CAMDEN GREEN ENERGY (RF) (PTY) LTD

CAMDEN I GREEN HYDROGEN AND AMMONIA FACILITY

DRAFT ENVIRONMENTAL SCOPING REPORT

25 FEBRUARY 2022

DRAFT

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CAMDEN GREEN ENERGY (RF) (PTY) LTD

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APPLICANT

Camden Green Energy (RF) (Pty) Ltd

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To be Advised

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Draft Environmental Scoping Report

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PRODUCTION TEAM

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Noise Specialist	Kirsten Collett
Traffic Specialist	Christo Bredenhann
Groundwater Specialist	Adam Sanderson

SPECIALISTS

Heritage Specialist	Jaco van der Walt (Beyond Heritage)
Agriculture Specialist	Johan Lanz
Ecology Specialist	David Hoare (David Hoare Consulting (Pty) Ltd
Aquatic Specialist	Brian Colloty (EnviroSci Pty Ltd)
Avifauna Specialist	Chris van Rooyen (Chris van Rooyen Consulting)
Social Specialist	Tony Barbour (Tony Barbour Environmental Consulting)
Visual Specialist	Kerry Schwartz (SiVEST SA (Pty) Ltd / SLR Consulting (Pty) Ltd)
Risk Specialist	Debra Mitchell (ISHECON)

TABLE OF CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 PURPOSE OF THIS REPORT

This Draft Scoping Report (DSR) documents the process and findings of the scoping phase of the Scoping and Environmental Impact Reporting (S&EIR) process for the proposed Camden I Green Hydrogen and Ammonia (GH&A) Facility, located approximately 10km south of Ermelo (near Camden) in the Mpumalanga Province of South Africa.

The DSR aims to provide stakeholders with information on the proposed development including location, layout and technological alternatives, the scope of the environmental assessment and key impacts to be addressed in the environmental assessment, and the consultation process undertaken through the environmental impact assessment (EIA) process.

1.2 BACKGROUND INFORMATION

The proponent is proposing the development of a Camden Renewable Energy Complex within the vicinity of the Camden Power Station in Mpumalanga. The Complex consists of eight projects referred to as:

- Camden I Wind Energy Facility (up to 200MW) (subject to a S&EIR process);
- Camden I Wind Grid Connection (up to 132kV) (subject to a Basic Assessment (BA) Process);
- Camden Grid Connection and Collector substation (up to 400kV) (subject to a S&EIR process);
- Camden I Solar (up to 100MW) (subject to a S&EIR process);
- Camden I Solar Grid Connection (up to 132kV) (subject to a BA Process);
- Camden II Wind Energy Facility (up to 200MW) (subject to a S&EIR process);
- Camden II Wind Energy Facility up to 132kV Grid Connection (subject to a BA Process); and
- Camden Green Hydrogen and Ammonia Facility, including grid connection infrastructure (subject to a S&EIR process).

The Complex is being developed in the context of the Department of Mineral Resources and Energy's (DMRE Integrated Resource Plan, and the Renewable Energy Independent Power Producer Procurement Programme (REIPPP).

The focus of this Scoping Report is the proposed Camden I GH&A project.

The proposed project will be operated under a Special Purpose Vehicle (SPV), and the Project Applicant is Camden Green Energy RF (Pty) Ltd. The proposed facility will connect directly to the nearby Camden Collector substation through an up to 132kV powerline, which will supply the GH&A facility with green energy for the production of hydrogen (and ultimately Ammonia) via the Haber–Bosch process. The broader Camden developments (i.e. seven of the abovementioned projects) will connect to the Camden Power Station substation through an up to 400kV powerline (either single or double circuit) (subject to a separate Scoping and EIA process).

In order for the proposed project to proceed, it will require an Environmental Authorisation (EA) from the Competent Authority (CA) (i.e. the Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (MDARDLEA)).

1.3 KEY ROLE PLAYERS

1.3.1 PROJECT PROPONENT

Camden Green Energy (RF) (Pty) Ltd is the project proponent (Applicant) with regards to this application for the construction and operation of the Camden GH&A Facility and associated infrastructure. **Table 1-1** provides the relevant details of the project proponent.

Table 1-1: Details of Project Proponent

PROPONENT:	**CAMDEN GREEN ENERGY (RF) (PTY) LTD**
Contact Person:	Mercia Grimbeek
Postal Address	Suite 104, Albion Springs, 183 Main Road, Rondebosch, Cape Town, South Africa 7700
Telephone:	071 752 8033
Email:	Gideon.raath@enertrag.co.za

1.3.2 COMPETENT AUTHORITY

Section 24C(2)(a) of NEMA stipulates that the Minister of Forestry, Fisheries and the Environment ("the Minister") must be identified as the CA if the activity has implications for international environmental commitments or relations. GN 779 of 01 July 2016 identifies the Minister as the CA for the consideration and processing of environmental authorisations and amendments thereto for activities related the Integrated Resource Plan (IRP) 2010 – 2030. Due to the fact that the Camden I GH&A Facility is not an activity related to the IRP, the CA was confirmed to be the MDARDLEA.

The CA was confirmed during the Pre-Application Meeting held on **4 November 2021**.

Table 1-2 provides the relevant details of the competent authority on the Project.

Table 1-2: Competent Authority

ASPECT	**COMPETENT / COMMENTING AUTHORITY**	**CONTACT DETAILS**
Competent Authority: Environmental Authorisation	Mpumalanga Department of Agriculture, Rural Development, Land and Environmental Affairs (MDARDLEA)	Case Officer: Sindisiwe Mbuyane mbuyanesb@mpg.gov.za

1.3.3 COMMENTING AUTHORITIES

The following commenting authorities have been identified for this application:

- Department of Forestry, Fisheries and the Environment (DFFE);
- DFFE: Biodiversity and Conservation;
- Department of Mineral Resources and Energy (DMRE);
- Department of Agriculture;
- Department of Water and Sanitation (DWS);

- Vaal Water Management Area (WMA) Authority;
- South African Heritage Resource Agency (SAHRA);
- Mpumalanga Heritage Resources Authority (MHRA);
- Mpumalanga Tourism and Parks Agency (MTPA);
- Civil Aviation Authority (CAA);
- Air Traffic and Navigation Services (ATNS);
- Department of Defence (SA Army) (DD);
- Astronomy Management Authority (AMA);
- South African Weather Services (SAWS);
- South African National Roads Agency Limited (SANRAL);
- Gert Sibande District Municipality;
- Msukaligwa Local Municipality; and
- Dr Pixley Ka Seme Local Municipality.

