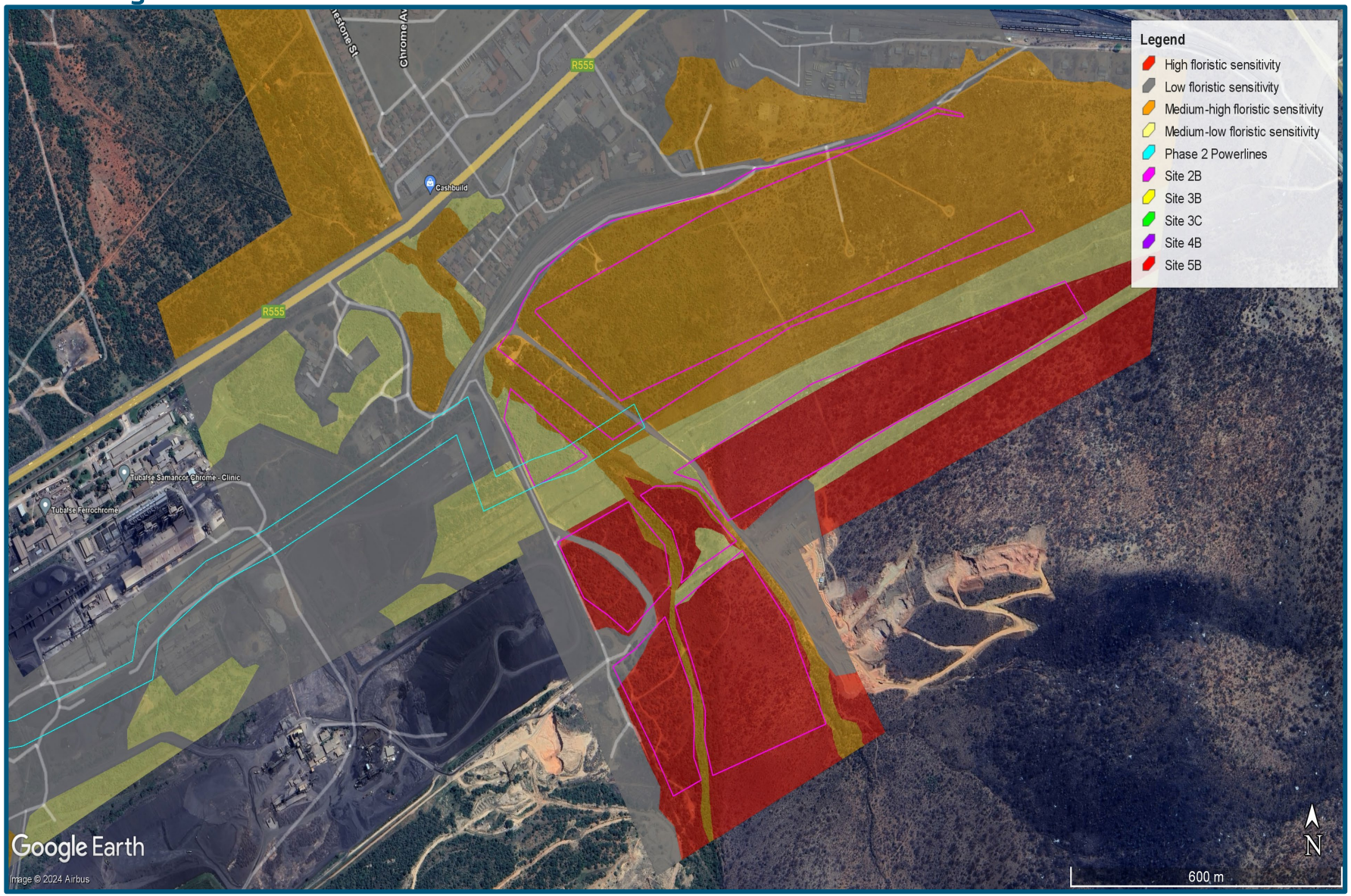


Figure 7-20: Floristic sensitivity of the study areas and immediate surrounds (Site 2) and powerline servitude

7.3.2 Annotations of Floristic Attributes of the Development Footprints

Annotations on the floristic attributes of the development footprints are provided in Table 7-11.

Table 7-11: Annotations on the floristic attributes of the development footprints

Site	Description
Site 2B	Site 2B comprises various smaller portions to augment and fill in the original Site 2 and therefore also comprising of various habitat types. Of importance in the southern sections of this site is the plains bushveld habitat type that correlates with the low foothills of the mountainous areas further to the south of the study area. The presence of the tree *Kirkia wilmsii*, provide an accurate indication of the floristic division between this and the plains bushveld that comprises the northern sections of Site 2B location. In addition, the presence of species such as *Senegalia nigrescens, S. senegal var. leiorhachis, Terminalia prunioides, Bolusanthus speciosus, Boscia albitrunca, Dichrostachys cinerea* and *Grewia vernicosa* are also noted, although elements of these species are also present in the plains woodland areas. These areas exhibit varying level of integrity but as a result of high integrity and connectivity, are afforded a sensitivity varying between medium-high and high. In particular, parts of Site 2B situated in the ridge area is considered pristine and sensitive. The obvious presence of mining activities in the local environment is a cause of concern, detracting from a potentially very high sensitivity and integrity. A deterioration factor is noted in the plains areas, with several invasive exotic species, such as *Agave sisalana, Cereus jamacuru, Opuntia ficus-indica, O. humifusa, O. leucotricha* as well as indigenous encroacher microphyllous species is noted across these parts. This, in association with a poor grass component and the extensive presence of a weedy disposition of much of the herbaceous layer, ultimately detract from the floristic status, although some parts are considered comparatively natural and representative of the regional type. The presence of several protected and conservation important plants, such as the vulnerable *Adenia fruticosa* and the protected trees *Balanites maughamii, Boscia albitrunca* and *Sclerocarya birrea* and a high connectivity to pristine savannah types to the south of the site, renders the floristic sensitivity medium-high.  ***Figure 7-21: Collage of images of habitat conditions within Site 2B***

Site	Description
Site 3B and 3C	Site 3B and Site 3C comprise mostly of the Variable Mixed Shrubland (plains bushveld), some transformed areas (from industrial activities), while Site 3C is situated adjacent to the large non-perennial drainage line exhibiting moribund and dense vegetation. The nature of the remaining portions of natural woodland is correlates to the regional ecological type with minor deterioration noted in places. The woody layer is dominant with densities ranging between 20 and 45%. Invasion by exotic species is generally low, with isolated occurrences of *Cereus jamacuru.* Comparatively high densities of protected and conservation important plants were recorded from this site, including the vulnerable *Adenia fruticosa,* the provincially protected *Eulophia petersii, Aloe burgersfortensis, Stapelia* species and the protected trees *Balanites maughamii, Boscia albitrunca* and *Sclerocarya birrea* occur in the remaining portions of natural woodland. The small drainage line on the eastern perimeter conforms to the xeric[60] surrounding shrubland, but with a shallow streambed where the overlying sandy soils were removed to expose the underlying rocky substrate. The vegetation does not correlate to a mesic environment and the herbaceous layer is somewhat depleted, while the woody stratum correlates to the surrounding shrubveld. A major drainage line is situated on the western perimeter of the site but is not spatially included in the site.  ***Figure 7-22: Collage of images of habitat conditions within Site 3B and Site 3C***
Site 4B	Site 4 correlates largely to the regional Sekhukhune Plains Bushveld, but historic management practices, specifically the exclusion of fire for a prolonged period, resulted in significant densification of the shrub layer, which allowed the development of the Closed Mixed Thicket and Bushland habitat in the southern extent of the site. The northern part of the site conforms to the Variable Mixed Shrubland, but with varying levels of deterioration. A major drainage line is situated on the eastern perimeter of the site but is not spatially included in the site. The dense thickets of the southern part of the site is dominated by an admixture of co-dominant woody species. As a result of the dense woody layer and the subsequent shade effect, the herbaceous layer is not as diverse or developed as the Variable Mixed Shrubland. Sporadic occurrences of the invasive *Opuntia ficus-indica* and *Cereus jamacuru* is noted. Comparatively high densities of protected and conservation important plants were recorded from this site, including the vulnerable *Adenia fruticosa,* the provincially protected *Eulophia petersii, Aloe burgersfortensis, Stapelia* species and the protected trees *Balanites maughamii, Boscia albitrunca* and *Sclerocarya birrea.*

[60] *Containing little moisture; very dry.*

Site	Description
	 ***Figure 7-23: Collage of images of habitat conditions within Site 4B***
Site 5B	Site 5B is characterised by the Deteriorated Open Shrubland type, comprising a modified habitat where most of the original woody vegetation has been removed for development purposes. Remaining vegetation on this portion does not correlate to the Sekhukhune Plains Bushveld type, although the presence of a low number of *Sclerocarya birrea* remains on the site.  ***Figure 7-24: Collage of images of habitat conditions within Site 5B***

7.3.3 Faunal Importance (Sensitivity)

The faunal importance of the study sites was based on the inherent biodiversity value and ecological function of the respective habitat units corresponding to each site. Major emphasis was placed on the following functional aspects during the sensitivity grading process:

- Presence of habitat of high vertical heterogeneity: Area with intact variable or riparian woodland tend have taller tree canopies. Habitat containing taller canopy structure will provide a higher niche space for bird and arboreal animal species through an ecological process of niche packing. Therefore, it allows species with similar guilds (e.g. insectivorous foliage gleaners in birds) to co-occur without too much inter-specific competition for recourses. The result is that more species could occur in habitat with high vertical heterogeneity.
- Presence of specialised habitat: The presence of wetland, riparian or aquatic habitat (including functional manmade impoundments) provide habitat for stenotropic[61] animals species with high affinities to either moist conditions or inundated habitat. Many of these habitat units are either spatially limited (azonal) and hence uncommon in the region. Typical species include facultative wetland taxa, such as shorebirds and waterbirds, which will collectively contribute towards the overall species diversity in the area.
- Ecological connectivity: Intact habitat that are located along drainage lines and rivers (Steelpoort River), will promote animal dispersal, thereby allow for more species to utilise the habitat units at a particular site.

[61] *Able to tolerate only a narrow range of environmental changes.*

The faunal sensitivities of the various habitat types are illustrated in Figure 7-25 and Figure 7-26. The faunal sensitivity for the additional areas for the PV facility are located in areas that range from Medium low to High sensitivity. Additionally, the powerline is routed in areas as Low to High. although a relatively poor compliment of terrestrial fauna species has previously been recorded, mostly the effect of significant anthropogenic impacts from surrounding land use activities, including industrial, peri-urban, residential, commercial and severe utilisation, remaining portions of habitat that exhibit a high connectivity to areas of natural habitat in the wider region, are considered suitable for a natural and diverse compliment of animal taxa, including animal SCC.

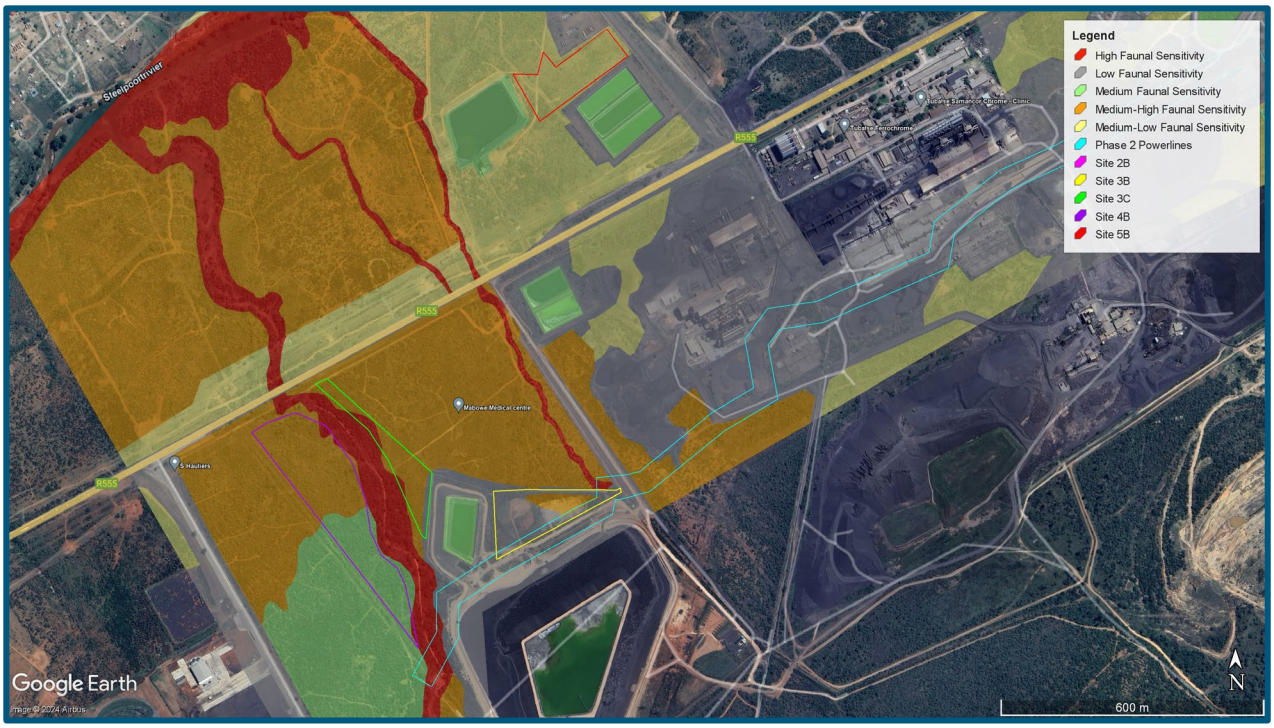


Figure 7-25: Faunal importance and sensitivity based on the occurrence of terrestrial fauna (Sites 3-5)

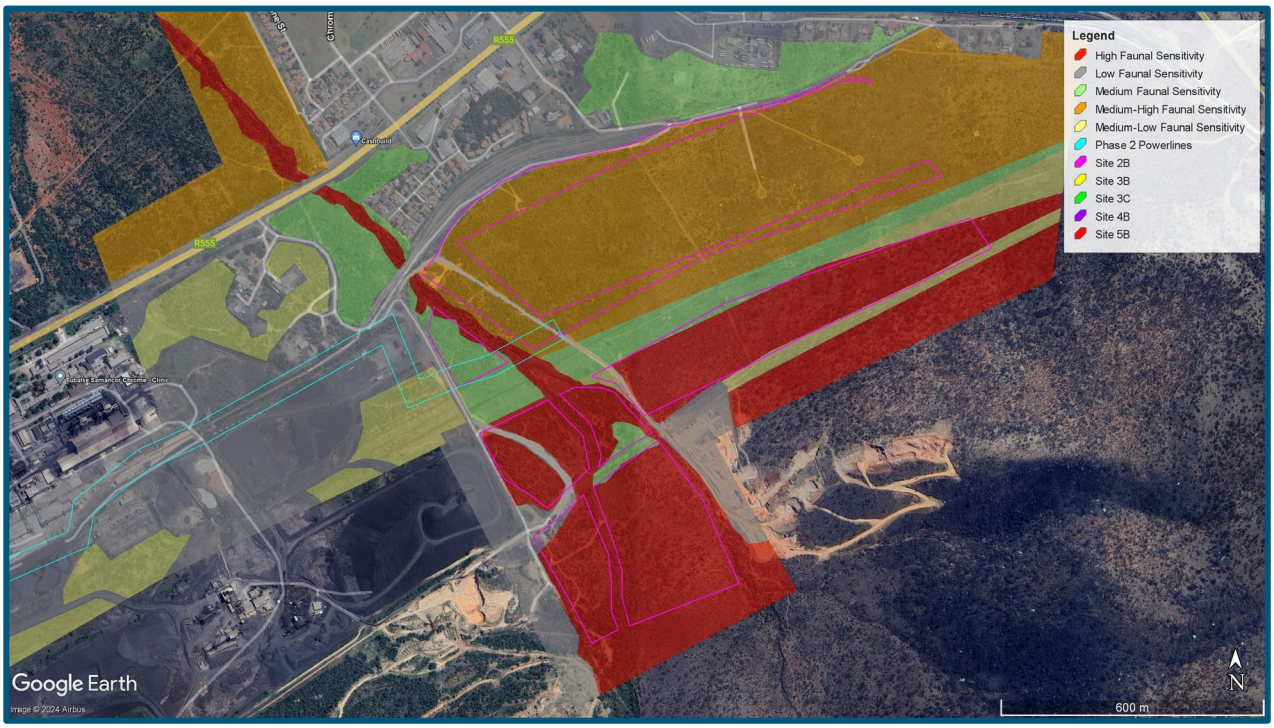


Figure 7-26: Faunal importance and sensitivity based on the occurrence of terrestrial fauna (Site 2)

7.3.4 Site Ecological Importance

A Site Ecological Importance (SEI) analysis provides a basis for assessing the significance of potential project related impacts on the receiving environment. The general ecology of the study area exhibit attributes of varying status; the confirmed presence of several plant and animal species of conservation concern elevates the importance of certain parts, ultimately rendering the SEI high. In contrast, high deterioration and disturbance factors, as well as the negative contribution of disruptive and intensive anthropogenic activities detracts from the importance of certain parts of the sites; a very low SEI for these parts of the site was derived from the assessment.

A review of the evaluation of local and regional information sources indicates a moderate to moderate-high ecological status and sensitivity of the proposed sites, which correlates with preliminary floristic and faunal results obtained from the various survey results, particularly the following key results:

- Botanical diversity, importance and sensitivity – moderate-high and high sensitivities of areas of remaining natural woodland, notably also as a result of the known abundance of several plant SCC;
- Faunal diversity, importance and sensitivity – although a relatively poor compliment of terrestrial fauna species have previously been recorded, mostly the effect of significant anthropogenic impacts from surrounding land use activities, including industrial, peri-urban, residential, commercial and severe utilisation, remaining portions of habitat that exhibit a high connectivity to areas of natural habitat in the wider region, are considered suitable for a natural and diverse compliment of animal taxa, including animal SCC;
- Biophysical and regional sensitivity and importance, indicated by the Sekhukhune District Bioregional Conservation Plan; and
- Context of the proposed industrial development on a temporal and spatial scale.

While a significant extent of the proposed sites exhibit a modified and deteriorated status, some parts are considered natural, with a high correlation to the regional ecological types. However, in the context of

intensive and persistent industrial expansion and development patterns around Steelpoort, these areas do not exhibit high conservation potential, in spite of a comparatively high ecological sensitivity and integrity. Impacts and pressures of surrounding land use activities are persistent, severe and a continuous decline of remaining portions of natural habitat within the peri-urban areas of Steelpoort (inclusive of the proposed development footprints) is reasonably expected should the development not take place. As with any type of industrial development within a region of natural habitat, the loss of habitat and species from direct impacts (footprint clearance, etc.) and significant indirect impacts will undoubtedly occur, notably in areas where the presence of endangered fauna taxa has been confirmed. Three aspects of concern are raised at this stage:

- The loss of natural and sensitive natural woodland habitat, including:
  - Plains woodland, which is categorized as endangered on a regional scale, albeit considered deteriorated;
  - Mountain woodland, although categorized as least concern, is considered highly representative of the regional types, and exhibiting high levels of ecological functionality, also representing habitat for endangered fauna taxa;
- Loss of numerous plant SCC; and
- Loss of habitat typically associated with animal SCC.

While these factors represent aspects of concern, they do not represent a fatal flaw, and the application of the mitigation hierarchy will likely allow for amelioration of anticipated impacts. It is also important to note that the statement specifically refers to areas of elevated SEI (i.e. very high and high), while areas of lower ecological sensitivities are generally considered more acceptable for the proposed development activities and will likely result in less significant impacts on the terrestrial biodiversity receiving environment. The Site Ecological Importance of the various habitat types is illustrated in Figure 7-27 and Figure 7-28.

Figure 7-27: SEI of broad-scale habitat types (Sites 3B, 3C, 4B and 5B)

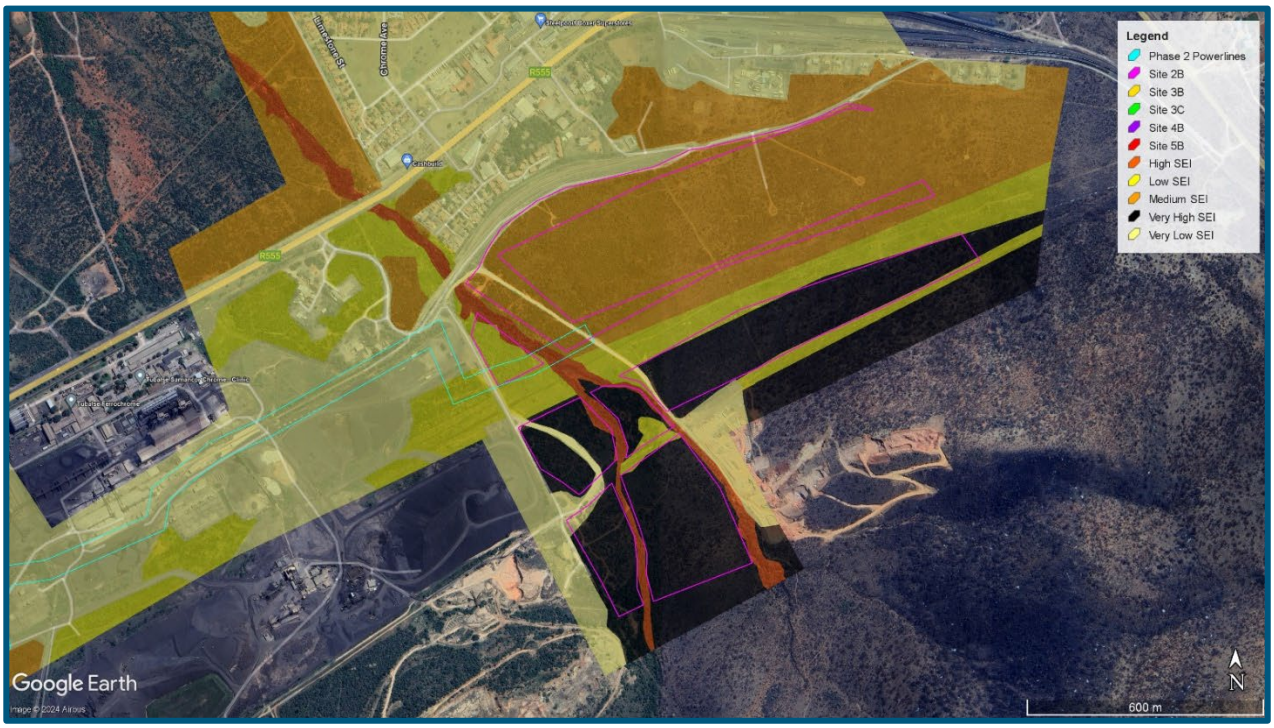


Figure 7-28: SEI of broad-scale habitat types (Site 2B)

7.4 Avifauna

7.4.1 Identification and Occurrence of Priority Bird Species

Based on the species list compiled for the study area and the sensitivity analysis, a number of 'priority species' with respect to the proposed development have been identified. The identification of priority species has also considered the conservation or endemism status of the species, whether the species would be vulnerable to being impacted by PV plant or whether the species is an important component of the avian ecology of the study area. Species recorded in the wider area have been included as these could easily move into the study area. The priority species are described in Table 7-12.