1.3.4 ENVIRONMENTAL ASSESSMENT PRACTITIONER

WSP Group Africa (Pty) Ltd (WSP) has been appointed in the role of Independent Environmental Assessment Practitioner (EAP) to undertake the S&EIR processes for the development of the Project. The CV of the EAP is available in **Appendix A**. The EAP declaration of interest and undertaking is included in **Appendix B**. **Table 1** details the relevant contact details of the EAP. In order to adequately identify and assess potential environmental impacts, a number of specialists will support the EAP.

Table 1-3: Details of the Environmental Assessment Practitioner

ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)	**WSP GROUP AFRICA (PTY) LTD**
Contact Person:	Ashlea Strong
Postal Address:	Building C, Knightsbridge, 33 Sloane Street, Bryanston, 2191, South Africa
Telephone:	011 361 1392
Fax:	011 361 1381
E-mail:	Ashlea.Strong@wsp.com

STATEMENT OF INDEPENDENCE

Neither WSP nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any business, financial, personal or other interest that could be reasonably regarded as being capable of affecting their independence. WSP has no beneficial interest in the outcome of the assessment.

1.3.5 SPECIALISTS

Specialist input was required in support of this application for EA. The details of the specialists are provided in **Table 1-4** below. The specialist declarations are included in **Appendix C.**

Table 1-4: Details of Specialists

ASSESSMENT	NAME OF SPECIALIST	COMPANY	SECTIONS IN REPORT
Agriculture	Johann Lanz	Independent consultant	Section 5.1.5 Section 6.4 Section 7.5.1
Avifauna	Chris van Rooyen	Chris van Rooyen Consulting	Section 5.2.6 Section 6.10 Section 7.5.4 **Appendix J**
Risk	Debra Mitchel	Ishecon cc	Section 5.2.7 Section 6.11 Section 7.5.5 **Appendix K**
Terrestrial Ecology	David Hoare	David Hoare Consulting (Pty) Ltd	Section 5.2 Section 6.9 Section 7.5.2 **Appendix I**
Aquatic	Brian Colloty	EnviroSci Pty Ltd	Section 5.1.6 Section 6.5 Section 7.5.3 **Appendix H**
Groundwater	Adam Sanderson	WSP Group Africa (Pty) Ltd	Section 5.1.7 Section 6.6
Heritage and Palaeontology	Jaco van der Walt	Beyond Heritage	Section 5.3.4 Section 6.13 and 6.14 Section 7.5.7 **Appendix D**
Socio-economic	Tony Barbour	Tony Barbour Environmental Consulting	Section 5.3.6 Section 6.16 Section 7.5.10 **Appendix L**
Traffic	Christo Bredenhann	WSP Group Africa (Pty) Ltd	Section 5.3.3 Section 6.15 Section 7.5.8
Visual	Kerry Schwartz	SiVEST SA (Pty) Ltd / SLR Consulting (Pty) Ltd	Section 5.3.5 Section 6.12 Section 7.5.9 **Appendix K**
Noise	Kirsten Collett	WSP Group Africa (Pty) Ltd	Section 5.3.2 Section 6.2 Section 7.5.6

ASSESSMENT	NAME OF SPECIALIST	COMPANY	SECTIONS IN REPORT
Air Quality	Loren Dyer	WSP Group Africa (Pty) Ltd	Section 5.1.2 Section 6.1 Section 7.5.10

1.4 SCOPING TERMS OF REFERENCE

The 2014 Environmental Impact Assessment (EIA) Regulations (GNR 982), as amended, identifies the proposed Camden I GH&A Facility development as an activity being subject to an S&EIR process due to the applicability of the EIA Listing Notices 1 and 2 (GNR 983 and 984, as amended).

As defined in Appendix 2 of GNR 982, as amended, the objective of the scoping process is to, through a consultative process:

- Identify the relevant policies and legislation relevant to the activity;
- Motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;
- Identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;
- Identify and confirm the preferred site, through a detailed site selection process, which includes an impact and risk assessment process inclusive of cumulative impacts and a ranking process of all the identified alternatives focusing on the geographical, physical, biological, social, economic, and cultural aspects of the environment;
- Identify the key issues to be addressed in the assessment phase;
- Agree on the level of assessment to be undertaken, including the methodology to be applied, the expertise required as well as the extent of further consultation to be undertaken to determine the impacts and risks the activity will impose on the preferred site through the life of the activity, including the nature, significance, consequence, extent, duration and probability of the impacts to inform the location of the development footprint within the preferred site; and
- Identify suitable measures to avoid, manage or mitigate identified impacts and to determine the extent of the residual risks that need to be managed and monitored.

Public participation is a requirement of scoping; it consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the S&EIR decision-making process. Effective public participation requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the Proposed Project. The objectives of the public participation process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the Proposed Project;
- Clearly outline the scope of the proposed Project, including the scale and nature of the existing and proposed activities;
- Identify viable proposed Project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the subsequent specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the Proposed Project, issues and solutions.

1.5 DRAFT SCOPING REPORT STRUCTURE

Table 2 cross-references the sections within the DSR with the legislated requirements as per Appendix 2 of GNR 982.

Table 1-5: Legislated Report Requirements as detailed in GNR 982

APPENDIX 2	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
(a)	Details of	
	the EAP who compiled the report; and	Section 1.3.4 and **Appendix A**
	the expertise of the EAP, including a Curriculum Vitae	**Appendix A**
(b)	The location of the activity, including-	
	The 21 digit Surveyor code for each cadastral land parcel;	Section 2.1
	Where available, the physical address and farm name	Section 2.1
	Where the required information in terms of (i) and (ii) is not available, the coordinates of the boundary of the property.	N/a
(c)	A plan which locates the proposed activities applied for at an appropriate scale, or, if it is-	
	A linear activity, a description of the corridor in which the proposed activity or activities is to be undertaken; or	N/A
	On land where the property has not been defined, the coordinates within which the activity is to be undertaken.	N/a
(d)	A description of the proposed activity, including-	
	All listed and specified activities triggered;	Section 3.1
	A description of the activities to be undertaken, including associated structures and infrastructure;	Section 2
(e)	A description of the policy and legislative context within which the development is proposed including an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks and instruments that are applicable to this activity and are to be considered in the assessment process;	Section 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 location;	Section 2.5
(h)	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including-	
	Details of all the alternatives considered;	Section 2.4
	Details of the public participation undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	Section 4.6
	a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;	To be included in the Final Scoping Report (FSR)

APPENDIX 2	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
	the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	Section 5 Section 7
	the impacts and risks identified for each alternative, 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;	Section 6
	the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives;	Section 4.5
	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;	Section 6
	the possible mitigation measures that could be applied and level of residual risk;	Section 6
	the outcome of the site selection matrix;	Section 2.4
	if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such and	N/A
	a concluding statement indicating the preferred alternatives, including preferred location of the activity;	Section 2.4
(i)	A plan of study for undertaking the environmental impact assessment process to be undertaken, including-	
	a description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	Section 7.3
	a description of the aspects to be assessed as part of the environmental impact assessment process;	Section 7.4
	aspects to be assessed by specialists;	Section 7.5
	a description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists;	Section 7.6
	a description of the proposed method of assessing duration and significance;	Section 7.7
	an indication of the stages at which the competent authority will be consulted;	Section 7.9
	particulars of the public participation process that be conducted during the environmental impact assessment process; and	Section 7.9
	a description of the tasks that will be undertaken as part of the environmental impact assessment process;	Section 7
	identify suitable measures to avoid, reverse, mitigate or manage identified impacts and to determine the extent of the residual risks that need to be managed and monitored.	Section 6 Section 7.7

APPENDIX 2	LEGISLATED REQUIREMENTS AS PER THE NEMA GNR 982	RELEVANT REPORT SECTION
(j)	An undertaking under oath or affirmation by the EAP in relation to-	
	the correctness of the information provided in the report;	**Appendix B**
	the inclusion of comments and inputs from stakeholders and interested and affected parties; and	
	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;	
(k)	An undertaking under oath or affirmation by the EAP in relation to the level of agreement between the EAP and interested and affected parties on the plan of study for undertaking the environmental impact assessment;	**Appendix B**
(l)	Where applicable, any specific information required by the competent authority; and	N/A
(m)	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	N/A

1.6 ASSUMPTION AND LIMITATIONS

General assumptions and limitations:

- The EAP hereby confirms that they have undertaken to obtain project information from the client that is deemed to be accurate and representative of the project;
- Site visits have been undertaken to better understand the project and ensure that the information provided by the client is correct, based on site conditions observed;
- The EAP hereby confirms their independence and understands the responsibility they hold in ensuring all comments received are accurately replicated and responded to within the EIA documentation;
- The comments received in response to the public participation process, will be representative of comments from the broader community; and
- Based on the Pre-Application meeting and subsequent minutes, the CA would not require additional specialist input, in order to make a decision regarding the application.

Risk:

- The engineering design details for the LAES, electrolysers, hydrogen and ammonia facilities are not yet available, so assumptions will be made based on engineering judgement,.
- Final storage and any transportation of ammonia, hydrogen, nitrogen and oxygen is assumed to be in the liquid phase.
- The electrolysers are assumed to be located indoors while the remaining facilities will be outdoors

Aquatic Ecology:

- To obtain a comprehensive understanding of the dynamics of both the flora and fauna of communities within a study site, as well as the status of endemic, rare or threatened species in any area, assessments should always consider investigations at different time scales (across seasons/years) and through replication. However, due to time constraints these long-term studies are not feasible and are thus mostly based on instantaneous sampling. This limitation is common to many impact assessment type studies, but the findings are deemed adequate for the purposes of decision-making support regarding project acceptability in this Phase, unless otherwise stated.
- Due to the scope of the work presented in this report, a long-term investigation of the proposed site was not possible and as such not perceived as part of the Terms of Reference – Scoping Phase. However, a concerted effort was made to sample and assess as much of the potential site, as well as make use of any supporting literature, species distribution data and aerial photography.

- It should be emphasised that information, as presented in this document, only has reference to the study area as indicated on the accompanying maps. Therefore, this information cannot be applied to any other area without detailed investigation.

Avifauna:

- The SABAP2 dataset is a comprehensive dataset which provides a reasonably accurate snapshot of the avifauna which could occur at the proposed site. For purposes of completeness, the list of species that could be encountered was supplemented with personal observations, general knowledge of the area, and the results of the pre-construction monitoring which was conducted over 12 months.
- Conclusions in this scoping report are based on experience of these and similar species at wind farm developments in different parts of South Africa. However, bird behaviour can never be predicted with absolute certainty.
- The precautionary principle was applied throughout. The World Charter for Nature, which was adopted by the UN General Assembly in 1982, was the first international endorsement of the precautionary principle. The principle was implemented in an international treaty as early as the 1987 Montreal Protocol and, among other international treaties and declarations, is reflected in the 1992 Rio Declaration on Environment and Development. Principle 15 of the 1992 Rio Declaration states that: "in order to protect the environment, the precautionary approach shall be widely applied by States according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall be not used as a reason for postponing cost-effective measures to prevent environmental degradation."
- The broader area refers to the area covered by sixteen SABAP2 pentads.
- The assessment concentrated on the potential impact on priority species, which were defined as all species currently included in the most recent edition of the Red List Book of Birds of South Africa, Lesotho and Swaziland (Taylor et al. 2015).

Ecology:

- The assessment is based on a single reconnaissance site visit from 3-7 February 2020 (summer season). The current study is based on an extensive site visit as well as a desktop study of the available information. The time spent on site was adequate for understanding general patterns across affected areas. If necessary, additional surveys will be recommended to compensate for any short-coming related to describing seasonal floristic patterns on site in detail.
- The vegetation was in good condition for sampling at the time of the field assessment, and the species lists obtained are considered reliable and relatively comprehensive.
- Compiling the list of species that could potentially occur on site is limited by the paucity of collection records for the area. The list of plant species that could potentially occur on site was therefore taken from a wider area and from literature sources that may include species that do not occur on site and may miss species that do occur on site. In order to compile a comprehensive site-specific list of the biota on site, studies would be required that would include different seasons, be undertaken over a number of years and include extensive sampling. Due to time constraints, this was not possible for this study.
- Rare and threatened plant and animal species are, by their nature, usually very difficult to locate and can be easily missed.
- The faunal component of the study relies primarily on existing information, as available in various spatial databases and published accounts. These databases are not intended for fine-scale use and the reliability and adequacy of these data sources relies heavily on the extent to which the area has been sampled in the past. Many remote areas have not been well sampled with the result that the species lists for an area do not always adequately reflect the actual fauna and flora present at the site. In order to counter the likelihood that the area has not been well sampled in the past and in order ensure a conservative approach, the species lists derived for the site from the literature were obtained from an area significantly larger than the study area and are likely to include a much wider array of species than actually occur at the site. This ensures that no species of potential conservation concern are missed ion the assessment. The study excludes Bats, Avifauna, Aquatic Ecology and Invertebrates

Social:

- Identification of social issues: The identification of social issues is based on the authors experience associated with undertaking in the region of 130 SIAs for renewable energy facilities and associated infrastructure (substations, transmission lines, roads etc.). Based on this the author is confident that the

majority of social issues have been identified. As indicated above, a site visit will be undertaken during the Assessment Phase of the SIA.