Although the likelihood of the occurrence of certain of these species is likely to be very low, their threat status, twinned with their ability to range extensively over large territories or areas of occurrence entails that they could occur in the study area and should be considered.

One species that is not threatened (SCC) has been included in the list of priority species – Wahlberg's Eagle (*Hieraaetus wahlbergi*). This is due to the confirmed occurrence of this species in the area surrounding the study area, the confirmed breeding of the species in the wider area, with a nest site close to the previously authorised Site 4 (located south of Site 4B) and its ecological importance in a study area context. The pair of Wahlberg's Eagles is thus resident in the study area while present in the southern African summer (being Intra-African migrants) and while present in the summer months are the apex avian predator in the study area.

Certain SCC species which could occur in the wider study area have not been included in the list of priority species. This is either due to their very low potential for occurrence in the study area, lack of available habitat, or in the case of the two species which are highly dependent on aquatic habitats in the form of rivers,

inhabit habitats (i.e. the aquatic habitat of the Steelpoort River) which will be unlikely to be directly or even indirectly affected by the proposed 40MW PV Plant development.

7.4.2 Study Area and Surrounds Avifaunal Habitat Units

Due to a mix of land use and land cover, combined with terrain present in the study area and its surrounds, there are a mix of habitats that occur in the wider area. The spatial distribution of habitat types is shown in Figure 7-33. The habitat types are described in Tables: Table 7-13, Table 7-14, Table 7-15 and Table 7-16.

Table 7-12: Priority species characteristics and potential impact associated with the proposed development

Scientific and Common Name	Description	Regional Status
Ciconia nigra (Black Stork)	**Range:** Widely distributed within southern Africa but with likely complex seasonal movements. Southern African Bird Atlas Project (SABAP) data suggests it is a species in decline in the sub-region. **Major habitats:** Freshwater habitats (foraging) and mountainous areas characterised by cliffs. **Description:** Strongly piscivorous, foraging at dams, rivers and floodplains where fish are present. Nests in winter on cliff faces. **Food**: Fish. **Available habitat with the study area and surrounds**: The Steelpoort River and the Tubatse Dam. **Nature of potential impact related to the proposed development**: The species may occasionally visit the study area to forage in the Steelpoort River or in larger dams such as the Tubatse Dam. The species could fly over and be attracted to investigate the natural freshwater features or the artificial waterbodies in the vicinity of the PV arrays, thus potentially making it at risk of collision with the PV arrays.	VU
Gyps africanus (White-backed Vulture)	**Range**: Resident; occurring across sub-Saharan Africa with the exception of forests in west and central Africa; in southern Africa is restricted to the northern parts of the subcontinent. **Major habitats**: Wooded Savannah. **Description**: Scavenger, being the most commonly occurring scavenger at carcasses within its range. Searches aerially for food, following other scavengers and predators. **Food**: Feeds primarily on large ungulate carcasses. **Available habitat with the study area and surrounds**: Residual areas of natural woodland; Nature of potential impact related to the proposed development: Transformation of habitat may indirectly affect this species through cumulative loss of natural habitat. Individuals ranging into the area may perch on powerlines in the area, thus being at risk of collisions with overhead wires.	EN
Gyps coprotheres (Cape Vulture)	**Range**: Resident and far ranging over much of South Africa but has disappeared from much of its former range. Now largely restricted to mountainous terrain where it breeds, ranging into surrounding areas. **Major habitats**: Wooded Savannah, grassland, mountainous terrain. **Description**: Scavenger. Searches aerially for food, following other scavengers and predators. **Food**: Feeds primarily on large ungulate carcasses. **Available habitat with the study area and surrounds**: Residual areas of natural woodland; Nature of potential impact related to the proposed development: Transformation of habitat may indirectly affect this species through cumulative loss of natural habitat Individuals ranging into the area may perch on powerlines in the area, thus being at risk of collisions with overhead wires.	EN
Sagittarius serpentarius (Secretarybird)	**Range**: Breeding resident, occurring widely across southern Africa and into sub-Saharan Africa. **Major habitats**: Short grassland, scrub, open woodland. **Description**: Terrestrial feeder, moving across large areas in search of prey.	VU

Scientific and Common Name	Description	Regional Status
	Food: Feeds primarily on reptiles (snakes) and small mammals. **Available habitat with the study area and surrounds**: Degraded grassland and open woodland. **Nature of potential impact related to the proposed development**: The transformation of habitat may exert a local impact on birds foraging in the local the area.	
Falco biarmicus (Lanner Falcon)	**Range**: Breeding resident ranging widely across southern Africa and occurring across Africa, Arabia, and the western Palaearctic. **Major habitats**: Grassland, cultivated fields, cleared woodland. **Description**: Aerial hunter of avian prey, with birds caught on the wing in an aerial chase. **Food**: Feeds primarily on small birds. **Available habitat within the study area and surrounds**: Cleared areas within degraded bushveld habitat especially along powerlines. **Nature of potential impact related to the proposed development**: The transformation of habitat may exert a local impact on birds foraging in the local the area. This may be mitigated somewhat if a grassy understorey is retained under the panels, thereby still attracting small passerines to the site. The panels could pose a collision risk for such birds engaging in high-speed aerial pursuits.	VU
Aquila verreauxii (Verreaux's Eagle)	**Range**: Breeding resident, occurring widely across southern Africa and into sub-Saharan Africa as far north as Ethiopia. **Major habitats**: Mountainous/hilly terrain, especially where its primary prey item *Procavia capensis* occurs. **Description**: Powerful raptor, often hunting in pairs, preferring to hunt along steep slopes or ridge tops, ambushing unsuspecting prey **Food**: Feeds primarily on *Procavia capensis* but is an opportunistic feeder taking smaller prey up to the size of small antelope and goats. **Available habitat with the study area and surrounds**: Birds may occasionally forage over the hilly terrain immediately south of the study area. **Nature of potential impact related to the proposed development**: Limited potential impact - birds may overfly the study area or may occasionally range in the vicinity of the site to search for prey in the hilly terrain on the southern edge of the study area.	VU
Aquila rapax (Tawny Eagle)	**Range**: Breeding resident, but largely restricted to large protected areas.in the central and north-eastern parts of the sub-region. **Major habitats**: Mesic woodland/savannah to semi-desert. **Description**: Powerful raptor, maintaining large territory. Hunts prey on the wing, but adept at scavenging and piracy. **Food**: Feeds on a variety of prey including small mammals, game birds, reptiles, etc. **Available habitat with the study area and surrounds**: Birds may occasionally forage over residual woodland in the study area.	EN

Scientific and Common Name	Description	Regional Status
	Nature of potential impact related to the proposed development: Transformation of habitat is the largest potential impact associated with this and other transformative developments in the area.	
Hieraaetus wahlbergi (Wahlberg's Eagle)	**Range**: North-eastern parts of South Africa. **Major habitats**: Various types of woodland. **Description**: Breeding intra-African migrant, present in southern Africa August to April. Birds commence with breeding-and nesting activities as soon as they arrive and maintain territories while present. **Food**: Feeds on small prey. **Available habitat with the study area and surrounds**: Residual patches of woodland. **Nature of potential impact related to the proposed development:** This species, and the breeding pair are most likely to be impacted by the cumulative loss of natural habitat within their territory.	LC

Table 7-13: Avifaunal habitat units - Woodland (Bushveld)

Woodland Bushveld


Figure 7-29: Photographs representing the woodland (bushveld) avifauna habitat unit

- Left: Open woodland habitat in the area to the east of the Steelpoort commercial area.
- Centre: Denser thicket-type woodland on the authorised Site 4.
- Right: Dense microphyllous thickets in the area beyond the Steelpoort riparian zone boundary.

Woodland Bushveld	
Avifaunal Assemblage	Savannah (Woodland) as a habitat supports a high diversity of avifauna. Importantly, savannahs and woodlands support both seedeaters (granivores) as well as insectivorous species. Accordingly woodland habitat in the wider area is expected to be characterised by a relatively high density of bird species and a relatively high abundance of overall avian biomass. Due to the seasonality of savannahs, many species are nomadic or migratory (especially seedeaters)[62], and the numbers of birds within savannahs increase greatly with the arrival of Intra-African and Palaearctic migrants in the summer months. This is expected to be true for the study area during the summer period following rains when the resident species are joined by large numbers of migratory and nomadic species. The importance for of this habitat unit for avifaunal assemblages in a wider area context in enhanced by residual land parcels containing woodland vegetation acting as areas of ecological connectivity in the landscape. Due to the high density of small mammals, reptiles, and smaller birds in this habitat type, this habitat generally supports a large number of raptors, in particular accipiter as well as other birds of prey such as eagles and buzzards. A number of raptor (and other smaller insectivorous bird species) species are migratory and will typically occur within this habitat in the summer during and after rainfall when certain types of prey species, especially non-invertebrates tend to increase in abundance. Raptors represent the most important species present within savannah/woodland – a number of which have been designated as priority species. In the context of the proposed development, the development of powerlines - a component of the proposed development – could be significant as certain of species are collision prone and often interact with powerlines by perching or nesting on them.
SCC Occurrence and Assemblage	Woodland habitat represents the largest component of natural habitat in the wider study area. Such habitat is present in varying states of disturbance, but areas of relatively intact woodland habitat are still present. Most of the SCC and identified priority species for the study area are raptors and accordingly these species, if ranging into the study area, are likely to be strongly dependent on the areas of residual woodland habitat for foraging, perching and roosting. Where observed in the study area and its surrounds, Lanner Falcons (*Falco biarmicus*) were observed hunting in woodland areas in the vicinity of transformed habitats, close to the Steelpoort riparian corridor, or in the vicinity of powerlines. The abundance of certain species in the vicinity of transformed habitats (e.g. doves and certain other small passerines) is likely to attract Lanner Falcons to this part of the study area, whilst powerlines provide excellent vantage points. Although avifaunal SCC are likely to range into and utilise woodland habitat for hunting/foraging, it is deemed unlikely that any SCC species would breed in the study area.

[62] *Maclean, G.L., 1990. Ornithology for Africa. Pietermaritzburg: University of Natal Press*

Table 7-14: Avifaunal habitat units - Freshwater Habitat (Aquatic-Riparian Corridors and Dams)

Freshwater Habitat (Aquatic-Riparian Corridors and Dams)	
	
Figure 7-30: Photographs representing the freshwater habitat (aquatic-riparian corridors and dams) avifauna habitat unit ▪ Left: The channel of the Steelpoort River; note the removal of vegetation and dumping of soil on the northern (left) bank. ▪ Centre: *Phragmites mauritianus* reedbeds in the riparian corridor of the Steelpoort River. ▪ Right: The episodic drainage line that drains between Sites 3C and 4B.	
Avifaunal Assemblage	The Steelpoort River as the primary river (drainage feature) in the wider area is likely to be a locally important bird movement corridor, especially as it occurs within an enclosed valley. The movement corridor is likely to be a flyway for certain species (especially waterfowl) and for smaller passerines that will move along its riparian corridor. Despite the observed polluted state of the Steelpoort River, the river channel supports a number of aquatic specialists, including cormorants, certain kingfishers, wagtails, herons and certain species of duck. The riparian habitat of the river, though degraded, is (naturally) wooded and accordingly support a great diversity of bird species akin to the woodland habitat unit and thus supports a similar species assemblage and abundance. However, the 'forested' riparian habitat of the river provide habitat for a number of bird species that are not found in other habitats in the area, that would typically occur in forest or dense thicket habitat such as Red-capped Robin Chat (*Cossypha natalensis*), Sombre Greenbul (*Andropadus importunus*), Tambourine Dove (*Turtur tympanistria*) and certain raptor species such as the African Goshawk (*Accipiter tachiro*). Riparian corridors of larger rivers in the wider area are also important as they contain a relatively high density of fruiting trees such as the Sycamore Fig (Ficus sycomorus) that provides foraging opportunities for frugivores such as the African Green-Pigeon (*Treron calvus*) and Purple-crested Turaco (*Gallirex porphyreolophus*). Certain parts of the riparian zone of the river are characterised by large riparian trees (primarily *Senegalia burkei*) forming a closed canopy. Such riparian woodland, akin to riparian forest, is an important habitat for a number of bird species, in particular certain raptors, especially accipiters, and certain owl species.

Freshwater Habitat (Aquatic-Riparian Corridors and Dams)	
SCC Occurrence and Assemblage	As with woodland habitat, freshwater habitat (especially riparian habitat) is likely to be significant for most of the SCC that range into the development area. For SCC raptors, the riparian habitat of the Steelpoort River and the riparian corridor associated with the drainage line located between sites 3B/C and 4B provides cover and ample hunting opportunities due to the year-round increased abundance of birds in this habitat due to elevated water and food supply. The Steelpoort River has been flagged for the potential occurrence of African Finfoot (*Podica senegalensis*). Whilst the species could nominally occur within the Steelpoort River, as it favours rivers with slow flowing reaches characterised by overhanging riparian vegetation, the increasing degradation of the channel and riparian zone of the reaches of the river in the wider area are unlikely to present suitable habitat for this species, or another SCC that has been recorded in less degraded upstream reaches of the river closer to the Lion Smelter, the Half-collared Kingfisher (*Alcedo semitorquata*), which favours fast flowing clear unpolluted stetches of river.

Table 7-15: Avifaunal habitat units - Modified Surface Water Habitat (Artificial Water Bodies)

Modified Surface Water Habitat (Artificial Water Bodies)	
	

Figure 7-31: Photographs representing the modified surface water habitat (artificial water bodies) avifauna habitat unit

- Left: One of the brine dams to the north of the smelter and to the south of Site 5B.
- Right: A settling dam at the smelter's wastewater treatment works.

Avifaunal Assemblage	The artificial water bodies are unlikely to hold significant numbers of waterbirds, as their structure is not attractive to birds inhabiting or feeding/roosting in aquatic habitats such as reedbeds and mudflats. Only certain species attracted to open water (e.g. Egyptian Geese –

Modified Surface Water Habitat (Artificial Water Bodies)	
	Alopochen aegyptiaca and Blacksmith Lapwing – *Vanellus armatus*) are likely to be regularly encountered at these habitats. The design of mist of these water bodies – having steep lined sides with no shallow water or marginal vegetation greatly reduces the likelihood of the occurrence of a significant array of waterbirds It is important to note that artificial waterbodies do however have the potential to attract waterbirds, including those flyovers at higher altitudes and thus these artificial waterbodies have been flagged as having a moderate avifaunal sensitivity. The potential proximity of settling ponds to certain of the sites (i.e. Site 5B) and therefore the solar panel arrays development is potentially an issue in the context of collision risks.
SCC Occurrence and Assemblage	Due to the general absence of suitable habitat (i.e. wading habitat and marginal vegetation) artificial water bodies are unlikely to attract any avifaunal SCC. The Caspian Tern (*Hydroprogne caspia*) has been flagged by the DFFE EST for the study area. In an inland setting this species occurs on large open water bodies such as large instream dams, however the artificial waterbodies in the wider area (and the Tubatse Dam) are considered too small to be utilised by this species.

Table 7-16: Avifaunal habitat units - Modified Terrestrial Habitats

Modified Terrestrial Habitats	
	
Figure 7-32: Photographs representing the modified terrestrial habitats avifauna habitat unit ▪ Left: An area cleared of woody vegetation in the vicinity of one of the brine dams to south of Site 5B. ▪ Centre: The Tubatse Smelter. ▪ Right: Powerline servitudes located to the south of Sites 3B, 3C and 4B.	
Avifaunal Assemblage	Due to the nature of the vegetation cover, areas that have been formerly cultivated tend to attract bird species associated with modified grassland habitats, including certain pipit and lapwing species, and other granivores including various finch, waxbill, whydah and other

Modified Terrestrial Habitats	
	similar species. The large buildings and structures of the Tubatse Ferrochrome Plant as well as the commercial areas of Steelpoort provide habitat for limited species such as certain dove and swift and swallow species. The residential areas associated with Steelpoort although transformed provide suitable habitat for certain woodland bird species adapted to surviving in suburban habitat due to the presence of gardens. Although not a natural habitat gardens represent a productive habitat for a number of bird species due to the human infrastructure availability of water, cover, foraging and nesting areas. In many ways the gardens are similar to woodland habitats and have been colonised by a number of species that would occur within woodland or thickets.
Occurrence and Assemblage	Most modified terrestrial habitats are considered unlikely to be of high significance to avifaunal SCC. As detailed above Lanner Falcons have been observed hunting in the study area surrounds within degraded habitat close to anthropogenically transformed areas and on infrastructure – i.e. powerlines. Though occasionally utilised, transformed areas are unlikely to be used exclusively by any SCC. The high number of powerlines in the study area surrounds could be utilised by SCC on which to perch and roost, but no nesting of any SCC was noted in the study area.

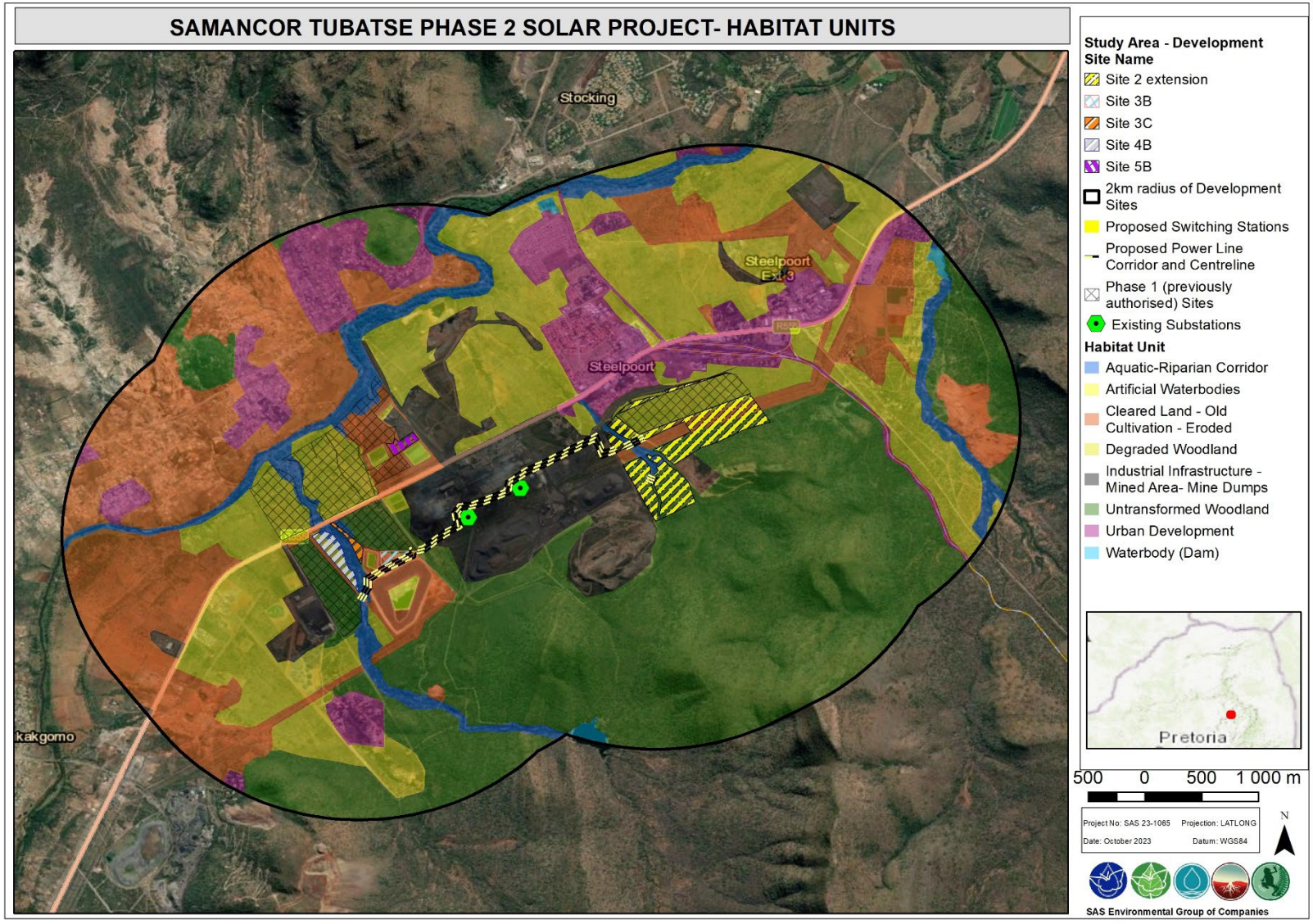


Figure 7-33:Avifauna habitat units and sub-units within the study area and surrounds

7.4.3 Study Area and Surrounds Habitat Unit Sensitivity

A sensitivity class has been assigned to each habitat type (unit/sub-unit) based on the relative abundance and species composition associated with each habitat type (Figure 7-34). The highest level of sensitivity has been assigned to riparian corridors and natural water bodies (including dams) and untransformed woodland, with the lowest level of sensitivity being assigned to highly transformed habitats. Woodland habitat has been divided into untransformed woodland (i.e. in hilly terrain where there is very limited human activity, or within certain fenced areas (including some parts of the study area to which there is no public/open access) which has been assigned a high degree habitat-based of sensitivity, and ‘degraded’ woodland where human impacts as described in 7.4.2 are apparent. Such less intact woodland has been assigned a moderate degree of habitat-based sensitivity.