- Technical suitability: It is assumed that the development site represents a technically suitable site for the establishment of the proposed development.
- Strategic importance of the project: The strategic importance of promoting renewable and other forms of energy is supported by the national and provincial energy policies.
- Fit with planning and policy requirements: Legislation and policies reflect societal norms and values. The legislative and policy context therefore plays an important role in identifying and assessing the potential social impacts associated with a proposed development. In this regard, a key component of the SIA process is to assess the proposed development in terms of its fit with key planning and policy documents. As such, if the findings of the study indicate that the proposed development in its current format does not conform to the spatial principles and guidelines contained in the relevant legislation and planning documents, and there are no significant or unique opportunities created by the development, the development cannot be supported.
- Demographic data: Some of the provincial documents do not contain data from the 2011 Census and or 2016 Household Community Survey. However, where required the relevant 2011 and 2016 data has been provided.
- Site visit: A site visit will be undertaken during the Assessment Phase of the SIA. The site visit will include interviews with key stakeholders and interested and affected parties. However, as indicted above, the author is confident that the key social issues have been identified.

Visual

- Given the nature of the receiving environment and the assumed height of certain components of the Facility, the study area or visual assessment zone is assumed to encompass an area of 5km from the two proposed site alternatives. This limit on the visual assessment zone relates to the fact that visual impacts decrease exponentially over distance. Thus although the higher elements of the Facility may theoretically still be visible beyond 5km, the degree of visual impact would diminish considerably. As such, the need to assess the impact on potential receptors beyond this distance would not be warranted.
- The identification of visual receptors involved a combination of desktop assessment as well as field-based observation. Initially Google Earth imagery was used to identify potential receptors within the study area. Where possible, these receptor locations were verified and assessed during a site visit which was undertaken in mid-September 2019. Due to the extent of the study area however and the number of receptors that could potentially be sensitive to the proposed development, it was not possible to visit or verify every potentially sensitive visual receptor location. As such, a number of broad assumptions have been made in terms of the likely sensitivity of the receptors to the proposed development.
- It should be noted that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility, the economic dependency of the occupants on the scenic quality of views from the facility and on people's perceptions of the value of "Green Energy". Sensitive receptor locations typically include sites such as tourism facilities and scenic locations within natural settings which are likely to be adversely affected by the visual intrusion of the proposed development. Thus, the presence of a receptor in an area potentially affected by the proposed development does not necessarily mean that any visual impact will be experienced.
- The potential visual impact at each sensitive visual receptor location was assessed using a matrix developed for this purpose. The matrix is based on three main parameters relating to visual impact and, although relatively simplistic, it provides an indicative assessment of the degree of visual impact likely to be experienced at each receptor location as a result of the proposed development. It is however important to note the limitations of quantitatively assessing a largely subjective or qualitative type of impact and as such the matrix should be seen merely as a representation of the likely visual impact at a receptor location.
- As stated, the exact status of all the receptors could not be verified during the field investigation and as such the receptor impact rating was largely undertaken via desktop means. Where details of the levels of leisure / tourism activities on different sectors of the relevant farms are not known, the impact rating matrix for these receptors is based on the assumed location of the main accommodation complex on each property.
- Where receptors have been identified within the Camden 1 Renewable Energy project area, it has been assumed that the land owners or residents at these locations support the proposed development and would not view the project in a negative light.

- Based on the project description provided by the proponent, all analysis for this VIA is based on a worst-case scenario where the highest structure associated with the Facility (Air Separation Unit) is assumed to be 60m.
- Due to the varying scales and sources of information; maps may have minor inaccuracies. Terrain data for this area, derived from the National Geo-Spatial Information (NGI)'s 25m Digital Elevation Model (DEM), is fairly coarse and somewhat inconsistent and as such, localised topographic variations in the landscape may not be reflected on the DEM used to generate the viewshed(s) and visibility analysis conducted in respect of the proposed development.
- In addition, the viewshed / visibility analysis does not take into account any existing vegetation cover or built infrastructure which may screen views of the proposed development. This analysis should therefore be seen as a conceptual representation or a worst-case scenario.
- No feedback regarding the visual environment has been received from the public participation process to date. Any feedback from the public during the review period of the Draft Scoping Report (DSR) for the Facility will however be incorporated into further drafts of this report, if relevant.
- At the time of undertaking the visual study no information was available regarding the type and intensity of lighting that will be required for the proposed Facility and therefore the potential impact of lighting at night has not been assessed at a detailed level. General measures to mitigate the impact of additional light sources on the ambiance of the nightscape have however been provided.
- In the light of the fact that green hydrogen and ammonia facilities are still relatively new in South Africa and as such, this report is based on assumptions as to the likely generic impacts associated with the proposed development.
- This study includes an assessment of the potential cumulative impacts of other renewable energy and infrastructural / mining developments on the existing landscape character and on the identified sensitive receptors. This assessment is based on the information available at the time of writing the report and where information has not been available, broad assumptions have been made as to the likely impacts of these developments.
- It should be noted that the fieldwork for this study was undertaken in mid-September 2019, during late winter which is characterised by low levels of rainfall and reduced vegetation cover. In these conditions, increased levels of visual impact will be experienced from receptor locations in the surrounding area.
- The overall weather conditions in the study area have certain visual implications and are expected to affect the visual impact of the proposed development to some degree. In clear weather conditions, the Facility would present a greater contrast with the surrounding environment than they would on an overcast day. Although the field investigation was conducted during clear weather conditions however, localised pollution in the study area results in relatively hazy skies which would reduce the visibility of the Facility.

Heritage

- The study area was not subjected to a field survey and will be conducted in the EIA phase. It is assumed that information obtained for the wider area is applicable to the study area and the authors acknowledge that the brief literature review is not exhaustive on the literature of the area. Due to the subsurface nature of cultural deposits, the possibility exists that some features or artefacts may not have been discovered/recorded during the survey, similarly the possible occurrence of graves and other cultural material cannot be excluded. This study did not assess the impact on medicinal plants and intangible heritage as it is assumed that these components would be highlighted through the public consultation process if relevant. It is possible that new information could come to light in future, which might change the results of this scoping report.

Notwithstanding these assumptions and limitations, it is the view of WSP that this DSR provides a good description of the issues associated with the project, and a reasonable plan of study for the EIA phase.

2 PROJECT DESCRIPTION

2.1 SITE LOCATION

The proposed Camden I GH&A Facility will be developed in an area of approximately 25 hectares (ha) south-west of Ermelo, in Mpumalanga. The proposed Camden I GH&A Facility falls within the Msukaligwa Local Municipality of the Gert Sibande District Municipality.

The eight projects of the Camden Renewable Energy Complex are located within the same geographical area and are inevitably linked and integrated. As such, the overall locality of the Camden Renewable Energy Complex is included in **Figure 2-1**. The Camden I GH&A Facility (*project under consideration for this DSR*) project site, including associated alternatives, is indicated in **Figure 2-2**.

The details of the properties associated with the proposed Camden I GH&A Facility, including the 21-digit Surveyor General (SG) codes for the cadastral land parcels are outlined in **Table 2-1.**

Table 2-1: Camden I GH&A Facility Affected Farm Portions

FARM NAME	21 DIGIT SURVEYOR GENERAL CODE OF EACH CADASTRAL LAND PARCEL
Alternative 1	
Portion 2 of Welgelegen Farm No. 322	T0IT00000000032200002
Alternative 2 (Preferred)	
Portion 1 of Welgelegen Farm No. 322	T0IT00000000032200001

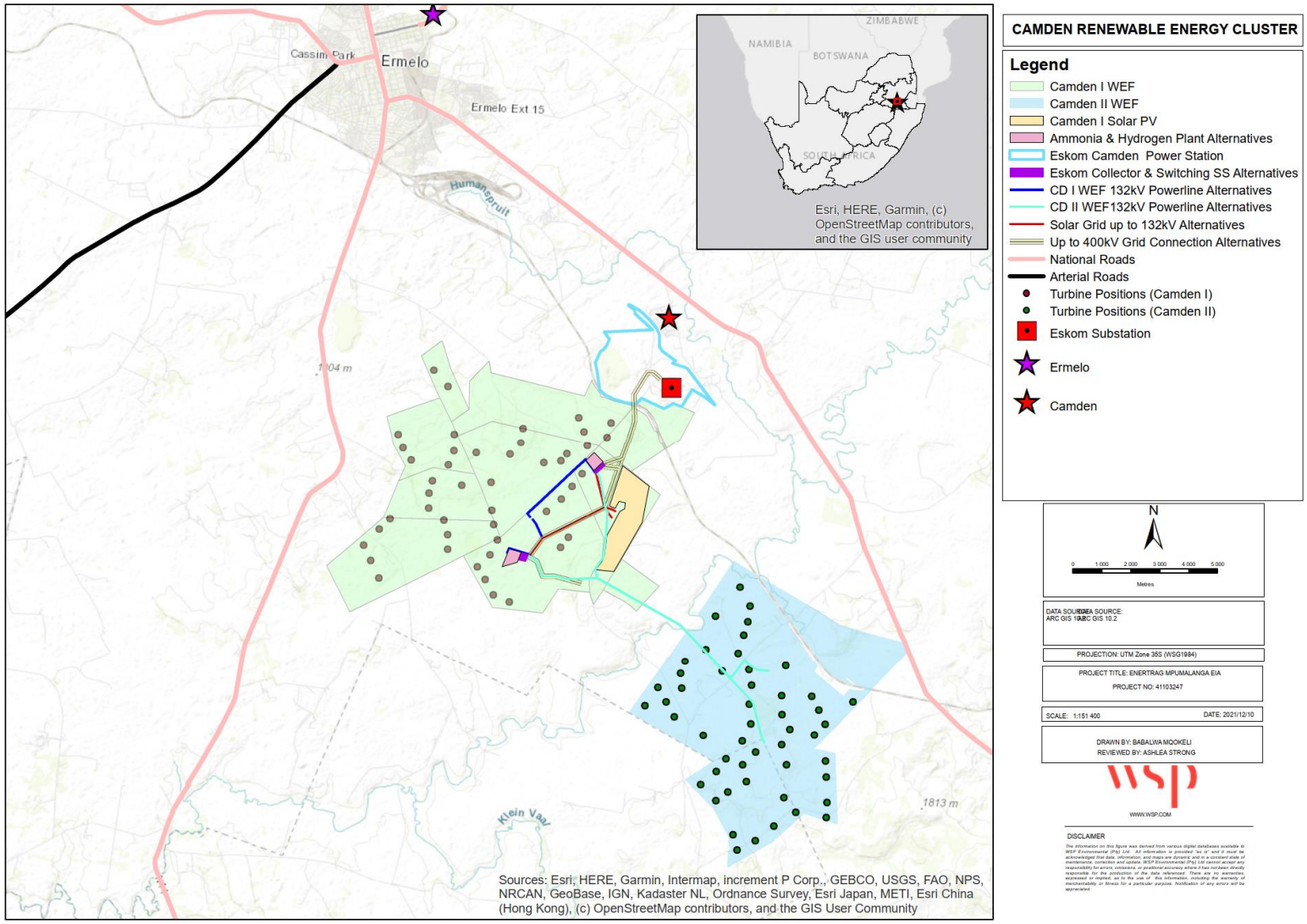


Figure 2-1: Locality map for the proposed Camden Renewable Energy Complex, near Camden in the Mpumalanga Province