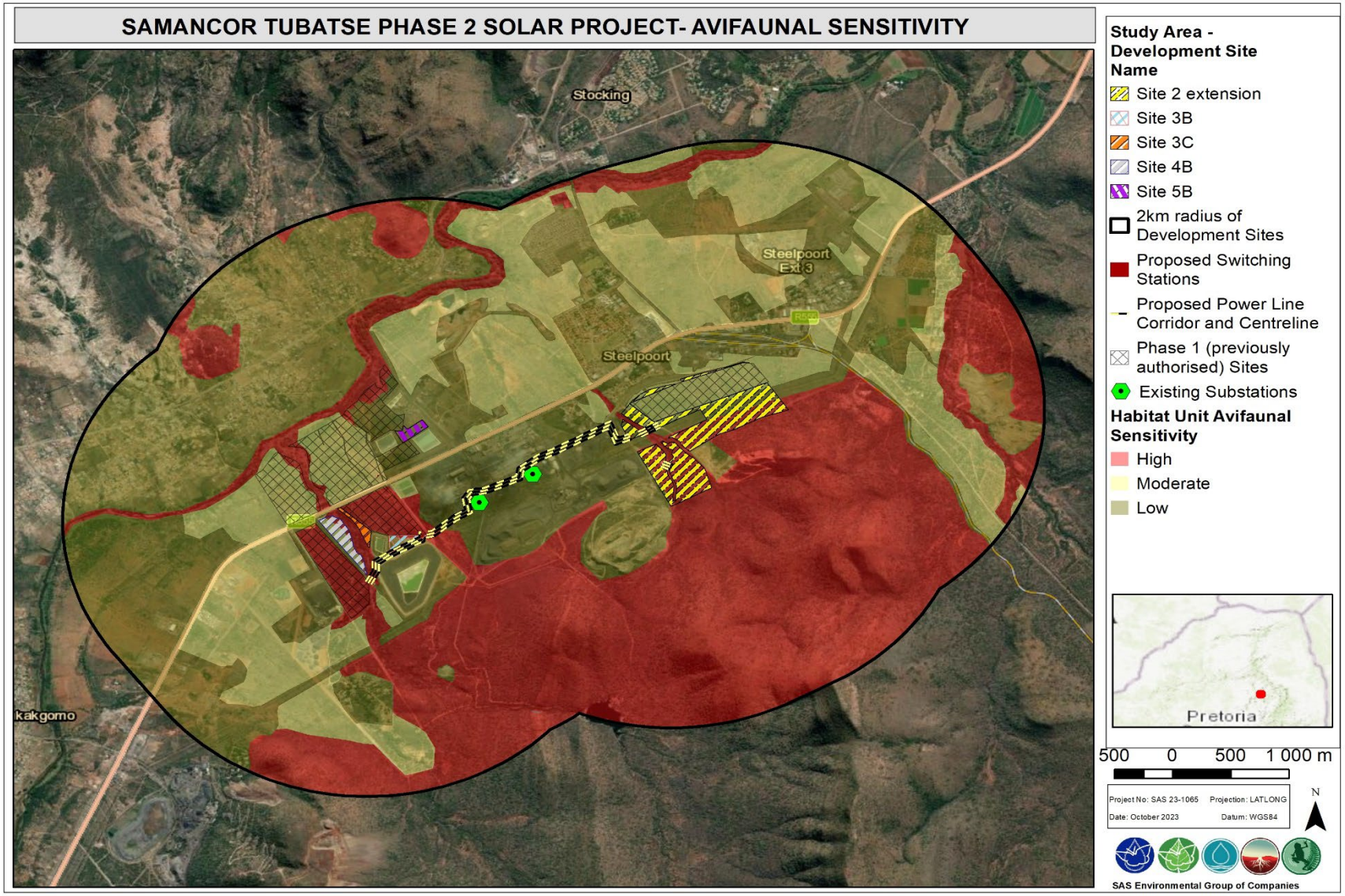


Figure 7-34: Habitat unit/sub-unit-based avifaunal sensitivity map for the study area and surrounds

7.4.4 Study Area Specific Issues

The habitat-based sensitivity assessment has identified certain areas of more intact habitat located on, or in close proximity to certain parts of the Phase 2 study area. This relates particularly to the presence of riparian habitat associated with certain drainage lines, in particular the drainage line that drains from the hilly area to the east of the south-east of the study area and which drains between Sites 3B and 3C and Site 4B, as well as the drainage lines that are located between the Site 2B development parcels.

The importance of these drainage lines and associated riparian corridors is even more locally significant given the authorisation of transformation of much of the residual woodland in the Phase 1 development footprint. The development of Sites 3B and 4C, as well as the development of Site 2B would exacerbate the loss of natural woodland habitat within the catchments of the respective drainage lines. It is however important to note that the solar array layout as presented by the applicant does not physically encroach on the riparian zones of these drainage lines, or on a 20m-wide development exclusion buffer that has been recommended as a development exclusion zone in the Freshwater Assessment (***Appendix F3***). In this context the drainage lines and a small flanking area of natural woodland vegetation will be retained and will likely continue to enable the function of the drainage lines as ecological movement corridors. All such riparian corridors must be considered as highly sensitive habitats that comprise development exclusion areas for solar panel arrays from an avifaunal perspective, and the key mitigation measure as stipulated in the freshwater report (***Appendix F3***) that the integrity of the buffer areas surrounding the drainage lines through all development phases is supported in an avifaunal context.

7.4.5 Disturbance and Displacement

The construction of the solar panel arrays over a large area will be a massive undertaking that will involve bulk earthworks, the removal of vegetation, and in some cases the removal of outcropping or underlying bedrock. Construction will thus be very noisy, will at times generate large volumes of dust, and will involve the use and co-ordination of large numbers of plant and other vehicles. Sources of loud noise are likely to have varied, but definite impacts on birds; Noise from human activities (in particular from infrastructure and construction sites) has a strong impact on the physiology and behaviour of birds. This impact related to the masking of signals used for communication, breeding and for hunting (Bottalico *et al*, 2015)[63]. The presence of a noise source in an area implies a decrease in bird density. The decrease happens because birds tend to leave the areas where their signals are masked by the noise source (Bottalico *et al*, 2015).

In the context of the study area, it is important to note however that the TFC Plant provides a significant source of noise to the ambient noise levels in the area. The baseline is thus altered from a natural setting, especially for parts of certain of the development sites that are located closest to the Smelter (in the context of the Phase 2 development Sites 3B and 5B). Nonetheless, construction activities, in particular the above-mentioned high noise generating activities would be likely to lead to the displacement and disturbance of birds, even in areas not being developed that are located adjacent to the development site. This is a temporary impact that will last for the duration of the construction in that particular development site/s but may lead to the temporary displacement of birds and the abandonment of breeding efforts. This would be particularly significant for larger species of birds which occur in lower densities due to the occurrence of large territories. The presence of a suspected Wahlberg's Eagle nest has been discussed in Section 7.4.2

[63] *Bottalico, P., Spoglianti, D., Bertetti, C. and Falossi, M., 2015, Effect of Noise Generated by Construction Sites on Birds.*

The undertaking of construction when such species are not breeding is important. The majority of bird species breed in the summer months, and accordingly it is thus recommended (as far as is practically possible) that construction activities, in particular earth moving, rock removal and vegetation clearing occur in the winter months when most bird species are not breeding and there is a lower number and species diversity on the site due to the absence of migratory species.

7.4.6 Priority Species

None of the species identified as priority species in the Scoping-phase avifaunal assessment were recorded in the study area, with the exception of the Lanner Falcon which was recorded on numerous occasions on certain of the development site in both the Phase 1 avifaunal assessment Scoping and EIA-phase field visits. There were a number of Lanner Falcon sightings, mostly in the eastern part of the study area, close to the town of Steelpoort and its surrounds and in the vicinity of the Steelpoort River riparian zone. Sightings occurred during both the Scoping-phase (April 2021) and EIA-phase site visits (September and October 2021). This suggests that at least one bird is resident in the area. The species appears to favour the Steelpoort riparian zone (where there is a high density of prey species) and the vacant areas surrounding the built-up areas of Steelpoort, being associated with the various powerlines to hunt its avian prey. The proposed transformation of habitat on the Phase 1 and 2 development footprints (especially relating to the Sites 2 and 5 for both Phases) could lessen the available area in which the species often hunts. The development of the Phase 2 solar development would exacerbate the Phase 1 impacts identified, but the Phase 1 impacts were identified to be able to be mitigated by the non-development of the Steelpoort riparian corridor in which the species' arguably most productive hunting area would remain undisturbed. Additionally, the Phase 1 Site 1 site is now not proposed for development and the Phase 1 avifaunal assessment assessed the Phase 1 development to be associated with a low level of impact on this species. The relatively small overall area of the transformation of the Phase 2 sites would be unlikely to elevate the intensity and overall significance of the development's likely impact on this species.

The Verreaux's Eagle was recorded out of the study area, but in sufficiently close proximity to suggest that a resident pair(s) are likely to range into the study area. Birds ranging over the development site are highly unlikely to hunt over the development sites as their primary prey (Rock Hyraxes – *Procavia capensis*) are not present on the development sites. This species may hunt other prey such as goats, but no goats are present on any of the development sites. The likelihood of Verreaux's Eagles occurring in the immediate vicinity of the Phase 2 development sites and interacting with the proposed infrastructure is thus deemed to be very low.

Of the other priority species, all were likely to be very occasional visitors to the site, in many cases ranging high above the sites, or very unlikely to visit the study area due to absence of suitable habitat or high human presence in the area. The likelihood of the Phase 2 development impacting the priority species (other than the Lanner Falcon) has thus been assessed to be very low.

7.4.6.1 Wahlbergs Eagle Breeding Impacts

A Wahlberg's Eagle nest site was located in close proximity to the southern part of the Phase 1 Site 4 along the non-perennial drainage line that drains from the south. Nesting at the site was confirmed by monitoring of the nest undertaken during late 2022 (STS, 2023)[64]. The potential significance of the Phase 1 development-related impacts on the nest site examined the overall conservation status context of the species. The species is not listed as threatened in the latest (2015) assessment of Red Data bird species

[64] *Scientific Terrestrial Services, 2023. Monitoring Assessment of a Wahlberg's Eagle (Hieraaetus Wahlbergi) nest close to the site of the proposed Tubatse 100MW Solar Power Generation Facility near Steelpoort, Limpopo Province – Finding of the 2nd Monitoring Site Assessment.*

in South Africa, Lesotho and Swaziland (Taylor *et al*. 2015)[65]. The species is also not listed in the Eskom Red Data Book (Taylor *et al*, 2015)[66] in any of the appendices as a special interest species or as a previously assessed species or an additional species that requires monitoring. The species text in Roberts[67] states that certain regional populations are decreasing however, and notes that in north-eastern South Africa an approximate 40% population decrease was observed over 10 years. Globally the species is listed as Least Concern. This species has an extremely large range, and hence does not approach the thresholds for Vulnerable under the range size criterion (extent of occurrence <20,000km^2 combined with a declining or fluctuating range size, habitat extent/quality, or population size and a small number of locations or severe fragmentation). The population trend appears to be stable, and hence the species does not approach the thresholds for Vulnerable under the population trend criterion (>30% decline over ten years or three generations). The population size is very large, and hence does not approach the thresholds for Vulnerable under the population size criterion (<10,000 mature individuals with a continuing decline estimated to be >10% in ten years or three generations, or with a specified population structure) (Birdlife International, 2021). Being one of the apex avian predators in the study area does however make this a significant species in a local context and the impacts on the development on a potentially breeding pair needs to be assessed.

The Phase 1 Avifaunal Assessment identified that the construction of the solar arrays in particular could cause breeding at the nest site to be abandoned due to the high level of noise associated with construction activities, especially vegetation clearing and site levelling and the erection of the arrays. The sensitivity of this species to disturbance in the vicinity of the nest site is unknown, however it must be assumed that as eagles, the pair would be sensitive to such disturbance to a certain degree, although during one of the monitoring visits to the nest site in late 2022, active construction and earthworks which were generating large volumes of dust were occurring at the site of the Samancor H:H waste disposal dam to the north-east of the nest site. The context of disturbance and transformation around the nest site was also considered – the nest is not located in an entirely undisturbed area – in addition to the presence of the TFC Plant which adds a constant level of ambient noise to this area, the nest is located in relatively close proximity to a truck depot (330m to the boundary of the depot) to the north-west, and around 770m to the northern H:H waste disposal dam. The area is thus characterised by a relatively high degree of human activity, noise and existing habitat transformation, and in this context the eagle pair thus can be assumed to have a reasonable degree of tolerance to disturbance in the context of the surrounding activities.

The Phase 1 Avifaunal Assessment concluded that the transformation of woodland on the Phase 1 Sites 3 and 4 would lessen the area available for foraging of the pair but may not cause breeding to be abandoned if noisy activities do not occur at the arrays during operation. In the context of the Phase 2 development, the transformation of vegetation associated with Sites 4B and 3B and 3C would cumulatively add to the loss of woodland and hunting territory in the vicinity of the nest site.

7.5 Heritage and Archaeology

Three additional sites previously identified in the 2021 survey[68] also fall within the current study area. Site 2-1 is a BGG with eighteen graves, Site 2-2, being a potential gravesite and Site 2-4 is another low significance archaeological site (Figure 5-28) and the individual site descriptions as contained in Table 7-17. The field description forms were collected with ArcGIS Survey123 in field software.

[65] *Taylor M.R., Peacock F. Wanless R.W. (eds) (2015). The 2015 Eskom Red Data Book of Birds of South Africa, Lesotho and Swaziland. Johannesburg, South Africa.*

[66] *Ibid*

[67] *Hockey, P. A. R.; Dean, W. R. J.; Ryan, P., (2005). Roberts Birds of Southern Africa, VIIth edition. Trustees of the John Voelcker Bird Book Fund*

[68] *Fourie, W., 2021. Proposed 100MW PV Plant at the Samancor Chrome Operations, Steelpoort, Limpopo.*

The recent historic structures are all older than sixty years given that they appear on the 1954 aerial photography and the 1963 map and are all poorly preserved homesteads intercepted and disturbed by the large servitude (TFC002-1 - TFC002-8). It is possible for stillborn burials to have been buried in association with the homestead locality at site TCF002, it is therefore given the high grading of IIIA.

The stone packed archaeological site of TFC003 is rated as IIIC given its degradation and could potentially be a grain bin stand or initiation cairn. The other features surrounding the potential grain bin stand/initiation cairn were too degraded which made identification difficult. The previously identified stone packed Site 2-4 was given the same rating and is detailed thoroughly in the HIA (2021)[69]. The potential grave sites of TFC001, TFC004 and TFC005 still require further investigation, but burial grounds have a high heritage rating and a heritage grading of IIIA. TCF001 contains potentially more than the five graves observed due to limited visibility. TFC004 and TFC005 contained two and three graves, respectively. Recommendations for Site 2-1 and Site 2-2 were detailed in the previous HIA Report[70].

[69] *Fourie, W., 2021. Proposed 100MW PV Plant at the Samancor Chrome Operations, Steelpoort, Limpopo.*
[70] *Ibid*

Table 7-17: Sites identified during the heritage survey

Site Number	Coordinates	Description	Grading	Heritage Significance
TFC001	-24.74395 S; 30.2081 E	Five stone packed graves, potentially more but limited due to visibility. Mounds of heaped soil with stones packed on top. All facing east-west, no head or foot stones visible. Graves are degrading and no longer visited. Dense shrubbery surrounds the graves with trees growing through. An old metal bar can be seen on the first grave.  *Figure 7-35: A stone packed, mounded feature (potential grave)*  *Figure 7-36: The second stone packed, mounded feature (potential grave)*	Grade IIIA	High

Site Number	Coordinates	Description	Grading	Heritage Significance
		 *Figure 7-37: The third stone packed, mounded feature (potential grave)*  *Figure 7-38: The fourth stone packed, mounded feature (potential grave)*		

Site Number	Coordinates	Description	Grading	Heritage Significance
TFC002-1	-24.736 S; 30.21443	Historic homestead made with mud, stone and concrete. Clear layers of larger stones visible in the walling with smaller stones throughout. Walls are damaged and washed away to the foundation mostly, and at their highest are 1.5m tall/40-20cm wide. Seven (7) rooms are observed of various sizes. Floors are concrete where they are not damaged. Site has been recently used for fires. This site is part of a wider spread of similar houses. Associated artefacts - historic ceramic, glass and metal.	 ***Figure 7-39: Intact walling of the poorly preserved historic homestead (this one is the best preserved of the locality)***  ***Figure 7-40: Portions of concrete flooring still preserved***	Grade IIIA	High

Site Number	Coordinates	Description		Grading	Heritage Significance
TFC002-2	-24.73581 S; 30.21495 E	Poorly preserved historic homestead made with mud, stone and concrete. Clear layers of larger stones visible in the walling with smaller stones throughout. Walls are damaged and washed away to the foundation mostly, and at their highest are 40cm tall/40-20cm wide. Five (5) rooms are observed of various sizes. Floors are concrete but damaged. Site has been recently used for fires. This site is part of a wider spread of similar houses. Associated artefacts - historic ceramic, glass and metal. Potential stillborn burials must be investigated (Figure 5-28). It is recommended that the possibility of stillborn burials is investigated through a stakeholder engagement process. If it is found that there are stillborn burials present the remains must be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of Section 36 of the NHRA and its regulations as well as the National Health Act and its regulations.	 *Figure 7-41: A poorly preserved historic homestead*  *Figure 7-42: A view of the flooring of the homestead*	Grade IIIA	High

Site Number	Coordinates	Description	Grading	Heritage Significance
TFC002-3	-24.73577 S; 30.2151 E	Poorly preserved historic homestead made with mud, stone and concrete. Clear layers of larger stones visible in the walling with smaller stones throughout. Walls are damaged and washed away to the foundation mostly, and at their highest are 35cm tall/40-20cm wide. Four (4) rooms are observed of various sizes. Floors are concrete but damaged. Site has been recently used for fires. This site is part of a wider spread of similar houses. Associated artefacts - historic ceramic, glass, and metal. Potential stillborn burials must be investigated.	 ***Figure 7-43: Poorly preserved historic homestead***  ***Figure 7-44: A close up of the homestead. Evidence of recent fires can be seen***	Grade IIIA	High

Site Number	Coordinates	Description	Grading	Heritage Significance
TFC002-4	-24.73558 S; 30.21584 E	Historic homestead made with mud, stone, and concrete. Clear layers of larger stones visible in the walling with smaller stones throughout. Walls are damaged and washed away to the foundation mostly, and at their highest are 1.5m tall/40-20cm wide. Eight (8) rooms are observed of various sizes. Floors and pillars are concrete where they are not damaged. Site has been recently used for fires. This site is part of a wider spread of similar houses. Associated artefacts -historic ceramic, glass, and metal. Potential stillborn burials must be investigated.  ***Figure 7-45: A column of the homestead with bits of thin concrete attached***  ***Figure 7-46: Intact walling of the homestead***	Grade IIIA	High

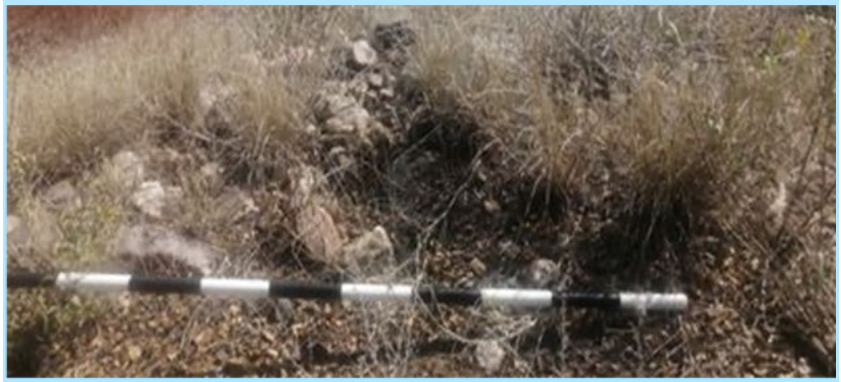
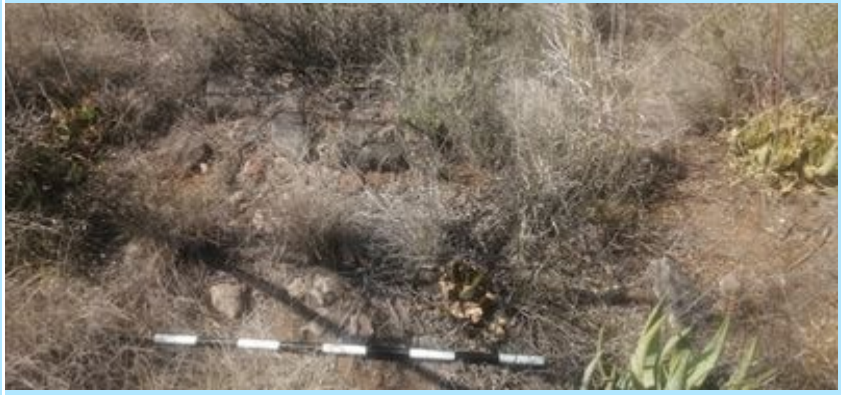
Site Number	Coordinates	Description	Grading	Heritage Significance
TFC002-05	-24.73554 S; 30.21617 E	Square foundation homestead different from the rest as it has a singular room. Packed with large stones around the perimeter of the foundation. This homestead falls within the same area as the other houses but appears differently made. Potential stillborn burials must be investigated.  *Figure 7-47: A poorly preserved homestead, built in a different style*  *Figure 7-48: A close-up of the larger rocks used to build its foundation*	Grade IIIA	High

Site Number	Coordinates	Description	Grading	Heritage Significance
TFC002-6	-24.73643 S; 30.21662 E	Poorly preserved historic homestead made with mud, stone and concrete. Clear layers of larger stones visible in the walling with smaller stones throughout. Walls are damaged and washed away to the foundation mostly, and at their highest are 1m tall/40-20cm wide. Eight rooms are observed of various sizes. Floors are concrete but damaged. Small patches of intact stone walling to the south. This site is part of a wider spread of similar houses. Associated artefacts - historic ceramic, glass and metal. Potential stillborn burials must be investigated.  ***Figure 7-49: Larger bit of walling visible of this poorly preserved historic homestead.***  ***Figure 7-50: An alternate view of the homestead***	Grade IIIA	High

Site Number	Coordinates	Description		Grading	Heritage Significance
TFC002-7	-24.73633 S; 30.21685 E	Square foundation homestead different from the rest as it has a singular room. Packed with large stones around the perimeter of the foundation. This homestead falls within the same area as the other houses but appears differently made. Floor is concrete and is possibly part of TFC002-6 which lies about 5m east. It has a clearly different building style and is a singular separate homestead. Potential stillborn burials must be investigated.	 ***Figure 7-51: Poorly preserved homestead, built in a slightly different style***	Grade 3 - A (IIIA)	High
TFC002-8	-24.73666 S; 30.21567 E	Poorly preserved historic homestead made with mud, stone, and concrete. Clear layers of larger stones visible in the walling with smaller stones throughout. Walls are damaged and washed away to the foundation mostly, and at their highest are 35cm tall/40-20cm wide. Four rooms are observed of various sizes. Floors and pillars are concrete but damaged. Site has been recently used for fires. This site is part of a wider spread of similar houses. Associated artefacts: historic ceramic, glass and metal. Potential stillborn burials must be investigated.	 ***Figure 7-52: Poorly preserved historic homestead***	Grade IIIA	High

Site Number	Coordinates	Description	Grading	Heritage Significance
TFC003	-24.74125 S; 30.2071 E	Stone packed circular feature - potential grain bin/initiation cairn. Less well-preserved circular features adjacent to the east of this one. This was the best preserved as others could not be explicitly identified.  ***Figure 7-53: Stone packed circular feature (potential archaeological grain bin stand/initiation cairn)***  ***Figure 7-54: A general view of the area, other heavily degraded features can be seen the background***	Grade IIIC	Low

Site Number	Coordinates	Description		Grading	Heritage Significance
TFC004	-24.74839 S; 30.18376 E	Two (2) stone packed features, mounding is indicative of possible graves. One feature with a potential headstone mostly packed with cobbles. Features are in a poor condition and are degraded.	 *Figure 7-55: A closer view of the stone packed mound*  *Figure 7-56: The second stone packed mound, with a headstone (potential grave)*	Grade IIIA	High

Site Number	Coordinates	Description	Grading	Heritage Significance
TFC005	-24.74597 S; 30.18434 E	An undisturbed stone packed feature - potential grave site made up of smaller stones. Bush clearing from the archaeological mitigation on Site 3 is visible close by. The stone mounds can potentially be associated with the archaeological at Site 3, however their alignment and general look indicates that the structures can be potential graves.  ***Figure 7-57: Small stone packed mounded feature – potential grave***  ***Figure 7-58: The second degraded stone packed mound, here much larger stones were used, and it is longer in length than the previous one (potential grave)***	Grade IIIA	High, NCW

Site Number	Coordinates	Description	Grading	Heritage Significance
Site 2-1	24°44'16.08"S; 30°12'20.28"E	Cemetery situated along proposed route of the powerline west of Site 2-2. This cemetery contains about eighteen (18) graves of various styles including packed stone and granite graves. The oldest marked grave dates to 1952.  ***Figure 7-59: Cemetery at Site 2-1***	Grade IIIA	High
Site 2-2	24°44'18.22"S; 30°12'26.44"E	Possible graves at Site 2-2. These packed stone features are hidden and overgrown.  ***Figure 7-60: Possible graves***	Grade IIIA	High

Site Number	Coordinates	Description		Grading	Heritage Significance
Site 2-4	24°44'18.81"S; 30°12'25.76"E	Site 2-4 marks an area with multiple packed stone features. These features are degraded making any identification difficult.	 *Figure 7-61: Packed stone feature*	Grade IIIC	Low

7.6 Palaeontology

The proposed development is underlain by Quaternary alluvium and scree while the south and south eastern margins is underlain by the Magaliesberg Formation of the Pretoria Group (Transvaal Supergroup). The PalaeoMap of the South African Heritage Resources Information System (SAHRIS) indicates that the Palaeontological Sensitivity of the superficial deposits is Low, while that of the potentially fossiliferous Magaliesberg Formation is High (Almond and Pether, 2009[71]; Almond et al., 2013[72]). In the Geotechnical report of the Limpopo Province, Groenewald et al (2014) indicates that the superficial deposits is of Low Palaeontological Sensitivity while that of the Magaliesberg Formation is High. Palaeontological Sensitivity generated by the DFFE National Environmental Web-Based Screening Tool indicates a small portion of High Palaeontological Sensitivity while the majority of the study area is underlain by sediments with a Medium Sensitivity. Updated geology (2014, Council for Geosciences) indicates that the study area is underlain by alluvium, colluvium, eluvium and gravel.