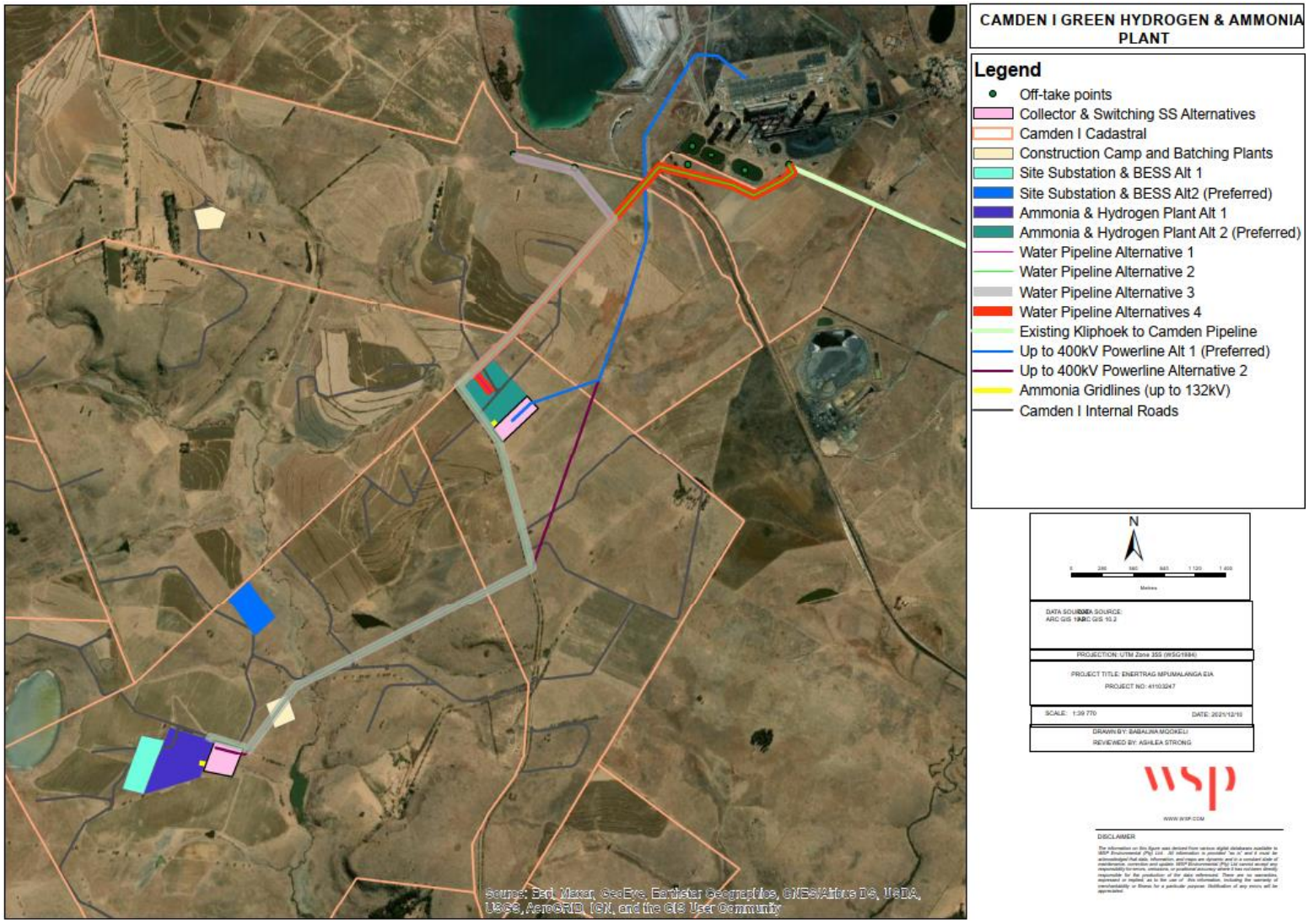


Figure 2-2: Proposed Camden I GH&A Facility and associated main components

2.2 GREEN HYDROGEN AND AMMONIA PROCESS

ENERTRAG developed its first green hydrogen facility, Hybridkraftwerk, in Germany which is powered by wind energy. The Hybridkraftwerk was commissioned in October 2011 and produces 94 tons of hydrogen per year (**Figure 2-3** and **Figure 2-4**).

Camden Green Energy (RF)Pty Ltd, a SPV, will be established for the sole purpose of developing, owning and operating the proposed up to 150MW GH&A facility.

Figure 2-3: Enertrag Germany's Hybridkraftwerk

Figure 2-4: Closer View of Electrolyser Housing and Storage Tanks

'Green Ammonia' is ammonia (NH_3) made using renewable energy, air and water (**Figure 2-5**). The process uses electrolysis (direct electric current to drive an otherwise non-spontaneous chemical reaction) and air separation to split water and air into its primary components i.e. hydrogen (H) and oxygen (O_2) from water, and nitrogen (N) and oxygen from air. NH_3 is then synthesised from the separated components using the Haber-Bosch method (the standard industrial process used to make ammonia). The Haber-Bosch process combines stoichiometric amounts of hydrogen and nitrogen in a moderate temperature (~ 400 – 500 °C), high pressure (100 barg[1]) reactor. The process requires a catalyst (usually iron-based) promoting NH_3 mixture equilibrium. The NH_3 gas generated is rapidly cooled to form anhydrous (liquid) NH_3 for easy and safe storage and transport. Any unreacted nitrogen and hydrogen is recycled back into the reactor[2].

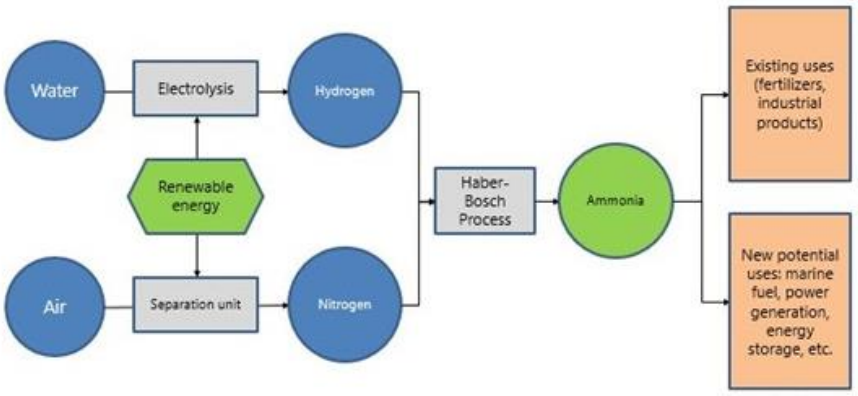


Figure 2-5: Green ammonia production and end uses[3]

Anhydrous NH_3 is easily stored in bulk tanks and used widely as an agricultural fertilizer as well as in industrial processes. When powered by renewable energy sources (i.e. wind or solar generated electricity) the production process is 100% carbon-free. NH_3 can also be used as a fuel in combustion engines (releasing nitrogen and water vapour as opposed to harmful emissions associated with the combustion of fossil fuels) or it can be cracked back into its components and the separated hydrogen used in other applications e.g. a fuel cell for charging battery powered electric vehicles. Hydrogen derived from renewable sources is also a viable substitute for fossil fuels, however, is difficult to store and transport in bulk. NH_3 is an effective and safe storage medium for hydrogen. Green Ammonia as a hydrogen carrier, thus presents an opportunity to capture renewable energy in a form that can be stored, safely transported and used in multiple applications[4].

The only solid waste stream is the production of brine from the water treatment plant. Ammonia spillages may occur however these will be accidental and mitigation measures will be developed and implemented, including amongst others suitable containment related to storage and emergency response measures.

A gaseous 'waste' (oxygen) is generated from the electrolyses process. Another source of gaseous 'wastes' is from the Air Separation Unit. This is where nitrogen is removed from the air and the other natural gases as expelled back to the environment.

A simplified flow process diagram is shown in **Figure 2-6** and **Figure 2-7**.

The production, storage and transport of hydrogen and ammonia is an industry undergoing in-depth research and developments. Consequently, technological solutions are constantly being improved and changing. Thus, the below Facility description is based on available technological solutions, however, the underlying fundamentals will remain.

[1] The unit of measurement of gauge pressure (i.e. absolute pressure minus atmospheric pressure)
[2] ENERTRAG (2021): Basis of Design – Doc no: 21004-ENT-PR-RPT-001
[3] Argus (2020): Green ammonia – Opportunity knocks (URL: https://www.argusmedia.com/en/blog/2020/may/28/green-ammonia-opportunity-knocks)
[4] Siemens Energy – The Green Ammonia Demonstration Programme (URL: https://www.siemens-energy.com/uk/en/offerings-uk/green-ammonia.html)

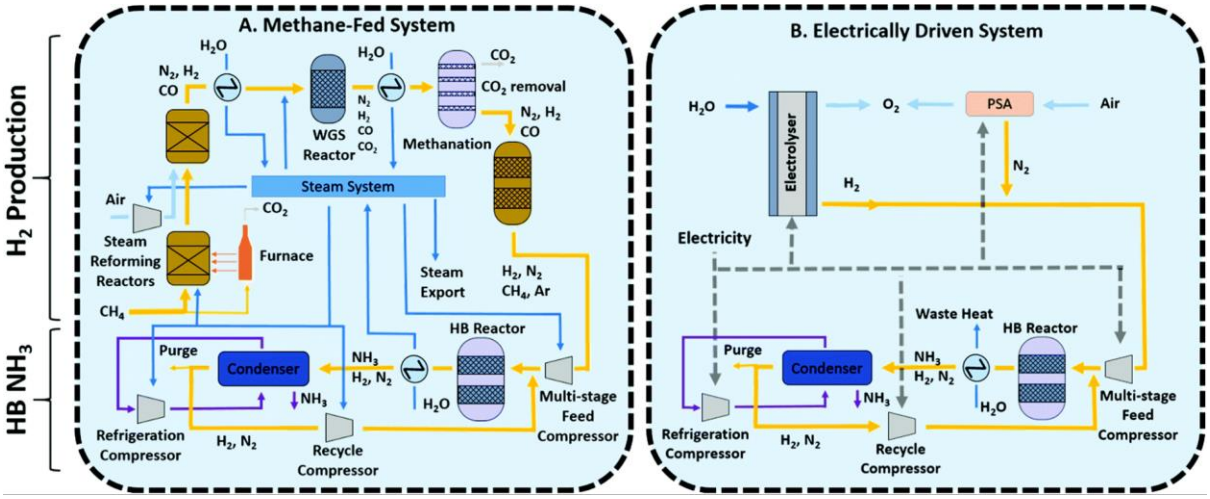


Figure 2-6: Simplified process flow diagram- traditional ammonia vs green ammonia production

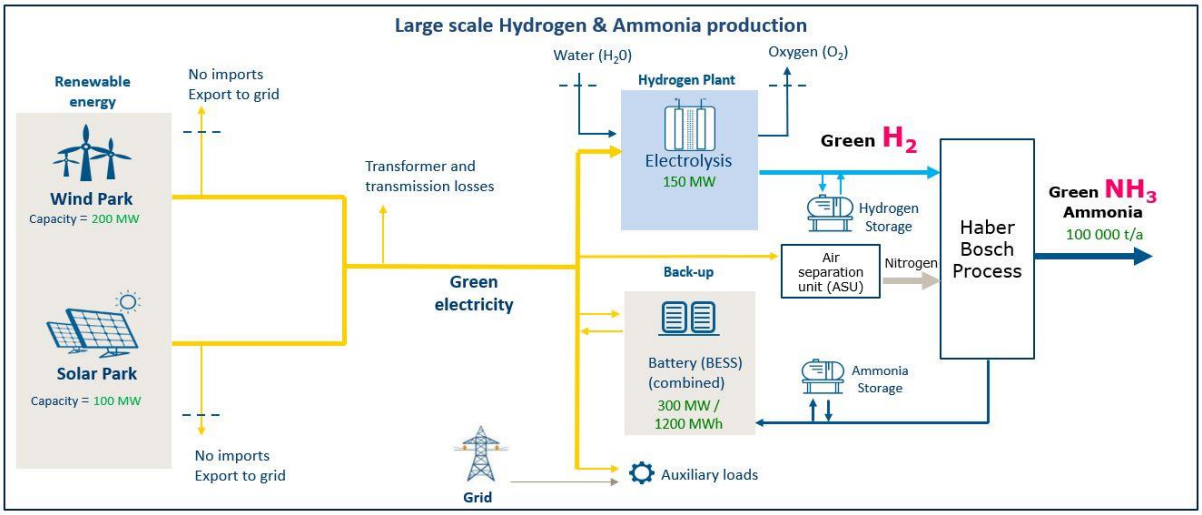


Figure 2-7: Simplified green hydrogen and ammonia production life cycle example

2.3 PROJECT INFRASTRUCTURE

The facility comprises the following components as summarised in **Table 2-2**, where the footprint and capacities are presented. An indicative block layout of the GH&A Facility is illustrated in **Figure 2-8**.

These parameters on based on the assumption that an up to 150MW electrolyser is installed (maximum). These components are detailed further below, but comprise the following general components:

- Water treatment.
- Electrolyser.
- Air separator.
- Ammonia processing unit.
- Liquid air energy system (LAES) for nitrogen storage.
- Feedstock and product storage.
- Utilities.
- Gantry and loading bay.

Associated infrastructure further includes:

- Electrical infrastructure required for power supply to the facility, including battery energy storage system (BESS). The BESS storage capacity will be up to 200MW/800 megawatt-hour (MWh) with up to four hours of storage. It is proposed that Lithium Battery Technologies, such as Lithium Iron Phosphate, Lithium Nickel Manganese Cobalt oxides or Vanadium Redox flow technologies will be considered as the preferred battery technology however the specific technology will only be determined following Engineering, Procurement, and Construction (EPC) procurement. The main components of the BESS include the batteries, power conversion system and transformer which will all be stored in various rows of containers.
- Temporary and permanent laydown areas required for temporary storage and assembly of components and materials.
- Access road/s to the site and internal roads between project components, with a width of up to up to 6m wide respectively.
- A temporary concrete batching plant (if necessary).
- Temporary staff accommodation.
- Fencing and lighting.
- Lightning protection.
- Telecommunication infrastructure.
- Stormwater channels.
- Water pipelines.
- Offices.
- Operational control centre.
- Operation and Maintenance Area / Warehouse / workshop.
- Ablution facilities.
- A gate house.
- Control centre, offices, warehouses.
- Security building.