7.7 Visual

7.7.1 Visual Receptors in the Study Area

As the proposed development consists of five (5) separate parcels of land on which PV arrays are proposed to be constructed that are distributed around the existing Tubatse Smelter, there are differing sets of potential receptor locations for each of the sites associated with the additional areas. Accordingly, each site, or set of sites in the case of those located in close proximity could potentially affect a different set of visual receptors (Figure 7-62).

Table 7-187-197-207-217-22: Description of visual receptors

Site	Description
2B	Site 2B is located close to the town of Steelpoort but most of the Site 2B area is set back from the town's commercial and residential areas with the Phase 1 Site 2 occupying the intervening area. The closest potential sensitive receptor is a set of residential dwellings located between the R555 and the railway shunting yards that are located immediately to the north of the Phase 1 Site 2 and parts of the Phase 2 Site 2B. The properties have been developed around a small koppie and thus certain houses have an elevated position in relation to much of Site 2B. A small number of households on Transnet Rail Property are located on the north-eastern side of the site. The remainder of the area surrounding Site 2B is comprised of either vacant land, power line servitudes, or mining / industrial areas and thus no receptor locations are located on the southern, eastern, and western areas surrounding Site 2B.
3B, 3C and 4B	Due to the proximity of these sites to each other, these are assessed together. There are very limited visual receptors located in close proximity to these sites. The R555 road runs parallel to the northern boundaries of both sites and is a receptor location carrying large amounts of traffic. The only static receptor location is located to the south-west of the sites – a set of homesteads located to the south of the truck depot. The remainder of the areas surrounding the sites is comprised of open vacant land, much of which has been approved for the development of solar panel arrays and the TFC Plant ancillary infrastructure in the form of two waste dams, various powerline servitudes and the TFC Plant and associated slag dump to the east.
5B	Site 5B is located on open vacant land to the north of the TFC Plant and the R555 road. This small site is bounded on two sides by brine dams associated with the TFC Plant and its water

[71] *Almond, J.E. & Pether, J. 2009. Palaeontological Heritage of the Northern Cape. SAHRA Palaeotechnical Report, Natura Viva cc., Cape Town.*

[72] *Almond, D., Edlund, L., & Milligan, K, 2013. Son Preference and the Persistence of Culture: Evidence from South and East Asian Immigrants to Canada. Population and Development Review. 39. 75-95. 10.2307/41811953.*

Site	Description
	treatment works to the north. There are thus no receptor locations in the immediate area. The only area in which receptor locations are thus located is in the area on the opposite (northern) bank of the Steelpoort River, an area characterised by peri urban settlements (households on small plots of land).

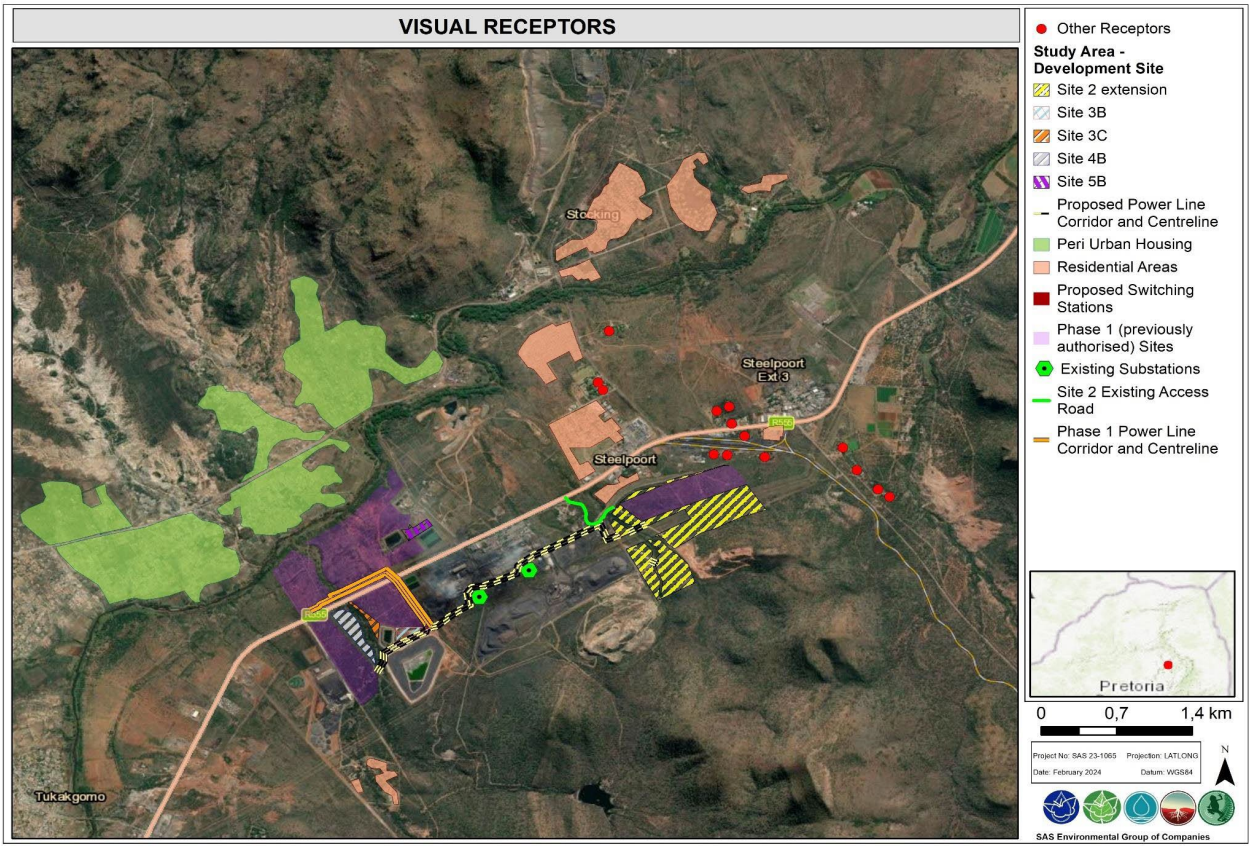


Figure 7-62: Receptor locations situated in the vicinity of the study area

8 Impact Assessment

Impact assessments must take account of the nature, scale and duration of effects on the environment, whether such effects are positive (beneficial) or negative (detrimental). Each issue/impact is also assessed according to the project stages construction (including pre-construction) and operation to the closure/rehabilitation phase (where applicable). The construction period of the project is estimated to be between 12-18 months and the operational period of individual plant will be 25 years. Decommissioning is not foreseen in the next 25 years.

8.1 Impact Assessment Methodology

The potential environmental impacts associated with the project will be evaluated according to its nature, extent, duration, intensity, probability and significance of the impacts, whereby:

- Nature: A brief written statement of the environmental aspect being impacted upon by a particular action or activity;
- Extent (Scale): The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;
- Duration: Indicates what the lifetime of the impact will be;
- Intensity (Magnitude): Describes whether an impact is destructive or benign;
- Probability: Describes the likelihood of an impact actually occurring; and
- Cumulative: In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

This approach incorporates two aspects for assessing the potential significance of impacts, namely occurrence and severity (Table 8-1), which are further sub-divided not probability and duration of occurrence and scale/extent and magnitude of the impact.

Table 8-1: Aspects of the assessment of occurrence and severity

Occurrence		Severity	
Probability of occurrence	Duration of occurrence	Scale/extent of impact	Magnitude (severity) of impact

To assess each of these factors for each impact, the following four ranking scales (Table 8-2) are used:

Table 8-2: Criteria for ranking of impacts

Probability	Duration
5 - Definite/don't know	5 – Permanent
4 - Highly probable	4 - Long-term
3 - Medium probability	3 - Medium-term (8 - 15 years)
2 - Low probability	2 - Short-term (0 - 7 years) (impact ceases after the operational life of the activity)
1 - Improbable	1 – Immediate
0 – None	0 – None
Scale	**Magnitude**
5 - International	10 - Very high/ don't know
4 - National	8 – High
3 - Regional	6 – Moderate
2 - Local	4 – Low
1 - Site only	2 – Minor
0 – None	0 – None

Once these factors have been ranked for each impact, the significance of the two aspects, occurrence and severity, must be assessed using the following formula:

SP (significance points) = (magnitude + duration + scale) x probability

The maximum value is 100 significance points (SP). The impact significance is then categorised into high, moderate and low positive and negative impacts (Table 8-3). Impacts will be assessed and rated before and after mitigation.

Table 8-3: Description of impact significance

Points	Rating	Description
SP >75	Indicates high environmental significance	An impact which could influence the decision about whether or not to proceed with the project regardless of any possible mitigation.
SP 30 – 75	Indicates moderate environmental significance	An impact or benefit which is sufficiently important to require management and which could have an influence on the decision unless it is mitigated.
SP <30	Indicates low environmental significance	Impacts with little real effect and which should not have an influence on or require modification of the project design.
+	Positive impact	An impact that constitutes an improvement over pre-project conditions.

Cumulative impacts (where applicable) will also be determined. A cumulative impact in relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will have been included in the EMPrs (***Appendix G and H***).

Refer to ***Appendix I*** for the detailed assessment of potential impacts.

8.2 Agricultural Potential

An agricultural impact is a change to the future agricultural production potential of land. The assessed area has low agricultural production potential. It does not therefore make sense to prevent other land uses on the grounds that it is being conserved for agricultural use. It is important to note that the need to conserve arable land is not only relevant to the present, but also to the future. The natural agricultural resources of this land must be conserved for a potential future time when the mining and smelting-related industries no longer occupy the site and agricultural use may again become possible. The proposed development is associated with those industries and so if they cease to occupy the site, the proposed development will also cease to occupy the site. Its impact does not therefore prevent future agricultural use.

8.2.1 Construction and Operation Impacts

In terms of impacts associated with the project soil erosion and degradation may also contribute to loss of agricultural production potential. An Agricultural Compliance Statement is not required to formally rate agricultural impacts by way of impact assessment tables. However, the following mitigation measures, are proposed for preventing soil degradation are all inherent in the project engineering and/or are standard, best-practice for construction sites:

- A system of stormwater management, which will prevent erosion on and downstream of the site, will be an inherent part of the engineering design on site.
- Any excavations done during the construction phase, in areas that will be re-vegetated at the end of the construction phase, must separate the upper 30cm of topsoil from the rest of the excavation spoils and store it in a separate stockpile. When the excavation is back-filled, the topsoil must be back-filled last, so that it remains at the surface. Topsoil should only be stripped in areas that are excavated. Across most of the site, including construction laydown areas, it will be much more effective for rehabilitation, to retain the topsoil in place. If levelling requires significant cutting, topsoil should be temporarily stockpiled and then re-spread after cutting, so that there is a covering of topsoil over the entire cut surface. It will be advantageous to have topsoil and vegetation cover below the panels during the operational phase to control dust and erosion.

8.2.2 Cumulative Impacts

The potential cumulative agricultural impact of importance is a regional loss (including by degradation) of future agricultural production potential. This cumulative impact assessment will determine the quantitative loss of agricultural land if all renewable energy project applications within a 30km radius become operational. The development is highly likely to have an acceptable impact on the agricultural production capability of the area and therefore be recommended for approval from a cumulative agricultural impact point of view.

8.2.3 Allowable Development Limits

The agricultural protocol stipulates allowable development limits for renewable energy developments of >20MW. Allowable development limits refer to the area of a particular agricultural sensitivity category that can be directly impacted (i.e. taken up by the physical footprint) by a renewable energy development.

For a solar energy facility, the footprint is considered to be the total area inside the security fence of the facility. The purpose of the allowable development limits is to conserve higher potential, predominantly arable, agricultural land by steering renewable energy development off such land and onto lower potential land. In this case the facility is proposed on land that effectively has no current agricultural production potential. Compliance with the allowable development limits is therefore unnecessary because there is no need to steer the renewable energy facility off the proposed land to conserve it as agricultural production land.

8.3 Hydrology

8.3.1 Construction Impacts

Table 8-4: Hydrology impacts during the construction phase

Impact/s	Significance with and without mitigation	Proposed mitigation
The poor-quality seepage and runoff from construction vehicles parked on site as well as poor quality or uncontrolled runoff from construction sites can impact the Vadose zone soils and subsequent groundwater.	Low (SP=-16) significance without mitigation and Low (SP=-6) significance with mitigation.	▪ Ensure service vehicles are parked in designated areas, with drip trays placed under the vehicles. Vehicles are to be pre-inspected for leakages before entering the site. ▪ Keep the site clean of all general and domestic wastes.
The disturbance of the vadose zone during soil excavations/construction activities.	Moderate (SP=-35) significance pre-mitigation and Low (SP=-8) significance with mitigation.	▪ Only excavate areas that apply to the project area. ▪ Backfill the material in the same order it was excavated to reduce contamination of deeper soils with shallow oxidised soils. ▪ Cover excavated soils with a temporary liner to prevent contamination. ▪ Retain as much indigenous vegetation as possible. ▪ Exposed soils are to be protected using a suitable covering or revegetating.
Erosion and sedimentation of watercourses due to unforeseen circumstances (i.e., bad weather); and Alteration of natural drainage lines due to cable trenches, powerline and pylon construction and internal access road construction can result in surface water contamination and sedimentation from the following activities.	Moderate (SP=-35) significance pre-mitigation and Low (SP=-15) significance with mitigation	▪ Cover soil stockpiles with a temporary liner to prevent contamination. ▪ Construct temporary silt traps at drainage points to allow sediment settlement from runoff. ▪ Return the drainage line to the previous geometry after construction and ensure sufficient measures are taken to divert water around the working area.

Impact/s	Significance with and without mitigation	Proposed mitigation
		▪ Stormwater management interventions as specified in the EMPr must be implemented.
Spillage of fuels and chemicals from construction equipment and vehicles can result in deterioration of water quality	Low (SP=-10) and Low (SP=-4) significance without and after mitigation	▪ Clean up spillages immediately. ▪ Keep chemicals in bunded areas. ▪ Keep vehicles and equipment clean.
Site clearing and preparation activities can result in increased runoff altering flow regimes of receiving watercourses due to vegetation removal and compaction of soil.	Moderate (SP=-35) significance pre-mitigation and Low (SP=-6) significance after mitigation	▪ Vegetation clearing is to be limited to what is essential. ▪ Retain as much indigenous vegetation as possible. ▪ Compact the site footprint only and minimise the working area.

8.3.2 Operation Impacts

Table 8-5: Hydrology impacts during the operation phase

Impact/s	Significance with and without mitigation	Proposed mitigation
Potential for some erosion if there are storm events and hydrocarbon/oil spillages onto soils have the potential to contaminate the soils.	Moderate (SP=-35) significance pre-mitigation and Low (SP=-14) significance after mitigation	▪ Keep the site clean of all general and domestic wastes. ▪ All development footprint areas to remain as small as possible, and vegetation clearing to be limited to what is essential. ▪ Retain as much indigenous vegetation as possible/re-vegetate. ▪ Have fuel/oil spill clean-up kits on site. ▪ Exposed soils are to be protected using a suitable covering or sandbags or berms to control erosion.
Increased runoff due to compacted surfaces from the proposed site onto the surrounding soils may cause higher velocities and frequency of occurrence and sediment transport to the nearby streams.	Low (SP=-20) significance without mitigation and Low (SP=-6) significance with mitigation	▪ It is imperative that release structures for stormwater runoff from the site must dissipate energy and disperse flow to ensure minimal impact on the receiving environment.
Potential sedimentation several months after the site has been constructed. It is anticipated that the sediment load will decrease with time to pre-construction levels.	Moderate (SP=-35) significance pre-mitigation and Low (SP=-12) significance after mitigation	▪ Release structures for stormwater runoff from the site must incorporate silt traps to allow for the settlement of sediments and these silt traps must be cleaned regularly.

8.3.3 Cumulative Impacts

The largest impact will be sedimentation of the river due to construction site runoff, slight increases in runoff may occur, but water will flow off of the panels and will either contribute to runoff or infiltrate into the soil. As noted in the operational section above increased sedimentation may still occur once construction activities have ceased but will alleviate as the operational activities continues. Considering the sub-catchment

conceptual hydrological cycle and the activities associated with the site and surroundings, no impacts are expected in terms of the hydrological cycle.

8.4 Freshwater

8.4.1 Pre-construction Impacts

Table 8-6: Freshwater pre-construction impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Alteration of hydrology and geomorphology of receiving freshwater ecosystems and resulting degradation of freshwater habitat through poor stormwater design.	Moderate (SP=--48) significance pre-mitigation and Low (SP=-20) significance after mitigation	▪ The SWMP compiled for the development must ensure that the stormwater drainage inputs to the freshwater ecosystems mimic the current baseline as far as possible (refer to 7.1.2). ▪ Stormwater features must be vegetated with indigenous obligate and facultative species suitable for seasonal saturation. This will assist with energy dissipation and prevent sedimentation and erosion as well as improve habitat provision. ▪ Rip rap must be placed on all outlet structures and indigenous vegetation established to bind the soil of the bed, to prevent erosion and assist with energy dissipation. This will also promote diffuse flow and decrease the velocity of water released downgradient towards the drainage lines. At no point must erosion or gully formation be allowed as this will have an impact on the water dispersal which could potentially reduce the extent and functionality of the riparian systems in the long-term. ▪ With regards to concrete works for the outlet structures (including concrete aprons, reno mattresses, gabions, headwalls, etc., as applicable), see control measures related to concrete works below. These must ideally be constructed during the drier winter months to reduce the potential for impacts on downgradient freshwater ecosystems.

8.4.2 Construction Impacts

Table 8-7: Freshwater construction impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
The clearing of vegetation and terrain levelling (bulk earthworks) within the catchments of the drainage lines may potentially result in the following impacts: ▪ Transformation of vegetation associated with freshwater ecosystems as well as associated habitat and ecosystem services as a result of indirect impacts; ▪ Transportation of construction materials can result in disturbances to soils, and increased risk of sedimentation/erosion and soil and stormwater contamination from oils and hydrocarbons originating from construction vehicles; ▪ Earthworks and the associated disturbed soil could be potential sources of sediment, which may be transported in runoff into the downgradient freshwater ecosystem areas. This is particularly pertinent in this project areas as the soils are prone to erosion; ▪ Exposure of soil, leading to increased runoff, and erosion, and thus increased sedimentation of the freshwater ecosystems; ▪ Increased sedimentation of the freshwater ecosystems, leading to smothering of the vegetation and aquatic biota associated with the freshwater ecosystems; and ▪ Proliferation of alien and/or invasive vegetation as a result of disturbances.	Moderate (SP=-40) significance pre-mitigation and Low (SP=-24) significance after mitigation	▪ All construction and site clearing should ideally take place during the dry season to limit potential impacts to downgradient drainage lines as a result of construction activities. ▪ All development footprint areas to remain within the approved development area and vegetation clearing to be limited to approved footprints. ▪ Where clearing of vegetation at a large scale (i.e. in the solar panel array footprints) is to be undertaken, blocks of vegetation must be systematically cleared of vegetation to avoid the creation of large volumes of dust and to control stormwater runoff during construction. ▪ All vegetation removed as part of the site clearing activities (specifically where large areas need to be cleared) must be transported from the construction site (may not be stockpiled) and disposed of at a registered waste disposal facility. ▪ During and after clearing regular spraying of non-potable water or the use of chemical suppressants, that are approved for use near freshwater ecosystems must be implemented to reduce dust and to ensure no smothering of vegetation within the adjacent freshwater ecosystems occurs from excessive dust settling. It is recommended that a suitably qualified specialist be consulted for approval of the product and conditions for use. ▪ The freshwater ecosystems and their 20m development exclusion buffers must be strictly maintained as no-go areas. No construction vehicles, nor construction personnel or vehicles may traverse through these freshwater ecosystems. ▪ Existing roads must be utilised to gain access to sites. ▪ All vehicle re-fuelling is to take place in specifically designated re-fuelling

Impact/s	Significance with and without mitigation	Proposed mitigation
		areas that must be located outside of the GN4167 ZoR. ▪ No vegetation may be removed from the 20m development exclusion buffer surrounding the freshwater ecosystems where no infrastructure is planned, as this vegetation provides a natural buffer zone around the freshwater ecosystems which plays a role in dispersing surface runoff into the freshwater ecosystems, and thus prevents sedimentation and erosion thereof.
Construction of surface infrastructure associated with the proposed development within the catchments of the drainage line reaches e.g. solar panel arrays and other associated infrastructure. Impacts include: ▪ Earthworks and excavations could be potential sources of sediment, which may be transported as runoff into the downgradient freshwater ecosystem areas; ▪ Disturbances of soils leading to increased alien vegetation proliferation within the terrestrial buffer zone surrounding the freshwater ecosystems, with the potential to affect the freshwater habitat; ▪ Altered runoff patterns within the local catchment of the freshwater ecosystems, potentially leading to increased erosion and sedimentation of the receiving freshwater environment; ▪ Potential impacts on the water quality of surface water runoff (when present) which may potentially enter the downgradient freshwater ecosystems and contamination of soils due to concrete casting; and ▪ Potential of backfill material entering the freshwater ecosystems, increasing the sediment loads therein.	Moderate (SP=-40) significance pre-mitigation and Low (SP=-24) after mitigation	▪ Regular spraying of non-potable water or the use of approved chemical dust suppressants, that are approved must be implemented to reduce dust and to ensure no smothering of vegetation within the adjacent freshwater ecosystems occurs from excessive dust settling. ▪ During excavation activities, topsoil must be stockpiled separately from other material outside the delineated extent of the freshwater ecosystems and their associated 20m development exclusion buffer. ▪ Suitable drainage must be ensured within construction areas (including contractor laydown areas, material storage facilities, etc.) in order to ensure that water does not pond or drain in a concentrated manner into the downgradient freshwater ecosystems. ▪ Silt traps or placing hay bales downgradient of the construction footprint should be installed to ensure no sediment laden or concentrated runoff generates from the construction footprint. ▪ Fresh concrete and cement mortar must not be mixed near the freshwater ecosystems. ▪ All excavated areas must be backfilled to the natural ground level with excavated material where possible.
Installation of the powerline towers (support structures) and stringing of the proposed powerline across the respective drainage lines.	Moderate (SP=-36) significance pre-mitigation and Low (SP=-14) significance after mitigation	▪ When the powerline is strung between the support structures, no vehicles may indiscriminately drive through the drainage lines.

Impact/s	Significance with and without mitigation	Proposed mitigation
		▪ The construction footprint must be limited to the pit area. The area must be rehabilitated after the completion of the construction phase, including Alien Invasive Plant (AIP) control undertaken until basal vegetation cover is achieved.
Development and construction of new roads due to the site preparation, movement of vehicles, excavations, and concrete works within the immediate catchments of freshwater ecosystems	Moderate (SP=-40) significance pre-mitigation and Low (SP=-14) significance after mitigation	▪ For the proposed internal access roads the construction footprint must be limited to a 10m wide construction Right of Way (ROW) that includes the road footprint. ▪ Any removed vegetation must be stockpiled outside of the delineated boundary of the drainage lines and their associated 20m buffer area. ▪ Reno-mattresses or riprap must be installed at the outlet side of any culvert structures to ensure energy dissipation and prevent concentrated runoff into the downgradient freshwater buffer area. The reno mattress/riprap must be installed flush with the culvert outlet. ▪ The disturbed part of the construction RoW outside of the road footprint must be revegetated with suitable indigenous vegetation to prevent the establishment of alien vegetation species and to prevent erosion from occurring.

8.4.3 Operation Impacts

Table 8-8: Freshwater operation impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Operational presence of a solar PV development within the catchments of the respective drainage lines resulting in: ▪ Permanent alteration of patterns and timing of flows and recharge to the receiving drainage lines due to the levelling or parts of their catchments and the permanent removal of vegetation from the solar PV footprints that could alter the hydrological regimes of the drainage lines and cause degradation of riparian habitat; and	Moderate (SP=-44) significance pre-mitigation and Low (SP=-27) significance after mitigation	▪ The maintenance of a 20m development exclusion area (buffer) around all freshwater ecosystems is critical to buffering the drainage lines from the effects of the loss of vegetation cover and long-term alteration of infiltration and resultant runoff capacity of parts of the catchments of the drainage lines within the solar array footprint.

Impact/s	Significance with and without mitigation	Proposed mitigation
▪ Altered runoff patterns that could lead to creation of erosion within the buffer areas and within the drainage lines themselves.		
Operational maintenance of the development (including washing of panels and the maintenance of the powerline, especially in the vicinity of the drainage lines).	Moderate (SP=-44) significance pre-mitigation and Low (SP=-27) significance after mitigation	▪ Maintenance activities must be confined to the developed footprint of the solar energy facility which must be fenced off to prevent accidental access into the adjacent freshwater ecosystems (riparian zones). ▪ A formal waste management and disposal system must be implemented at the solar energy facility. ▪ No indiscriminate movement of construction equipment through the drainage lines must be permitted during standard operational activities or maintenance activities. ▪ Should erosion be noted in the footprint of the arrays that may potentially impact on a freshwater ecosystem, the area must be rehabilitated by infilling the erosion gully and revegetation thereof with suitable indigenous vegetation. ▪ The surface infrastructure areas must be inspected to ensure that no concentrated runoff from these areas form erosion gullies leading to erosion and sedimentation of the receiving freshwater ecosystems. Should these impacts be noted, these gullies/preferential flow paths must be infilled with in situ material and appropriately stabilised and/or revegetated.
Operational stormwater control management of stormwater attenuation facilities on the development sites resulting in the following impacts: ▪ Potential pollutants and toxicants entering the downgradient drainage lines if attenuation facilities are not properly maintained; ▪ Potential changes to the water retention pattern, timing and flows within the downgradient drainage lines if attenuation facilities are not properly maintained and thereby become ineffective; and	Moderate (SP=-44) significance pre-mitigation and Low (SP=-18) significance after mitigation	▪ Regular inspection of the stormwater outlet structures must be undertaken (specifically after large storm events) in order to monitor the occurrence of erosion. If erosion has occurred, it must immediately be rehabilitated through stabilisation of the embankments and revegetation. ▪ All channels and open swales must be regularly cleaned, and all outlet structures (if any) checked to ensure there is no debris/blockages.

Impact/s	Significance with and without mitigation	Proposed mitigation
▪ Potential exacerbation of existing erosion and development of new erosion, along with concomitant increased sedimentation within the downgradient drainage lines as a result of the increased stormwater discharge causing increased scour and velocity if the attenuation features are not maintained.		
Operation and maintenance of the proposed internal access roads located on the development sites in the catchments of the drainage lines (where applicable). Impacts include: ▪ Concentrated runoff from the road crossings leading to erosion and subsequent sedimentation of the freshwater ecosystems (increase in the sediment load) and turbulent flows when surface water is present. ▪ Litter and spills (e.g. oils, hydrocarbons) could be washed off the road surface by stormwater and could pollute downgradient areas, including the downgradient drainage lines.	Low (SP=-27) significance pre-mitigation and Low (SP=-14) significance after mitigation	▪ Unnecessary disturbances on the margins of the newly developed roads must be avoided. ▪ Stormwater runoff from the roads must be monitored, to ensure it does not result in erosion of the freshwater ecosystems. ▪ During periodic maintenance activities of the roads, monitoring for erosion must be undertaken; and ▪ Should erosion be observed, caused by the road crossings/instream infrastructure, the area must be rehabilitated.

8.4.4 Cumulative Impacts

Freshwater ecosystems within the wider area of the wider Sekhukhuneland area and in the context of the Steelpoort-Dwars River platinum mining belt are under continued threat due a variety of factors primarily related to increasing mining activities which are responsible for transformation of large areas of land, including freshwater ecosystems. Other land uses which, in the long term, may prove to be unsustainable include communal ranging of livestock, as well as urban expansion typically result in transformative impacts on freshwater ecosystems. Development of renewable energy infrastructure, including solar energy facilities can also form part of the cumulative impact on freshwater ecosystems. Other factors such as existing linear infrastructure (roads and railways) as well as climate change also exert impacts on the freshwater ecosystems in the wider area.

The development of the TFC Solar Phase 1 PV Plant has already been authorised, and although construction has not commenced, TFC Solar intends to develop both Phase 1 and Phase 2 in order to acquire 100MW of power. Assuming that the Phase 1 development sites are constructed, these will exert a further impact on the freshwater ecosystems within the study area, considering factors such as the change in vegetation cover, as well as potential risks to the sediment balance and pattern flow and timing of water in the landscape associated with the development and the formalisation of certain of the EDLs on the Phase 1 Site 5.

Should the development of the TFC Solar Phase 2 PV Plant impact freshwater resources, this will result in a cumulative impact on the freshwater ecosystems in a wider area, especially at a quaternary catchment or smaller catchment area level. It is however notable that increased sediment inputs are at least partially offset by the reduction in sediment input created by the De Hoop Dam that is located along the Steelpoort River

upstream of the development site. The implementation of mitigation measures to avoid impacts will negate the creation of a significant cumulative impact.

8.5 Biodiversity

8.5.1 Construction Impacts

8.5.1.1 Site 2B

While parts of this proposed site are considered deteriorated and heavily infested with exotic and invasive plants, other portions comprise natural and highly sensitive savannah habitat that is also representative of the regional ecological types, and losses of remaining natural habitat is an important consideration. Ultimately, the abundant presence of several protected plants, notably the vulnerable *Adenia fruticosum*, as well as the confirmed presence of the endangered Southern Mountain Reedbuck renders the remaining natural vegetation comparatively sensitive, and losses of these conservation important species and habitat is an important consideration on a local scale. As this site is spatially situated on the perimeter of areas of existing transformation, including industrial and linear activities, the buffering role that this portion of land plays between these areas and pristine and natural habitat further to the south of the site is also considered important.

However, it should also be noted that while these areas do provide habitat for the Mountain Reedbuck, their presence is considered opportunistic, particularly in view of existing impacts from the surrounds. The ecological habitat is currently categorised as Least Concern. The presence of several protected plant species within the site is furthermore considered typical of the larger environment and limited losses, on a regional scale, is anticipated. Ultimately, the results of the assessment indicated that habitat from the site is considered ubiquitous to the wider region and does not constitute critical habitat that is restricted on a local or regional scale.

While the anticipated impact significance is considered to be moderately high, the introduction of generic and site-specific mitigation measures, notably a dedicated invasive species management programme will result in amelioration of high significance impacts to a more acceptable level, refer to the EMPrs (***Appendix G and H***).

Table 8-9: Site 2B construction impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Losses of conservation important and protected species (individuals, stands, populations) as well as habitat that is associated with plants of conservation importance.	High (SP=-85) significance pre-mitigation and Moderate (SP=-75) significance after mitigation	▪ Apply for and secure all relevant permits from DFFE and LEDET for protected plant species that occur on the site prior to any activity being undertaken. No protected plant species may be affected, removed, excavated, relocated, or impacted in any manner, except under a valid permit granted by the relevant authority and under the supervision of the appointed ECO. ▪ The ECO should delegate and oversee the final walkdown to identify and geolocate protected

Impact/s	Significance with and without mitigation	Proposed mitigation
		plant species for permitting purposes. ▪ Develop and execute a Search and Rescue operation for certain plants/trees as per recommendations from the Final Walkdown Report. It should be noted that the transportation and relocation process of protected plant species is also subject to permitting requirements; this process should be guided by the ECO and executed by a suitable ecological specialist.
Losses and deterioration, of natural and sensitive habitat types, including essential habitat refugia, atypical and unique/restricted habitat types.	Moderate (SP=-75) significance pre-mitigation and Moderate (SP=-60) significance after mitigation	▪ All development areas must be demarcated, and no personnel or construction vehicle shall be allowed to access neighbouring properties for any purpose whatsoever. ▪ Under no circumstances shall any natural area on neighbouring properties (outside the development site footprints) be impacted, degraded, cleared, or affected in any manner. ▪ The use of locally indigenous plant species for landscaping purposes is strongly recommended. Under no circumstances shall exotic and invasive plants be used for landscaping purposes. ▪ Rehabilitation of areas where construction activities have been finalised, must be prioritised.
Depletion of local diversity and loss of rare species or communities.	Moderate (SP=-60) significance pre-mitigation and Moderate (SP=-48) significance after mitigation	▪ Develop and implement a biodiversity monitoring programme to establish long-term trends of floristic and faunal diversity patterns and the latent and immediate effects of the project on these receiving environments.
Deterioration and changes to untransformed habitat in the surrounds, with specific reference to sensitive habitat types and habitat types of limited representation on a local scale.	Moderate (SP=-75) significance pre-mitigation and Moderate (SP=-52) significance after mitigation	▪ Develop and implement a biodiversity monitoring programme to establish long-term trends of floristic and faunal diversity patterns and the latent and immediate effects of the project on these receiving environments.
Disruption of important ecological processes, services, and infrastructure	Moderate (SP=-52) significance pre-mitigation	▪ Stormwater management must aim to ameliorate destructive erosion

Impact/s	Significance with and without mitigation	Proposed mitigation
and altered ecological functionality (including fire, erosion) of surrounding areas and natural habitat.	and Low (SP=-27) significance after mitigation	events that will result in further deterioration of the drainage channels. ▪ Erosion control must be prioritized, notably during the planning phase where slopes, runoff from paved and tarmac areas and stormwater control measures need to be highlighted and planned to prevent erosion of surrounding natural areas. ▪ Ensure the implementation of erosion control measures on the perimeter of the development, aimed at avoiding exacerbation of the existing erosion patterns. ▪ No painting or marking of rocks or vegetation (trees) to identify locality or other information shall be allowed, as it will disfigure the natural setting. Marking shall be done by steel stakes with tags, if required. All temporary markings will be removed upon completion of the construction. ▪ Collection of branches, wood (dead or alive), shrubs or any vegetation for fire making purposes is strictly prohibited. ▪ Prevent all open fires on site. ▪ The irresponsible use of welding equipment, oxy-acetylene torches, and other naked flames, which could result in veld fires, or constitute a hazard should be guided by safe practice guidelines. ▪ The burning of general waste material is not to be allowed. ▪ Provide demarcated fire-safe zones, facilities, and suitable fire control measures.
Introduction of exotic and invasive species to the area or exacerbating the spread of existing infestations.	Moderate (SP=-60) significance pre-mitigation and Low (SP=-28) significance after mitigation	▪ An AIP Management Programme should be developed and implemented with the onset of the construction phase. The aim of this programme should include *inter alia* the identification, control, and eradication of invasive plants from the site and immediate surrounds through a responsible, yet effective, management strategy that might involve a combination of physical

Impact/s	Significance with and without mitigation	Proposed mitigation
		removal methods and application of chemical treatments. The Environmental Officer shall compile relevant action plans to deal with the presence of alien and invasive species.
Exacerbated decline in the aesthetic appeal of the landscape.	Low (SP=-26) significance pre-mitigation and Low (SP=-16) significance after mitigation	▪ Provide temporary and suitable on-site ablution, sanitation, litter and waste management and hazardous materials management facilities until such time that adequate permanent and operational facilities can be provided. Abluting anywhere other than in provided ablutions shall not be permitted. Under no circumstances shall use of the veld for ablution purposes be permitted. ▪ A periodic (at least annual) clean-up of the surrounding natural environment should be undertaken to remove litter and prevent unwanted deterioration of the surrounding natural environment.
Inappropriate harvesting of natural resources and exacerbation of pressure on natural resources due to increased human encroachment, accessibility to the site, also considering changes in land use of surrounding areas that are not compatible to conservation efforts.	Moderate (SP=-56) significance pre-mitigation and Low (SP=-16) significance after mitigation	▪ Under no circumstances shall any natural area on neighbouring properties (outside the development site footprints) be impacted, degraded, cleared, or affected in any manner. ▪ Cleared vegetation and debris that has not been utilised must be collected and disposed through an appropriate manner.

8.5.1.2 Site 3B and 3C

These sites comprise largely natural shrubveld habitat that is moderately representative of the regional ecological types. Considering that the regional type is categorised as endangered, and also with the known presence of conservation important plants within this site, the ecological sensitivity is considered moderately high. Losses of conservation important species and natural savannah habitat is therefore considered significant on a local scale and the implementation of a generic mitigation approach refer to the EMPrs (***Appendix G and H***), notably the relocation of conservation important plants from the site, will only render the post-mitigation significance of anticipated impacts moderate, albeit mostly localised.

Table 8-10: Site 3B and 3C construction impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Losses of conservation important and protected species (individuals, stands, populations) as well as habitat that is associated with plants of conservation importance.	Moderate (SP=-75) significance pre-mitigation and Moderate (SP=-56) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Losses, and deterioration, of natural and sensitive habitat types, including essential habitat refugia, atypical and unique/ restricted habitat types.	Moderate (SP=-75) significance pre-mitigation and Moderate (SP=-60) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Depletion of local diversity and loss of rare species or communities.	Moderate (SP=-60) significance pre-mitigation and Moderate (SP=-44) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Deterioration and changes to untransformed habitat in the surrounds, with specific reference to sensitive habitat types and habitat types of limited representation on a local scale.	Moderate (SP=-60) significance pre-mitigation and Moderate (SP=-44) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Disruption of important ecological processes, services, and infrastructure and altered ecological functionality (including fire, erosion) of surrounding areas and natural habitat.	Moderate (SP=-52) significance pre-mitigation and Low (SP=-27) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Introduction of exotic and invasive species to the area or exacerbating the spread of existing infestations.	Moderate (SP=-45) significance pre-mitigation and Low (SP=-11) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Exacerbated decline in the aesthetic appeal of the landscape.	Moderate (SP=-39) significance pre-mitigation and Low (SP=-16) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Inappropriate harvesting of natural resources and exacerbation of pressure on natural resources due to increased human encroachment, accessibility to the site, also considering changes in land use of surrounding areas that are not compatible to conservation efforts.	Moderate (SP=-56) significance pre-mitigation and Low (SP=-16) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.

8.5.1.3 Site 4B

This site comprises natural shrubveld habitat that is representative of the regional ecological types. Considering that the regional type is categorised as endangered, and also with the known presence of conservation important plants within this site, the sensitivity is considered moderately high. Losses of conservation species and natural savannah habitat is therefore considered significant on a local scale and the implementation of a generic mitigation approach refer to the EMPrs (***Appendix G and H***), notably the

relocation of conservation important plants from the site, will only render the post-mitigation significance of anticipated impacts moderate, albeit mostly localised.

Table 8-11: Site 4B construction impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Losses of conservation important and protected species (individuals, stands, populations) as well as habitat that is associated with plants of conservation importance.	Moderate (SP=-75) significance pre-mitigation and Moderate (SP=-56) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Losses, and deterioration, of natural and sensitive habitat types, including essential habitat refugia, atypical and unique/ restricted habitat types.	Moderate (SP=-75) significance pre-mitigation and Moderate (SP=-55) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Depletion of local diversity and loss of rare species or communities.	Moderate (SP=-60) significance pre-mitigation and Moderate (SP=-44) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Deterioration and changes to untransformed habitat in the surrounds, with specific reference to sensitive habitat types and habitat types of limited representation on a local scale.	Moderate (SP=-60) significance pre-mitigation and Low (SP=-22) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Disruption of important ecological processes, services, and infrastructure and altered ecological functionality (including fire, erosion) of surrounding areas and natural habitat.	Low (SP=-26) significance pre-mitigation and Low (SP=-18) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Introduction of exotic and invasive species to the area or exacerbating the spread of existing infestations.	Moderate (SP=-60) significance pre-mitigation and Low (SP=-22) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Exacerbated decline in the aesthetic appeal of the landscape.	Low (SP=-28) significance pre-mitigation and Low (SP=-22) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Inappropriate harvesting of natural resources and exacerbation of pressure on natural resources due to increased human encroachment, accessibility to the site, also considering changes in land use of surrounding areas that are not compatible to conservation efforts.	Moderate (SP=-56) significance pre-mitigation and Low (SP=-16) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.

8.5.1.4 Site 5B

Site 5B constitutes deteriorated woodland; results of the site inspection indicated a low presence of protected plant species on this site. Anticipated impacts from a botanical perspective is therefore likely to

be moderate, mostly as a result of the minor losses of remaining natural woodland from the site (also in context with the location of the proposed site adjacent to existing transformed areas). The introduction of a generic mitigation approach is provided in the EMPrs (***Appendix G and H***), but with specific reference to the management and control of invasive plant species from the site, is likely to reduce the anticipated impacts significance to acceptably low levels.

Table 8-12: Site 5B construction impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Losses of conservation important and protected species (individuals, stands, populations) as well as habitat that is associated with plants of conservation importance.	Moderate (SP=-40) significance pre-mitigation and Low (SP=-20) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Losses, and deterioration, of natural and sensitive habitat types, including essential habitat refugia, atypical and unique/ restricted habitat types.	Low (SP=-22) significance pre-mitigation and Low (SP=-9) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Depletion of local diversity and loss of rare species or communities.	Low (SP=-22) significance pre-mitigation and Low (SP=-20) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Deterioration and changes to untransformed habitat in the surrounds, with specific reference to sensitive habitat types and habitat types of limited representation on a local scale.	Low (SP=-22) significance pre-mitigation and Low (SP=-8) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Disruption of important ecological processes, services, and infrastructure and altered ecological functionality (including fire, erosion) of surrounding areas and natural habitat.	Low (SP=-20) significance pre-mitigation and Low (SP=-9) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Introduction of exotic and invasive species to the area or exacerbating the spread of existing infestations.	Moderate (SP=-52) significance pre-mitigation and Low (SP=-18) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Exacerbated decline in the aesthetic appeal of the landscape.	Low (SP=-20) significance pre-mitigation and Low (SP=-7) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.
Inappropriate harvesting of natural resources and exacerbation of pressure on natural resources due to increased human encroachment, accessibility to the site, also considering changes in land use of surrounding areas that are not compatible to conservation efforts.	Low (SP=-20) significance pre-mitigation and Low (SP=-7) significance after mitigation	▪ Refer to mitigation measures proposed for Site 2B.

8.5.2 Cumulative Impacts

- Available information on existing and planned renewable energy projects within a 30km radius, indicates that, apart from the authorised Phase 1 PV Plant, no other projects or activities are identified. The brief conclusion is therefore that the anticipated cumulative effects of this project on biodiversity attributes from a regional perspective are considered of low importance and significance. The proposed development will utilise, to a large extent, habitat that already exhibit moderate to high levels of deterioration and disturbance.
- Minor portions of highly sensitive habitat are proposed for development.
- The proposed sites do not comprise geographically isolated greenfield areas that are situated within larger expanses of natural and untransformed habitat; it therefore does not constitute a 'thin end of the wedge' in natural habitat/areas.
- The proposed project sites are situated in proximity to a commercial and industrial centre (Steelpoort) that is characterised by significant levels of transformation, fragmentation, and deterioration. The activity is therefore considered consistent with current land uses within an area that is already (ecologically) compromised to an extent, although being cognisant of the presence of several sensitive and conservation important plants and animals that persist.
- In comparison with significant increases in industrial, and specifically mining related activities noted in the wider region, the contribution to habitat and species losses from this project are considered marginal. It is particularly evident, from a regional perspective, also with specific reference to mining activities immediately adjacent to Site 2B, that mining, probably, constitutes the most significant and devastating activity on natural and sensitive resources on a regional scale.

8.6 Avifauna

8.6.1 Construction Impacts

Table 8-13: Avifaunal construction impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Direct transformative impact on natural habitat related to construction of solar panel arrays, cable trenching and internal access roads, as well as other construction-related activities including uncontrolled movement of vehicles and other construction machinery. The impact would relate to the loss of habitat for the current bird species inhabiting/visiting the development site and surrounding area, in particular in the context of priority species/SCC.	Moderate (SP=-60) significance pre-mitigation and Moderate (SP=-55) significance after mitigation	▪ Clearing of vegetation to be completed in a phased manner. ▪ No unauthorised fires are to be allowed on the site. ▪ During the establishment (construction) of the powerline servitudes in areas of residual natural vegetation, especially within riparian corridors, clearing of vegetation must be limited to what is technically required and woody vegetation within drainage lines that is below the minimum clearance distance to the lines must not be indiscriminately felled. ▪ Construction activities must not encroach beyond the development footprint. ▪ Construction staff must not enter any areas of residual woodland or other natural habitat outside of the development footprint.

Impact/s	Significance with and without mitigation	Proposed mitigation
		▪ In the context of construction phase environmental management, edge effect control must be implemented to ensure no further degradation and potential loss of avifaunal habitat outside of the proposed project footprint area. An ECO must monitor and mitigate any edge effects throughout the construction phase. Special attention must also be paid to potential increase and spread of AIPs. ▪ No collection or hunting of any fauna species is to be allowed by personnel during the construction phase, especially with regards to avifaunal SCC (if encountered and not part of a rescue/relocation plan). ▪ No commencement of construction (especially vegetation clearing and bulk earthworks) for the solar power site on Phase 1 Site 4 and Phase 2 Site 4C and its surrounds must occur within the designated 350m buffer around the Wahlberg's Eagle nest until such time as the Wahlberg's Eagles have left the area on their northward migration in April and before their arrival in August, as stipulated in the EA Amendment for the Phase 1 Solar Development. ▪ It is also important that vehicular access into the buffer area along the new access road to Site 4 continue to be restricted to authorised personnel (e.g. security) only and that no general construction personnel / construction vehicle access into the buffer area be permitted. Access to the parts of Site 4 and 4C outside of the buffer must be along the newly created access road, and no access routes must be created from the areas to the south and east of Site 4.

8.6.2 Operation Impacts

8.6.2.1 Collision related impacts

A significant direct impact relating to the development and operation of solar panel arrays is bird trauma or mortality that is caused by collisions with PV panels, with the possible reasons for collisions being polarised light pollution and/or relating to waterbirds mistaking large arrays of PV panels as wetlands or waterbodies

– the so-called “lake effect” (Walston et al, 2016)[73]. Although no evaporation ponds are proposed to be developed in association with the solar power development, certain of the arrays on Site 5B are located in close proximity to a number of artificial waterbodies (brine dams) that exist in the vicinity of the Smelter.

A certain assemblage of waterbird species inhabits these artificial waterbodies and the waterbodies are utilised as roosting sites by a number of species that are resident in the area, and accordingly these birds will move to and from the waterbodies, often in low light conditions at the start and end of the day. However, it is important to consider that a relatively small overall number of birds and species diversity inhabit and utilise these water bodies. Incidental observations are suggestive that the waterbodies may occasionally be utilised by species that would not regularly occur in the wider area to rest / roost.

As solar arrays are proposed to effectively surround the brine dams (with the development of Site 5B, in addition to the Phase 1 Site 5 arrays), the panels in the vicinity of the brine dams could also pose a collision risk for waterbirds, especially during low light conditions as discussed above. The relatively low number of birds visiting these artificial waterbodies would render the potential impacts less significant that a scenario in which large numbers of waterbirds were frequenting the waterbodies, and the potential impact is not considered highly significant. Furthermore, when considered in a wider (regional) context, the Sekhukhuneland-Lydenburg area is not associated with significant water bodies or wetlands, primarily due to the nature of the terrain which is often highly mountainous and rocky and thus does not typically attract a wide range of waterbirds that would be attracted to large natural wetlands, floodplains, pans or dams. The presence of large number of over-flying waterbirds that could be attracted to the panels in the manner of the ‘lake effect’ would thus be highly unlikely in the study area. This potential impact is thus not considered to be significant and the potential for large numbers of waterbirds or threatened species to be attracted to the solar arrays through the lake effect is expected to be low. Nonetheless certain mitigation measures have, and operational monitoring of collisions has been recommended at these waterbodies.

Table 8-14: Avifaunal operational phase impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Permanent transformative impact on natural vegetation that would lead to the relate to the loss of habitat for the current bird species inhabiting/visiting the development site and surrounding area.	Moderate (SP=-55) significance pre-mitigation and Moderate (SP=-55) significance after mitigation	▪ Retention of residual natural vegetation on the parts of the Phase 2 (and Phase 1) development sites that do not fall within the solar array or other infrastructure footprint. ▪ Active protection of sensitive habitats through fencing off from public access – in the context of Phase 2 this would include the riparian zones of the drainage lines located between sites 3B/C and 4C and drainage lines located between the Site 2B development compartments and the fringing non-development buffer areas. ▪ It is recommended that low vegetation be retained or allowed to become re-established under the arrays to protect the underlying soil from erosion and to aid in the control

[73] *Walston LJ, Rollins KE, Kirk E, LaGory KE, Smith KP and Meyers SP. 2016. A preliminary assessment of avian mortality at utility-scale solar energy facilities in the United States. Renewable Energy 92:405-414*

Impact/s	Significance with and without mitigation	Proposed mitigation
		of stormwater management to prevent edge effects on residual areas of avifaunal habitat adjacent to the development site boundaries from materialising. ▪ Powerline servitudes must not be cleared of all woody vegetation and only woody vegetation infringing on the required clearance area around the lines must be felled. ▪ Maintenance of the integrity of the 350m Wahlberg's Eagle nest buffer throughout the lifespan of the proposed development and the restriction of access (other than security personnel access) into this buffer area.
Bird fatalities due to collisions with overhead powerlines or with PV panels.	Moderate (SP=-42) significance pre-mitigation and Low (SP=-24) significance after mitigation	▪ Monitoring of the solar arrays for bird fatalities must occur at regular intervals during the operational phase of the development, in line with the BLSA Birds and Solar Energy Guideline. ▪ Anti roosting spikes/diverters should be fitted to the solar panels, if required. ▪ Placing of bird flight diverters along the spans of the powerline crossing the drainage lines or located within 100m each side of the drainage line riparian zones. ▪ Operational lighting at the solar facility must be limited to low level security lighting and no floodlighting must be utilised.

8.6.2.2 Wahlberg's Eagle Breeding Impacts (Operational)

Operation of PV solar arrays is not typically associated with high levels of noise, and the presence of solar arrays on the Phase 1 Site 4 and the Phase 2 Site 4B would arguably not deleteriously affect breeding, provided the riparian zone of the drainage line in which the nest is located remains an area in which human activity is restricted. Along with other raptors that frequent the study area, the loss of foraging habitat may affect the occurrence of this species in the study area, although suitable habitat would remain in the surrounding area. The closest point of the Phase 2 Site 4B solar arrays to the nest is 600m (refer to Figure 8-1), and Site 4B is not located within the buffer area of the nest which was recommended for exclusion of construction of arrays during the Wahlberg's Eagle nesting period.

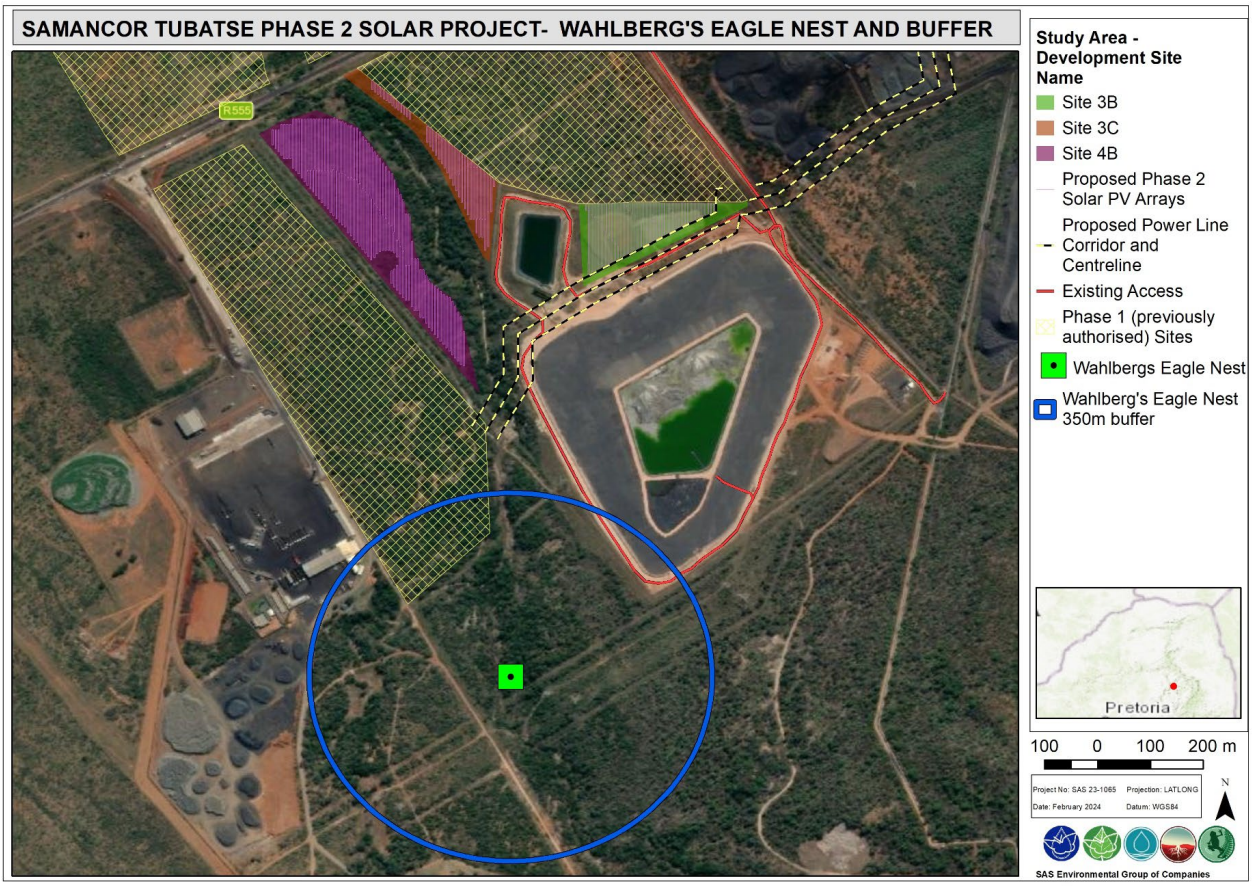


Figure 8-1: Location of the Wahlberg's Eagle nest and associated 350m buffer in relation to the Phase 2 development sites

8.6.3 Cumulative Impacts

The development, in particular of solar arrays that will result in large-scale transformation of residual natural vegetation and habitats forms part of a wider trend of transformation of natural habitat in the wider area. The wider area is characterised by mining operations, human settlements and undeveloped land that is used for livestock grazing. The Phase 1 PV Plant has been authorised and as such transformation of large areas of residual woodland habitat has been permitted to occur in the near future. As such the Phase 2 development, in particular the transformation of untransformed woodland habitat associated with the Phase 2 solar arrays is considered a cumulative impact on avifauna in the wider area at a local level. Both development phases viewed together would also constitute a cumulative impact through which increasing loss of habitat and resultant loss on avian diversity and abundance is occurring in the area.

In a cumulative impact context specific to solar power developments, the approval, or application for solar developments within a 30km radius of the development site. No approved or proposed solar developments are located within a 30km radius other than the associated Phase 1 development, thus the development will not be responsible for a cumulative impact in this context.

8.7 Heritage and Palaeontology

8.7.1 Construction Impacts

Table 8-15: Heritage and palaeontology resources construction impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Impact on BGG during construction activities.	Moderate (SP=-70) significance before mitigation and Moderate (SP=-40) after mitigation	▪ Implement a chance to find procedures in case where possible heritage finds are uncovered. ▪ An appropriately qualified heritage practitioner/archaeologist must be identified to be called upon if any possible heritage resources or artefacts are identified. ▪ TFC001, TFC004, TFC005, Site 2-1 and Site 2-2 to be avoided. The sites Site 2-1, Site 2-2, Site 2-4, TFC001, TFC004, and TFC005 must be fenced with a 30m buffer. If this is not possible, the structures at TFC001, TFC004, TFC005 and Site 2-2 will be investigated through test excavation (if required post-authorisation) to determine if there are graves. If it is found to be graves these graves including the graves at Site 2-2 must be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of Section 36 of the NHRA and its regulations as well as the National Health Act and its regulations. ▪ A social consultation process in terms of in terms of Chapter XI of the NHRA Regulations (2000) must be undertaken, only if the structures are confirmed to be graves, to identify the descendent families of the burials at the aforementioned sites. ▪ If long-term conservation of sites Site 2-1, Site 2-2, Site 2-4, TFC001, TFC004, and TFC005 is not possible then, a Section 36 of the NHRA permit application in terms of Chapter XI of the NHRA Regulations (2000) must be applied for by a suitably qualified archaeologist for the relocation of the graves. ▪ If unmarked human burials are uncovered, the SAHRA DAU (Nokukhanya Khumalo/Natasha

Impact/s	Significance with and without mitigation	Proposed mitigation
		Higgitt 021 202 8660), must be alerted immediately as per section 36(6) of the NHRA. Non-compliance with section of the NHRA is an offence in terms of section 51(1)e of the NHRA and item 5 of the Schedule.
Impact on archaeological sites.	Moderate (SP=-60) significance before mitigation and Moderate (SP=-40) after mitigation	▪ Site locality TFC002-1 – TFC002-8's structures are of low significance, but to be avoided given the potential for infant burial and unmarked graves. ▪ A 30m no-go buffer around sites TFC002-1 – TFC002-8 must be implemented to avoid potential infant burials. ▪ It is recommended that the possibility of stillborn burials are investigated through a stakeholder engagement process. If it is found that there are still born burials present the remains must be relocated after completion of a detailed grave relocation process, that includes a thorough stakeholder engagement component, adhering to the requirements of Section 36 of the NHRA and its regulations as well as the National Health Act and its regulations. ▪ Monitoring during site clearing in a 20m radius from the identified archaeological Sites TFC003 and Site 2-4 through the implementing of an archaeological watching brief. ▪ If heritage resources are uncovered during the course of the development, a professional archaeologist or palaeontologist, depending on the nature of the finds, must be contracted as soon as possible to inspect the heritage resource. If the newly discovered heritage resources prove to be of archaeological or palaeontological significance, a Phase 2 rescue operation may be required subject to permits issued by SAHRA.
Impact on palaeontological resources.	Moderate (SP=-60) significance before mitigation and Low (SP=-10) after mitigation	▪ The ECO for this project must be informed that the Magaliesberg Formation has a high palaeontological sensitivity. ▪ If palaeontological heritage is uncovered during surface clearing and excavations the Chance Find Protocol

Impact/s	Significance with and without mitigation	Proposed mitigation
		attached should be implemented immediately. Fossil discoveries ought to be protected and the ECO/Project Manager must report to South African Heritage Resources Agency (SAHRA) (Contact details: SAHRA, 111 Harrington Street, Cape Town. PO Box 4637, Cape Town 8000, South Africa. Tel: 021 462 4502. Fax: +27 (0)21 462 4509. Web: www.sahra.org.za) so that mitigation (recording and collection) can be carried out. ▪ Preceding any collection of fossil material, the specialist would need to apply for a collection permit from SAHRA. Fossil material must be curated in an accredited collection (museum or university collection), while all fieldwork and reports should meet the minimum standards for palaeontological impact studies suggested by SAHRA. ▪ If any evidence of archaeological sites or remains (e.g. remnants of stone-made structures, indigenous ceramics, bones, stone artefacts, ostrich eggshell fragments, charcoal and ash concentrations), fossils or other categories of heritage resources are found during the proposed development, SAHRA DAU (Nokukhanya Khumalo/Natasha Higgitt 021 202 8660) must be alerted as per section 35(3) of the NHRA.

8.8 Visual

As described above the TFC Plant visually dominates the town of Steelpoort and its surrounds and imbues the landscape with a strong industrial element. The presence of the Smelter is enhanced, albeit not visually, by the constant drone of the plant's activities and the various sirens which intermittently sound, thus always making any receptor present in its vicinity, aware of its existence. For many receptors, for example the households located on the southern side of the R555 in Steelpoort, any views towards the proposed solar arrays that would be developed on Site 2 would be in the context of views of the Smelter, its associated slag dump and the adjacent mining operations. In the context of such level of landscape change, the presence of solar arrays would be likely to add to the industrial element in the landscape.

The majority of residential areas and other visual receptors including a church and two schools, that are located closest to the proposed development sites, are located in Steelpoort, to the west and north-west of the study area. The visual context of the landscape is strongly characterised by anthropogenic-industrial influences in the form of mining operations on the hills to the north and a multitude of powerlines radiating outwards from the Merensky Substation. Most of the study area is currently unvegetated, and the visual

contrast and visual intrusion factor associated with solar arrays in the east would arguably be greater than for the residences on the southern side of the R555. Certain of the households in the north-western part of the complex on the northern side of Steelpoort, as well as the residential complexes located to the north of the Steelpoort River along the R37 link road are elevated and thus may have a wider view of solar arrays proposed to be developed, although the intervening houses and vegetation such as trees will have a screening effect.

The households along Anthracite Street would be exposed to a direct view of the powerline in very close proximity if the powerline were to be developed along this road. However, it should be noted that the households on the western boundary of the Steelpoort residential area would be able to view the powerline, as aligned 150m to the west, but this would be ameliorated by the views of the existing powerline that runs immediately adjacent to the entire length of the residential area's western boundary.

Even though the closest households are located between 150m and 200m from the northern boundary of Site 5, these households are located adjacent to the Steelpoort River and the remaining riparian vegetation (albeit having been largely removed by the felling of the larger trees, especially on the northern bank of the river) would provide an effective screening function, limiting views from the closest households towards the arrays. The solar arrays as visible to these receptor locations would be located in the foreground of the view, with the Smelter dominating the background. The development of solar arrays on the northern part of Site 5 would be mostly shielded by intervening vegetation of the Steelpoort River riparian corridor, but the southern parts of Site 5 would be visible from the areas to the north and north-west. The proposed arrays on Sites 3 and 4 would also be visible from this area and would be located adjacent to the cleared area of the H:H Waste Disposal Facility and the buildings of the truck depot.

The residential areas located to the north of the Steelpoort River along the R37 link road would be able to see parts of Sites 2 and 5 due to their elevated position on the opposite side of the valley, with a slope aspect facing towards these development sites. The photograph in Figure 8-2 below provides an indicative view from these residential areas, but it should be noted that screening features are likely to be present in the form of buildings or vegetation that would limit the views. If viewed clearly the development of the sites would add to the existing development and change to the landscape that has resulted from the development of the town of Steelpoort.

Figure 8-2: A typical view from the peri-urban areas to the northwest of Site 5 towards the TFC Plant and Site 5

8.8.1 Construction Impacts

Table 8-16: Visual impacts during construction

Impact/s	Significance with and without mitigation	Proposed mitigation
Direct transformative impact on natural habitat related to construction of solar panel arrays, cable trenching and internal access roads, as well as other construction-related activities including uncontrolled movement of vehicles and other construction machinery. The impact would relate to the transformation of currently uncopied land parcels on which natural vegetation is present which could cause a visual impact	Moderate (SP=-50) significance before mitigation and Moderate (SP=-40) after mitigation	▪ Clearing of vegetation to be completed in a phased manner. ▪ Construction activities must not encroach beyond the development footprint. ▪ Dust suppression must be applied to areas of cleared vegetation in very windy conditions and especially along construction access routes.

8.8.2 Operational Impacts

8.8.2.1 Proposed Pre-cast Flood Protection Wall

A query was raised as part of the public comment process for the draft EIAR regarding the potential visual impact of a pre-cast flood protection wall that has been provided as a recommendation in the CSWMP (Section 7.1.2.1) located on the north-eastern side of the Site 4 extension (Site 4B). The wall has been

identified for the part of Site 4B that falls within the 1:100-year floodline of the non-perennial drainage line that is located between Sites 3 and 4 and between 3.5 – 4m in height.

The potential visual impact of the wall has been assessed and a few considerations are relevant in this context. Firstly, the wall would be located on the edge of the Site 4B development and in relatively close proximity to the drainage line. Accordingly, the wall would form part of the expanded solar development as viewed from public access areas, the closest of which is the R555 road to the north of Site 4. Due to its landscape position in a valley, the wall would not be a prominent feature by virtue of its position in the valley bottom, and viewers on the R555 road would view the wall within the enclosed setting of the valley through which the drainage line runs.

Secondly the height of the wall is slightly lower than the average height of the panels which is 5m. The wall will thus not exceed the height of the panels, and a viewer on the R555 road would be able to view the wall with the panels rising up the valley slopes behind it. If a strip of natural woody vegetation were to be retained in the area between the road reserve and the northern boundaries of Sites 3 and Site 4/4B, this vegetation would assist in partly screening the wall from view. If able to be viewed, it is concluded that the proposed wall would not be visually prominent and would form a component of the altered local landscape context that would result from the replacement of natural vegetation with solar panel arrays.

8.8.2.2 Glint and Glare

PV panels are designed to generate electricity by absorbing the rays of the sun and are therefore constructed of dark-coloured materials, and are covered by anti-reflective coatings. Indications are that as little as 2% of the incoming sunlight is reflected from the surface of modern PV panels especially where the incidence angle (angle of incoming light) is smaller i.e. the panel is facing the sun directly (LOGIS, 2021[74]). This is particularly true for tracker arrays that are designed to track the sun and keep the incidence angle as low as possible (LOGIS, 2021).

Glint and glare occur when the sun reflects off surfaces with specular (mirror-like) properties, which include glass windows, water bodies and potentially some solar energy generation technologies (e.g. CSP heliostats and parabolic troughs). Glint is generally of shorter duration and can be described as “a momentary flash of bright light”, whilst glare is the reflection of bright light for a longer duration. Glint and glare may impair the visibility of observers and cause annoyance, discomfort, or loss in visual performance.

Literature review indicates glint and glare is only likely experienced when the observer is at a higher elevation than the proposed solar PV panels and depends on the degree to which is the panels are tilted. For example, the glint and glare from tracking panels with back tracking towards ground-based receptors are most common when the panels are flat in the morning/evening (LOGIS, 2021). This is when the larger incidence angle (angle of incoming light) yields more reflected light.

The visual impact associated with glint and glare relates to the potential it has to negatively affect sensitive receptors in relatively close proximity to the source, or aviation safety risk for pilots (especially where the source interferes with the approach angle to the runway). Based on elevation data, the residential areas located within 3km (north, east and west) of the proposed solar development as well as the R555 situated within close proximity, are at a lower elevation than the proposed solar development, as such the residents would not experience a reflection (glint and glare) due to the 0° tilt (lying flat) of the panels in the mornings. The observers would theoretically be looking at the base (underside) or edge of the panels.

[74] *LOGIS, (2021). Lourens Du Plessis. Proposed Sturdee Energy PPC Cement 7MW Solar PV Project. De Hoek, Bergrivier Local Municipality, Western Cape Province. Visual Impact Assessment as part of a basic assessment report.*

The Federal Aviation Administration of the United States of America have researched glare as a hazard for aviation pilots on final approach and may prescribe specific glint and glare studies for solar energy facilities in close proximity to aerodromes (airports, airfields, military airbases, etc.). It is generally possible to mitigate the potential glint and glare impacts through the design and careful placement of the infrastructure. The airstrip of the Winterveld Airfield – FASO is located approximately 8km north of the proposed solar development. Airstrips with the runway situated on an east to west axis and located at an angle of less than 30 degrees to the north and 20 degrees to the south in the southern hemisphere from a proposed solar facility are invariably at a higher risk of experiencing glint and glare, due to the airstrip being orientated at an angle that would lead to reflection toward the runway.

The abovementioned airstrip axis is orientated at a north north west to south south east direction, which puts the airstrip at a significantly lower risk to glint and glare impacts when landing and on take-off from features in the landscape. The airstrip which is at a bearing of 316,45˚, and the angle of incidence of the proposed solar development is at a bearing of 163.68˚, indicating that the airstrip is at a 152.77˚ from the proposed development. From the above, the risk of glint and glare on the Winterveld Airfield – FASO is reduced significantly. Should there be risk of glint and glare, it will be most significant in the mornings and in winter months when the sun rises further to the north. Should glint and glare be experienced, this could be mitigated with a simple go-around of the aircraft and landing in the opposite direction which should be possible in the early morning when winds are generally at a lower speed and direction of landing is not a significant factor. Solar PV systems can safely coexist in area where aerodromes are located, provided that mitigation measures are undertaken, such as utilising anti-reflection coating on the PV modules, texturing the PV module surface and/ or varying the alignment of the PV array (Sreenath *et al.*, 2020)[75]. Should additional mitigatory measures be deemed necessary solar panels with this technology can be utilised.

Table 8-17: Visual impacts during operation

Impact/s	Significance with and without mitigation	Proposed mitigation
Permanent transformative impact on natural vegetation on the five development sites with the development of solar arrays and associated powerlines, that would permanently alter parts of the landscape as viewed from surrounding receptor locations. This visual change could lead to perceptions of visual intrusion and impact.	Low (SP=-36) significance before mitigation and Moderate (SP=-20) after mitigation	▪ The existing altered visual baseline of the landscapes into which the developments would be located, and their location directly adjacent to existing areas of visual change due especially to urban or infrastructural development is a strong mitigating factor. ▪ Retention of residual natural vegetation on the parts of the five development sites that do not fall within the solar array or other infrastructure footprint. ▪ As the structures supporting the panels could create cumulative glint and glare if these are metallic and reflective, the consideration of non-reflective material for such supports is recommended. ▪ For the proposed powerlines, it is recommended that the monopole powerline tower be used (as opposed to the steel lattice tower) in order to

[75] *Sukumaran, S., Sudhakar, K., and Yusop, A.F (2020). Solar photovoltaics in airport: Risk assessment and mitigation strategies. Environmental Impact Assessment Review. 84. 106418. 10.1016/j.eiar.2020.106418.*

Impact/s	Significance with and without mitigation	Proposed mitigation
		reduce the visibility of powerline towers.

8.8.3 Cumulative Impacts

According to the South African Renewable Energy EIA Application Database (REEA, 2023)[76] this project is the only proposed renewable energy project within a 30km radius, thus no other renewable project will form part of cumulative impacts on the receiving environment. Renewable energy facilities have the potential to cause large scale visual impacts and the location of several such developments in close proximity to each other could significantly alter the sense of place and visual character in the broader region. With the proposed solar development being the only one within a 30km radius and the nearest proposed facilities being 75km to the west and 80km to the east, the cumulative impact is considered sequential due to the facilities situated quite a distance from each other. Furthermore, with the moderately low viewer incidence, the cumulative visual impacted is expected to be of moderately low significance.

8.9 Social

8.9.1 Construction Impacts

Table 8-18: Social impacts during construction

Impact/s	Significance with and without mitigation	Proposed mitigation
Construction activities may be a danger to proximate residents (Mohlakwana, Matholeng, Stocking, Steelpoort Town) through increased road traffic, dust and potential noise.	Moderate (SP=-48) significance before mitigation and Low (SP=-24) after mitigation	▪ Road signage, maintaining speed limits, watering down of access roads during dry periods and the acknowledgement of free roaming cattle must be addressed. ▪ A policy on Contractor Health and Safety for the duration of their work on site, must apply, and be monitored. ▪ In addition, a Contractor's Code of Conduct (especially in terms of respecting local by-laws and specific practical community concerns on which agreement may be reached), should be applied for the duration of the construction period. ▪ Regular information sharing discussions with the Contractors must be pursued, giving residents an opportunity to voice concerns and grievances throughout the duration of the project construction. ▪ In addition, it is vitally important that a formal grievance

[76] *https://egis.environment.gov.za/renewable_energy*

Impact/s	Significance with and without mitigation	Proposed mitigation
		management system be put in place (and should remain throughout the life of the plant).
The influx of Contractors and staff will result in the proliferation of social ills and issues such as crime, prostitution, alcohol consumption, abuse, the spread of HIV/AIDs etc.	Moderate (SP = -48) significance before mitigation and Low (SP = -20) after mitigation.	▪ The Developer needs to be actively involved in the prevention of social ills associated with Contractors. ▪ Communication with local communities is also an important tool that will assist in monitoring such a situation. ▪ Formal grievance system to be maintained throughout project. ▪ Due to the concentration of a workforce in the area over the construction period, the Contractor must implement an HIV/ AIDS Awareness Programme, annually on site. ▪ Strict penalties must be built into tenders to deal with issues such as petty crime, stock theft, fence cutting, trespassing etc.
Local job creation opportunities may be realised during the construction phase.	Moderate (SP=+36) without mitigation and Moderate (SP=+48) with mitigation	▪ All labour (skilled and unskilled) and Contractors must be sourced locally where possible. ▪ Job creation expectations will have to be well managed via management systems and communication mechanisms that regularly informs the local community (on site and at local community centres) of the progress and job/skills needs at the development site. ▪ A formal job application process must be communicated (should this be a requirement). It is expected that the Contractor will have a Human Resource Procedure/Policy in place in order to respond to Local labour legislation. ▪ A formal grievance system to be maintained throughout the project ▪ A Community Liaison Officer must be appointed to deal with the employment of local labour and to interface between the Contractor and the local community.

Impact/s	Significance with and without mitigation	Proposed mitigation
		▪ The principles of equality, BEE, gender equality and non-discrimination must be implemented.

8.10 Dust and Emissions

8.10.1 Construction Impacts

Table 8-19: Dust and emissions impacts during construction

Impact/s	Significance with and without mitigation	Proposed mitigation
Dust and emissions will be generated during construction activities e.g. site clearing, excavation, drilling, operation of vehicles, plant and equipment.	Moderate (SP=-36) significance before mitigation and Low (SP=-21) after mitigation	▪ The retention of a natural buffer (with a minimum width of 15-20m) comprising of natural vegetation (i.e. the natural trees and shrubs that are present on the development sites) along the boundary of each site would assist with dust mitigation. ▪ Dust must be suppressed on construction site and during the transportation of material during dry periods by the regular application of water. Water used for this purpose to be used in quantities that will not result in runoff generation. ▪ Loads to be covered to avoid loss of material in transport, especially if material is transported off site. ▪ Speed limit of 40km/hr to be set for all vehicles travelling over exposed areas. ▪ During the transfer of materials, drop heights should be minimised to control the dispersion of mater being transferred. ▪ Equipment used by the Contractor must be maintained in good working order to prevent smoke emissions. ▪ Chemical toilets must be provided and cleaned on a regular (weekly) basis.

8.11 Waste

8.11.1 Construction and Rehabilitation Impacts

Table 8-20: Waste impacts

Impact/s	Significance with and without mitigation	Proposed mitigation
Waste generation during the construction and closure/ rehabilitation phases will have a negative impact on the environment, if not controlled adequately. Waste includes general construction rubble, existing redundant infrastructure and hazardous waste (used oil, cement and concrete etc.).	Low (SP = -28) pre-mitigation that can be reduced to a Low (SP = -14) significance after-mitigation	▪ Adequate rubbish bins and waste disposal facilities must be provided on site and at the construction camp. ▪ The construction site must be kept clean and tidy and free from rubbish. ▪ Recycling/ re-use of waste must be encouraged. ▪ No solid waste must be burned on site. ▪ Bins must be provided to all areas that generate waste e.g. worker eating and resting areas and the camp site. General refuse and construction material refuse must not be mixed. ▪ Should rubble be required as a raw material for the construction, it must be taken to a designated stockpile area - which must be approved by the ECO. ▪ Spoil material must be hauled to a designated spoil site. No spoil material must be pushed down slope or discarded on site. ▪ The Municipality has one licensed landfill site situated at Apel. The site is a general waste facility, no hazardous waste is allowed, therefore all the general waste generated during construction and operational phase must be disposed at the Malogeng Landfill site in Apel. ▪ The life span for the solar module is 30 years. As the panels are classified a hazardous waste, the disposal of the panels will be according to waste legislation and waste disposal followed by TFC to a licenced hazardous waste facility. The waste will not be disposed of into any landfills within the Sekhukhune District Municipality and no additional burden will be placed on these landfills.

9 Environmental and Cumulative Impact Statement

9.1 Environmental Impact Statement

The project, in the EAPs opinion, does not pose a detrimental impact on the receiving environment and its inhabitants and although there are potentially high to moderate significant impacts, these impacts can be mitigated. There are no fatal flaws prohibiting the project from going ahead. This Environmental Impact Statement is based on the findings summarised in the section below.

9.1.1 Agriculture

The proposed development is acceptable because it leads to no loss of potential, productive agricultural land and therefore no loss of future agricultural production potential.

The site is classified as high agricultural sensitivity by the EST. This has been confirmed by this assessment, because of the climate, terrain, and soil suitability. However, despite the natural agricultural resources, the site's agricultural potential is completely limited, and the high sensitivity rating is therefore not relevant to an assessment of the agricultural impact.

Agriculture is not possible on the sites while Samancor and related industries are operating there, and the land therefore effectively has zero current potential for agricultural production. The natural agricultural resources of the land must however still be conserved for a potential future time when agricultural use may again become possible.

Due to the fact that the proposed development will not result in the loss of any viable, productive agricultural land, the overall negative agricultural impact of the development (loss of future agricultural production potential) is assessed here as being of low significance and as acceptable. From an agricultural impact point of view, it is recommended that the proposed development be approved. The conclusion of this assessment on the acceptability of the proposed development and the recommendation for its approval is not subject to any other conditions other than recommended mitigation.

9.1.2 Hydrology

The floodlines are produced to suggest that some infrastructure at the site is situated inside probable zones of inundation. Hence, measures need to be taken to minimise flooding risk as mentioned in Section 7.1.2. The site specifically at risk is Site 4 as the panels will be placed in the 1:50-year and 1:100-year flood line. The hydrological risk of the proposed activities is considered low to marginal.

It would normally be recommended that the 1:100-year floodline be used as an avoidance area for any future development at the site. However, due to space constraints within the sites and the number of panels needed to generate the desired 100MW, some panel arrays will have to be placed within the inundation zones. With this, the internal access roads on the perimeter of the panel arrays will also be located within some inundation zones. It is the Hydrologist's opinion that this should be allowed if the mitigation measures in Section 8.3 and recommendations within the CSWMP (Section 7.1.2) be adhered to. The mitigation measures will not hinder the flow of flood waters within the drainage line, but merely divert it around the site, allowing the drainage system to function as it normally would and ensuring flood waters are allowed to flow to the downstream Steelpoort River system.

It is imperative that during the construction phase, stormwater management interventions are implemented particularly to manage sediment washing off the sites. The sediments result from the removal of vegetation

disturbance of the soils and stockpiling of materials. From all these sources, particles are transported during rainfall events and if not managed can cause a problem in receiving waterways.

Ongoing inspection and maintenance of drainage management measures should be carried out throughout the construction period. As the site changes during the progression of construction, the drainage system may need to be re-evaluated and altered.

9.1.2.1 Monitoring

It is anticipated that the Steelpoort River and non-perennial stream are the receptors of any pollution from the proposed activity (i.e., overland runoff, stormwater discharge etc.). The vadose zone and underlying aquifers are also viewed as receptors of potential pollution (i.e., poor-quality seepage). Phase 2 monitoring should focus on these areas and will entail visual inspections every quarter during the operational phase of the development. It is proposed that four (4) stormwater monitoring points be established, as illustrated Figure 9-1.

It is proposed that monitoring of SW1 to SW4 be undertaken during the construction and operational phase of the project after a storm event, specifically after the first storm event of the season, and then before the season ends.

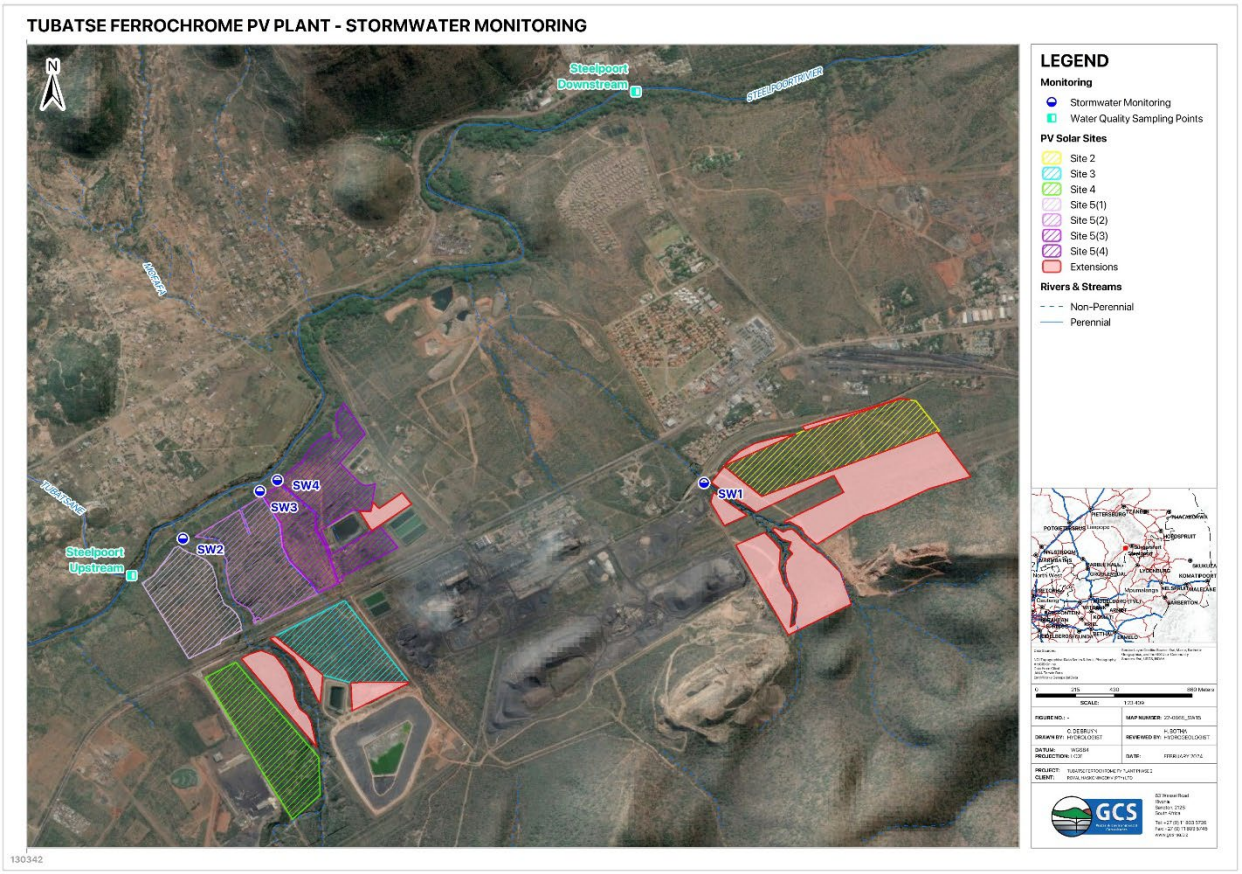


Figure 9-1: Proposed stormwater monitoring

This assessment cannot find any grounds to not authorise the Environmental Authorisation. This is grounded on the assumption that the proposed mitigation, monitoring, and stormwater management recommendations are implemented.

9.1.3 Freshwater

The results of the identification of freshwater ecosystems indicated that eight (8) non-perennial drainage lines are located in the investigation area, as well as two small portions of the riparian zone of the Steelpoort River. The Site 2B development areas are located in close proximity to two drainage lines, but no part of the physical development footprint extends into the delineated extent of the drainage lines or an associated 20m development exclusion buffer. The results of the detailed assessment of freshwater ecosystems located in the vicinity of the Site 2B and Sites 3B and 3C and 4B development areas.

All activities associated with the construction, operation and decommissioning of the proposed PV facility pose a “Low” risk significance to the freshwater ecosystems within the study and investigation areas. To a large degree the assessment of low risk is due to the exclusion of the drainage line reaches and a 20m development exclusion buffer around their delineated extents from the development footprint. Two powerline crossings are proposed, but it is likely that with careful planning the freshwater drainage lines can be fully spanned. It is however highly important that all mitigation measures be fully implemented and that the integrity of the 20m development exclusion area be protected through all development phases.

Based on the strict proviso that all mitigation measures specified Section 8.5 and in the Freshwater Assessment Report (***Appendix F3***) implemented, it is the professional opinion of the Freshwater Ecologist that the proposed development can be considered acceptable and be able to be granted environmental authorisation.

9.1.4 Biodiversity

Th Biodiversity Assessment concludes that the study sites comprise of savannah habitat of varying status and sensitivity, which is consistent with natural habitat in proximity to the intensive anthropogenic and disruptive land use activities noted around Steelpoort. As most of the project sites are situated in proximity to, or are surrounded by, industrial infrastructure or areas where human activities are relatively of high frequency, remaining portions of natural habitat conforms to short, open and deteriorated woodland habitat or habitat that are fragmented. Extensive parts of the proposed sites comprise of deteriorated types that are characterised by unspecialised and generalist taxa and communities that are also well represented in the wider region. Portions of the proposed sites are considered diverse and sensitive, and retaining these areas for conservation purposes is highly recommended, although technical considerations for the proposed development might not allow for much mitigation in this sense. The presence of numerous and abundant conservation important plant and animal species, which provides for an elevated ecological sensitivity and importance of certain parts, are noted throughout the study area.

The nature of the activity dictates that natural habitat will be lost through unavoidable land clearance, and the application of a recommended mitigation approach will allow for some moderation of anticipated impacts. It is predicted that impacts on the ecological environment will generally be of high to moderate significance, notably with regards to the anticipated loss of conservation important plant species and habitat that is associated with animal species of conservation concern.

In light of the conclusions reached in this report, and despite concerns that are raised about the loss of minor portions of highly sensitive habitat associated with southern sections of Site 2B, no specific objections to the project are raised in its current configuration. This is however with the explicit understanding that the suggested mitigation protocol is timeous and comprehensively implemented during all phases of the project,

including the use of a strategy to offset and the implementation of an overall Biodiversity Management Plan (which will be drawn up over a two year period by Samancor using the Locate-Evaluate-Assess-Prepare [LEAP] as well disclosure recommendations and guidance set up by the Taskforce on Nature-related Financial Disclosures (TNFD) as to compensate for any losses.

9.1.5 Avifauna

Areas of residual natural habitat in the wider study area have been identified, of which certain habitat units, in particular freshwater habitat and residual non-impacted woodland vegetation have been designated as sensitive habitat from an avifaunal perspective. A number of priority species were identified as part of the characterisation of the avifaunal assemblage of the study area and the assessment of impacts of the proposed development on avifauna.

The impact of greatest significance that is anticipated to occur is the alteration of areas of natural habitat in the development area footprint, reducing avian abundance and diversity within the study area and potentially impacting the priority species, most of which are avifaunal SCC. Further impacts that may result from the proposed project are as a result of potential collisions with the proposed PV plant.

On its own the Phase 2 development would impact relatively small land parcels and areas of residual natural habitat, however the Phase 2 development needs to be viewed in the context of the larger Phase 1 development with the Phase 2 development sites being located immediately adjacent to Phase 1 development sites (which have been authorised to be developed). The Phase 2 development would thus constitute a cumulative impact in the context of the Phase 1 development. In certain areas, the Phase 2 development sites would result in further transformation of areas earmarked in the Phase 1 Avifaunal Study as areas of residual natural habitat that should be kept free of development. Despite this cumulative impact, the riparian corridors of drainage lines in the vicinity of the Phase 2 development sites and a 20m development exclusion buffer have been left as non-developable areas. A set of mitigation measures have been stipulated to reduce the impacts of habitat loss in the development footprints.

The solar arrays and proposed powerlines are potential sources of collision impacts. It is anticipated that should the proposed mitigation measures be implemented the risk of collisions can be drastically reduced. Due to the low potential of occurrence of SCCs in the study, impacts to these priority species are not anticipated to be regionally significant.

It is important that all essential mitigation measures and recommendations presented in this report should be adhered to as to ensure the ecology within the proposed construction areas as well as surrounding zone of influence is protected or adequately rehabilitated in order to minimise the deviations from the PES as much as possible.

Based on the findings of the avifaunal assessment it is the opinion of the ecologists that from an avifaunal perspective, the proposed components of the development can be considered acceptable and can be granted environmental authorisation.

9.1.5.1 Monitoring

The development of solar power generation facilities is a relatively recent phenomenon in South Africa, and such facilities have only been in place for the last decade, concentrated in certain parts of the country. The localised impacts of such facilities are still poorly understood.

As such it is advised that monitoring be conducted in the pre-construction and post construction phases of the project as detailed below. It should be noted that as the Phase 1 and Phase 2 projects will in effect likely

be developed as one project the below monitoring regime is applicable to both Phase 1 and Phase 2 as one effective development:

- Monitoring of the Wahlberg's Eagle nest site must continue (as part of the general recommended pre-, during- and post-construction (operational) avifaunal monitoring on the development sites and wider study area) on a yearly basis in the period prior to the start of construction, through the construction phase, and for five (5) subsequent years after the end of construction.
- Assessment of habitat loss on bird species richness and relative abundance must be undertaken through the application of the same data collection and observation techniques as were applied in the EIA-phase field assessments. Surveys conducted twice a year in the first two years of operation must be conducted as a minimum.
- Quantifying bird mortalities – Regular searches for carcasses of any bird fatalities associated with the operational solar facility must be undertaken, by an avifaunal specialist or a suitably qualified ECO. Search focus must be directed at the areas/components of the development highlighted as high risk for collisions, including all new powerline alignments, the arrays in the vicinity of the existing water bodies on the site, and the arrays located closest to the Steelpoort riparian corridor. The methods detailed in the BirdLife South Africa Guidelines must be applied.

9.1.6 Heritage and Palaeontology

The HIA identified various heritage resources within the study area including archaeological resources and BGG which are rated as having a high heritage significance and will require further mitigation work before the project can continue.

Three additional sites previously identified in the 2021 survey[77] also fall within the current study area. Site 2-1 is a BGG with eighteen graves, Site 2-2, being a potential gravesite and Site 2-4 is another low significance archaeological site (Figure 5-28) and the individual site descriptions as contained in Table 7-17. The field description forms were collected with ArcGIS Survey123 in field software.

The recent historic structures are all older than sixty years given that they appear on the 1954 aerial photography and the 1963 map and are all poorly preserved homesteads intercepted and disturbed by the large servitude (TFC002-1 - TFC002-8). It is possible for stillborn burials to have been buried in association with the homestead locality at site TCF002, it is therefore given the high grading of IIIA. All BGG should be retained and avoided with a buffer zone of 30m as per SAHRA guidelines.

The stone packed archaeological site of TFC003 is rated as IIIC given its degradation and could potentially be a grain bin stand or initiation cairn. The other features surrounding the potential grain bin stand/initiation cairn were too degraded which made identification difficult. The previously identified stone packed Site 2-4 was given the same rating and is detailed thoroughly in the HIA (2021)[78]. The potential grave sites of TFC001, TFC004 and TFC005 still require further investigation, but burial grounds have a high heritage rating and a heritage grading of IIIA. TCF001 contains potentially more than the five graves observed due to limited visibility. TFC004 and TFC005 contained two and three graves, respectively.

If any of the identified archaeological sites are to be disturbed, a Phase 2 archaeological mitigation process must be implemented. This will include surface collections, test excavations and analysis of recovered material. A permit issued under Section 35 of the NHRA will be required to conduct such work. On completion of the mitigation work, the developer can apply for a destruction permit with the backing of the mitigation report.

[77] *Fourie, W., 2021. Proposed 100MW PV Plant at the Samancor Chrome Operations, Steelpoort, Limpopo.*
[78] *Fourie, W., 2021. Proposed 100MW PV Plant at the Samancor Chrome Operations, Steelpoort, Limpopo.*

The proposed development is underlain by Quaternary alluvium and scree while the south and south-eastern margins is underlain by the Magaliesberg Formation of the Pretoria Group (Transvaal Supergroup). According to the Palaeo-sensitivity Map available on the South African Heritage Resources Information System database (SAHRIS), the Palaeontological Sensitivity of the proposed development area is rated as low for superficial deposits, however, the small portion of Site 2B's southern section is within the Magaliesberg Formation of the Pretoria Group (Transvaal Supergroup) which has a high palaeontological sensitivity. The proposed development will not lead to damaging impacts on the palaeontological resources of the area. The construction of the development may thus be permitted in its whole extent, as the development footprint is not considered sensitive in terms of palaeontological resources. It is consequently recommended that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.

It is the combined considered opinion of the Heritage Specialists that the proposed project will have a direct impact on several identified heritage resources rated being of low to high heritage significance. With the implementation of recommended mitigation measures the overall impact on heritage resources will be reduced to acceptable levels during the activities of the project.

9.1.7 Visual

It is important to note that visual impacts are only experienced when there are receptors present to experience the impact. With the study area situated in an anthropogenically altered visual landscape the visual receptors in the receiving environment are accustomed to such a landscape. Based on the findings of the visual compliance statement, the proposed solar development is expected to have a minimal visual impact on the receiving environment. It is therefore the opinion of the specialist that the project be considered favourably from a visual resource management perspective.

9.1.8 Social

Construction activities and impacts that pose a danger to proximate residents (Mohlakwana, Matholeng, Stocking, Steelpoort Town) through increased road traffic, dust and potential noise must be managed by the implementation of mitigation measures as proposed in the EMPrs (***Appendix G - H***.

The influx of Contractors and staff will result in the proliferation of social ills and issues such as crime, prostitution, alcohol consumption, abuse, the spread of HIV/AIDs etc. Communication with local communities is also an important tool that will assist in monitoring such a situation as well as the implementation of a formal grievance system to be maintained throughout project.

The potential job creation at the construction phase of the project will be a positive for the local and regional economy as unemployment in the country is increasing.

9.1.9 Other Impacts

Other impacts relate to dust, emissions, traffic and waste must be managed during the construction, post-construction and rehabilitation and operations. Mitigation measures proposed in the EMPrs (***Appendix G and H***) must be adhered to reduce the significance of these potential impacts.

9.2 Cumulative Impact Statement

9.2.1 Renewable Energy Projects within a 30km Radius

Figure 9-2 provides an indication of solar projects within a 30km radius of the study area as obtained from the Renewable Energy EIA Application Database for South Africa (2023)[79]. There is one project within a 30km radius, which is the linked Phase 1 project for the TFC Solar (Pty) Ltd proposed development of a Solar PV facility of up to 100-Megawatt (MW) generation capacity over five (5) sites. There are four projects noted outside the radius:

- Proposed Establishment of a 40MW Photovoltaic Solar Plant with associated structures on Farm Welgelegen Portion 756 KS, within the Moeding Area, Ephraim Mogale Local Municipality, Limpopo Province (~81km from the project study area);
- Proposed construction of 10MW solar farm to be established on Portion 121 Mapochsgronde JS in Rossennekal within Elias Motsoaledi Local Municipality, Greater Sekhukhune District (~65km from the project study area);
- Proposed Construction of a 40MW Photovoltaic Facility on Portion 915 Mapochsgronde in Rossennekal, Limpopo Province (~57km from the project study area); and
- Proposed Sabie Site Co-Generation facility within the Ehlanzeni District Municipality, Mpumalanga Province (~68km from the project study area).

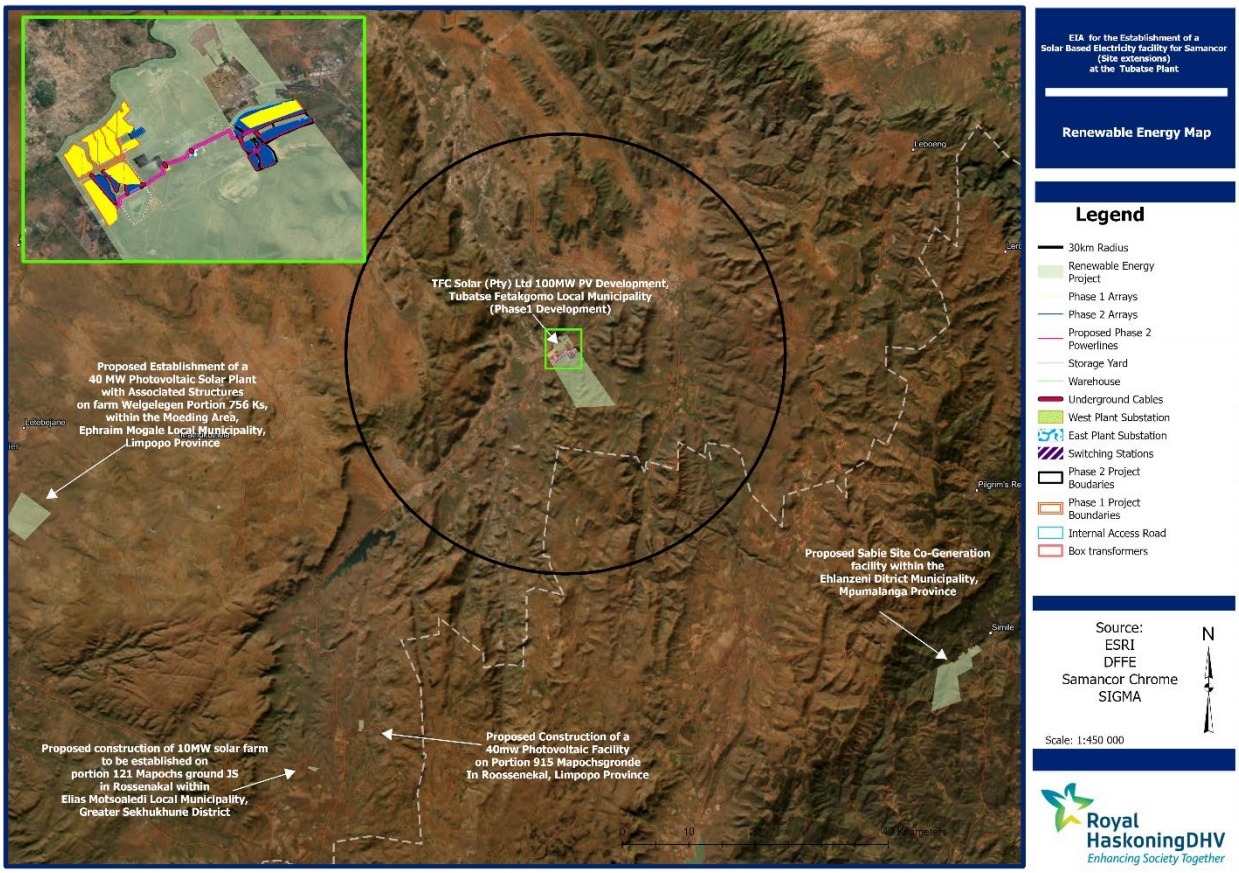


Figure 9-2: Renewable energy projects within 30km of the study area

[79] *https://egis.environment.gov.za/renewable_energy*

Various cumulative impacts have been identified in the preceding sections, and from a cumulative impact assessment perspective, the project is considered acceptable provided that the recommended mitigation approach is timeously and comprehensively implemented and adhered to during all stages of the development.

9.3 Sensitivity Maps

The sensitivity maps presented in Figure 9-3 and Figure 9-4 must be considered when determining if the proposed project should be authorised.

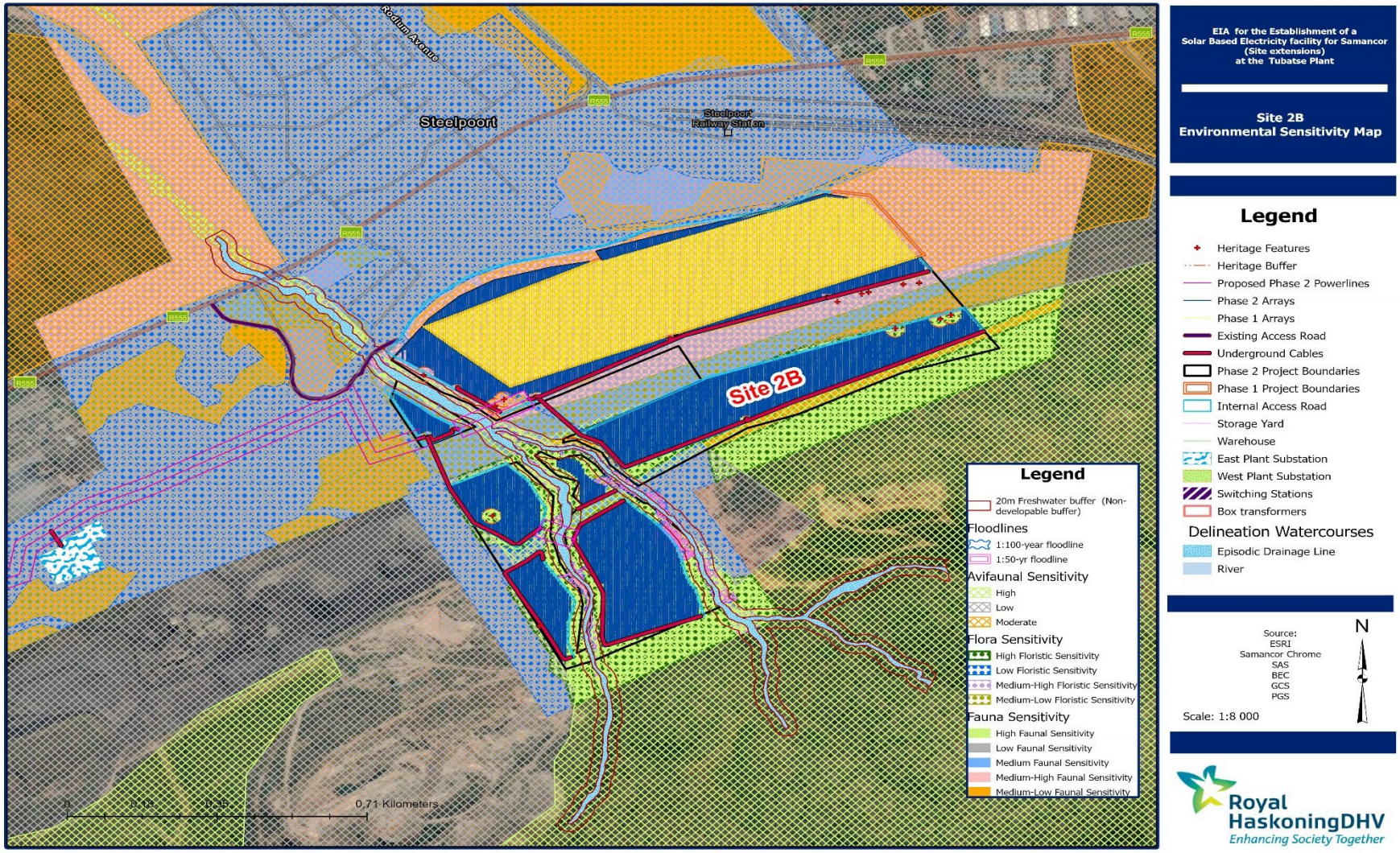


Figure 9-3: Site 2B environmental sensitivity map

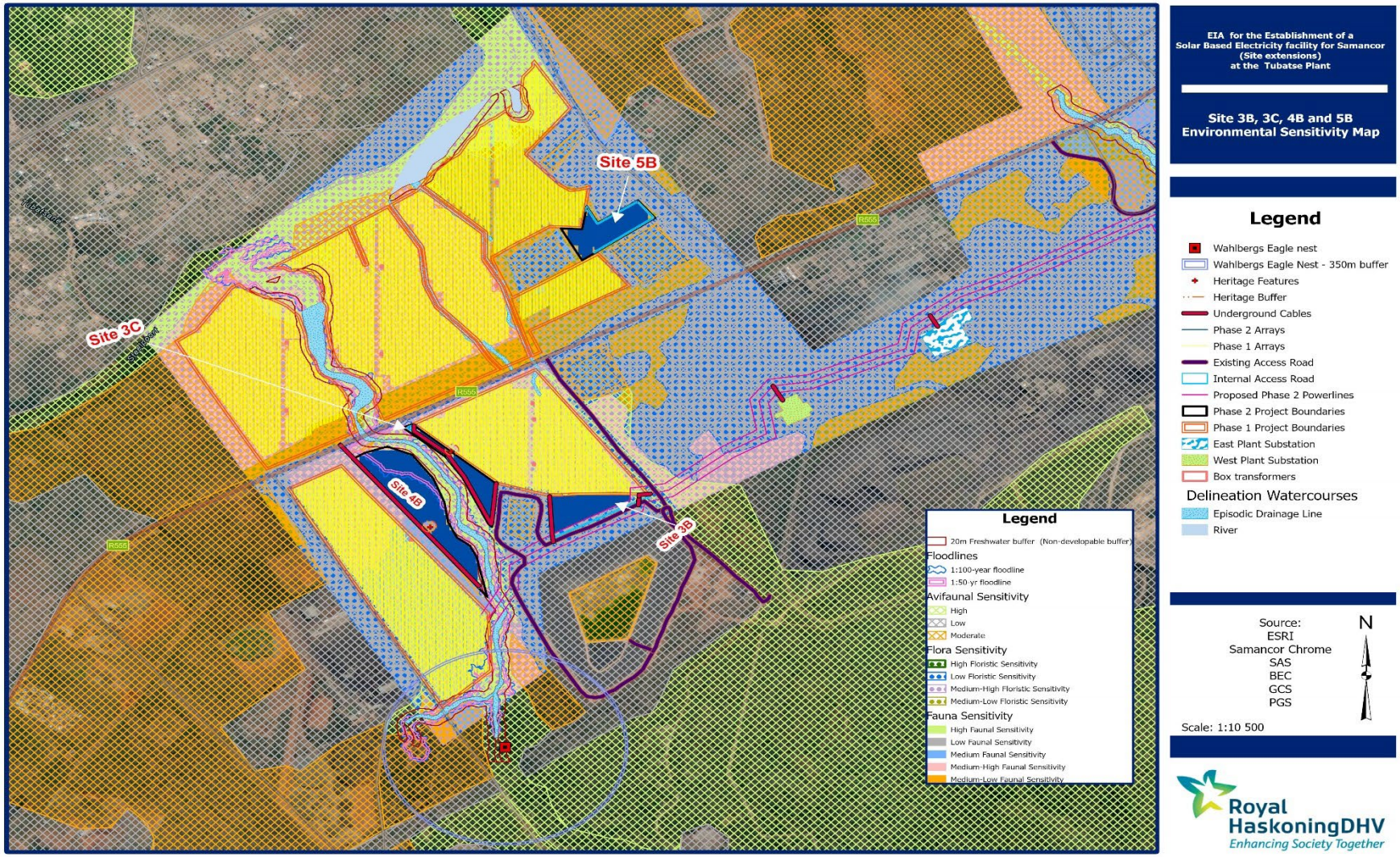


Figure 9-4: Site 3B, 3C, 4B and 5B environmental sensitivity map

9.4 Assumptions and Uncertainties or Gaps in Knowledge

The EIA study followed the legislated process required and as governed and specified by the EIA Regulations 2014 (as amended). Inevitably, when undertaking scientific studies, challenges and limitations are encountered. For this specific EIA study, the following should be noted:

- This EIA study is based on a concept design.
- All information provided by the Engineering team, to the EAP was correct and valid at the time it was provided.
- Although all effort was made by the project team to identify all environmental social and health aspects, impacts and mitigation measures, errors and omissions may have occurred.
- The EAP does not accept any responsibility in the event that additional information comes to light at a later stage of the process.
- All data from unpublished research is valid and accurate.
- Every effort was made to engage I&APs and stakeholders, however not every I&AP and stakeholder may have been consulted. A grievance mechanism must be put in place at the commencement of construction through which I&APs and stakeholders are able to raise grievances and continue to contribute their concerns and issues with the project team.
- Specialist assessments have highlighted further assumptions, limitations and gaps – refer to ***Appendix F*** for the specific-discipline related assumption, limitations and gaps.

10 Recommendations

The following recommendations and conditions for inclusion into the EA is advised:

Construction is expected to commence before January 2025 and last 12-18 months. An EA with a validity of ten (10) years is recommended.

The Applicant must be bound to stringent conditions to maintain compliance and a responsible execution of the project.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIAR are included within the EMPrs ***(Appendix G and H)***. The EMPrs must be used to ensure compliance with environmental specifications and management measures. The implementation of the EMPrs for the construction phase of the project is considered to be vital in achieving the appropriate environmental management standards as detailed for this project.

In addition, the following key conditions should be included as part of the authorisation:

a) The Developer is not negated from complying with any other statutory requirements that is applicable to the undertaking of the activity. Relevant key legislation that must be complied with by the proponent includes inter alia:
    i. Provisions of the National Water Act, 1998 (Act No. 36 of 1998) (as amended).
    ii. National Heritage Resources Act (Act No. 25 of 1999).
    iii. National Forests Act (Act No. 84 of 1998).
    iv. Limpopo Environmental Management Act (Act No. 07 of 2003).
b) The Developer must appoint a suitably experienced (independent) ECO for the construction phase of the development that will have the responsibility to ensure that the mitigation/rehabilitation measures and recommendations are implemented and to ensure compliance with the provisions of the EMPrs ***(Appendix G - H)***.
c) All other necessary permits, licences and approvals must be obtained prior to the commencement of construction.
d) Prior to site clearance, a detailed 'walkthrough' must be conducted of the proposed site to ascertain the number, abundance and physical conditions of all protected tree species to assist with permit applications (DFFE).
e) Prior to site clearance, a detailed 'walkthrough' must be conducted of the proposed site to ascertain the number, abundance and physical conditions of all protected plant to assist with permit applications (LDEDET).
f) Maintenance of the integrity of the 350m Wahlberg's Eagle nest buffer throughout the lifespan of the proposed development and must be seen as a no-go area for development.
g) A 20m development exclusion area (buffer) around all freshwater ecosystems where no development should occur is recommended.

10.1 Recommendations to the Applicant

The Applicant must adhere to the recommendations provided by the specialists and the EAPs. The EMPrs ***(Appendix G and H)*** summarises these recommendations. The Applicant must take full responsibility for the execution of the project in a manner which does not negatively impact on the environment by ensuring that responsible decisions are made.

10.2 Oath and Declaration by the EAPs

The following is hereby affirmed by the EAPs to be included in this report:

- the correctness of the information provided in the report;
- the inclusion of all comments and inputs from stakeholders and I&APs (when received);
- the inclusion of all comments and inputs from stakeholders and I&APs on the Plan of Study for EIA;
- the inclusion of all inputs and recommendations from the specialist reports where relevant; and
- any information provided by the EAPs to I&APs and any responses by the EAPs to comments or inputs made by interested and affected parties.

S.G.

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Signed: Seshni Govender (*Pr Sci Nat; EAPASA)*

P.R.

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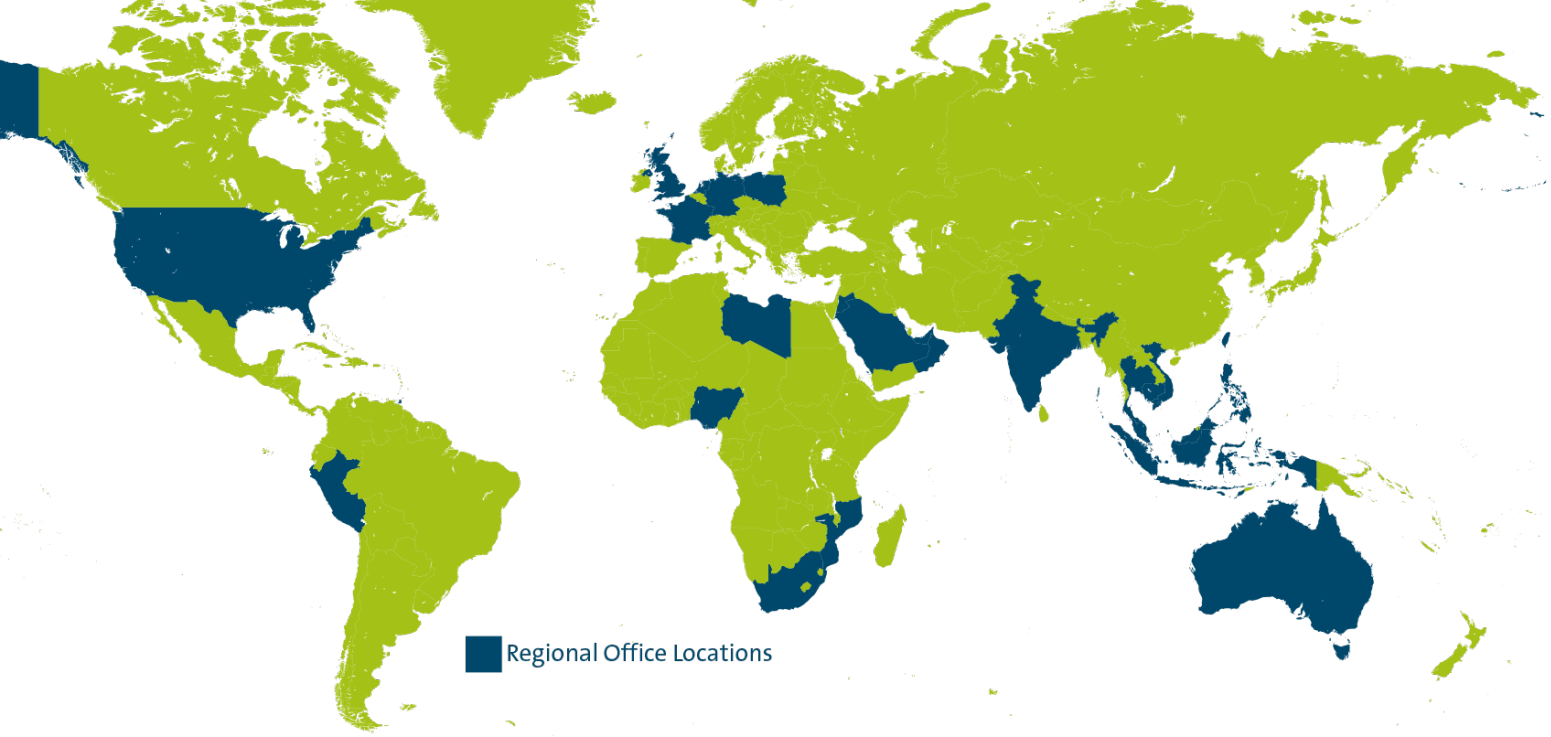
Signed: Prashika Reddy (*Pr Sci Nat*; *EAPASA)*



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