Access to the site is possible primarily via an unnamed gravel road immediately off the N11 (south of Ermelo town). Existing roads will be used where feasible and practical.

Table 2-2: Summary of Facility Components[5]

NO.	COMPONENT	APPROXIMATE FOOTPRINT (HA)	STORAGE CAPACITY (M^3 / TONS)	MAXIMUM THROUGHPUT (M^3 / TONS PER ANNUM)	NOTE
1	Water Reservoir	2	6 800 / 6 800	800 / 800	Process and utilities water
2	Water Treatment Unit	1.5	N/A	192 000 / 192 000	Process and utilities water
3	Electrolyser Unit	1	N/A	(1 239 157 – 301 932 367) / 20 000	Hydrogen Output Oxygen Output
4	Air Separation Unit	0.5	N/A	92 905 405 / 110 000	Nitrogen Input
5	Ammonia Processing Unit	2	N/A	149 253 / 100 000	Ammonia Output
6	Liquid Air Storage System (LAES)	1	3 983/ 3 505	460 227 / 405 000	Nitrogen Storage
7	Liquid Ammonia Storage Tank	2	2 273/ 1 523	261 194 / 175 000	
8	Hydrogen and Oxygen Storage Tank Farm	12	59 566/ 800	5 576 208 / 90 000	Hydrogen and Oxygen storage (combined tank farm), i.e. feedstock storage
9	Ancillary infrastructure	3	n/a	n/a	Includes temporary and permanent laydown areas, parking, offices and other related infrastructure.
	Total Footprint	~ 25			

[5] These are Provisional Values which are subject to change, pending further layout revisions

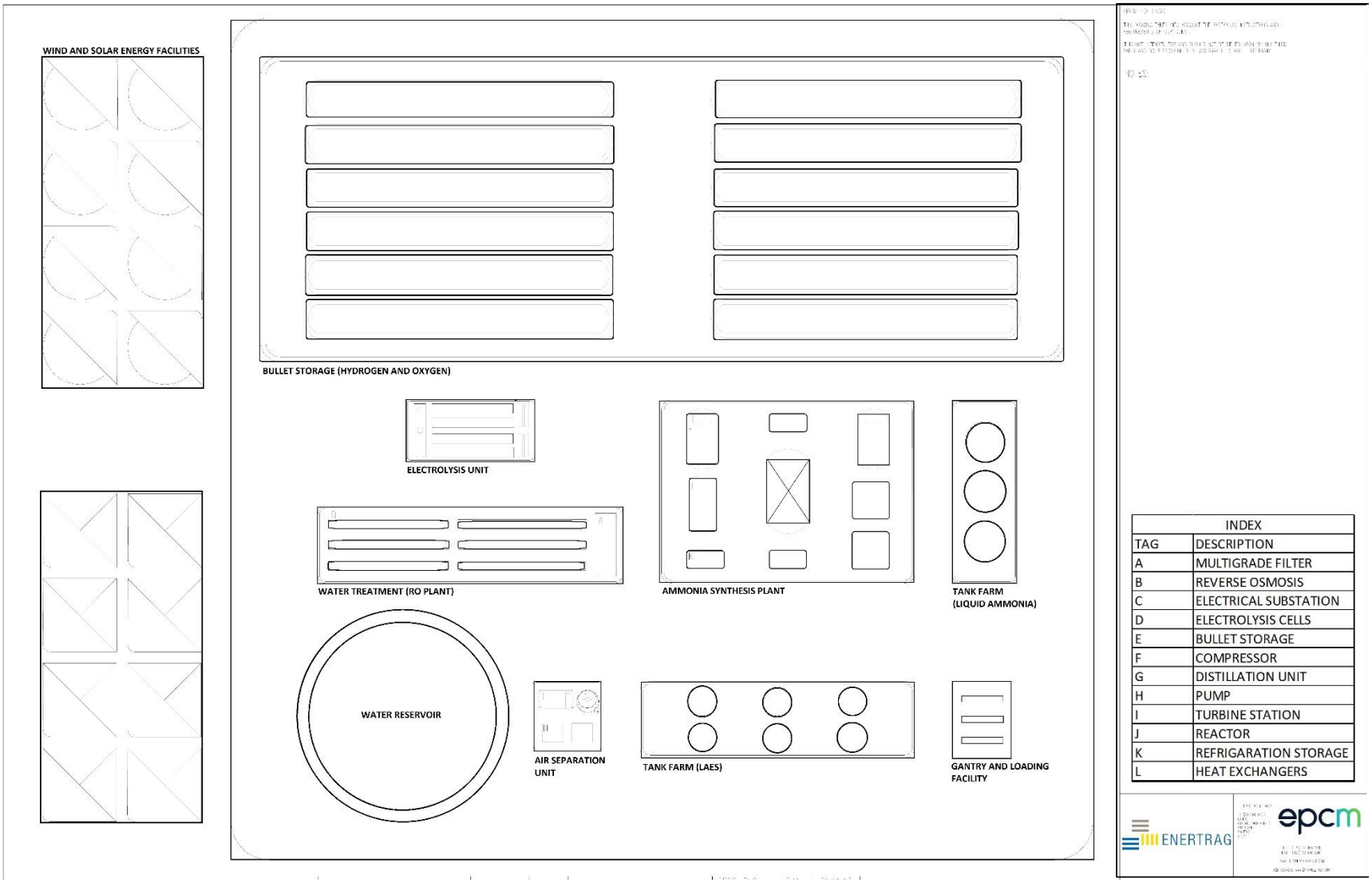


Figure 2-8: Indicative block layout of the proposed hydrogen and ammonia plant

2.3.1 WATER RESERVOIR

Water is required for the production of hydrogen and for heating and cooling purposes. Feedstock water will be stored in a water reservoir with a footprint of up to 1.5ha and a capacity of approximately 6800 m^3. It is proposed that three water reservoirs will be located on site. Each reservoir will have a diameter of up to 25m and a height of 6m (maximum height up to 15m), pending detailed design. The water reservoirs will consist of either reinforced concrete or steel cylindrical tanks (**Figure 2-9**). The precise design will be determined during the detailed design engineering phase.

A variety of water sources are being investigated for the broader development, and include the following:

- Groundwater: Various boreholes may be utilised across the project site for extraction of construction and operational water requirements.
- Municipal water: Where available, water may be sourced for construction and operation from municipal reticulation.
- Purified wastewater: Wastewater from nearby commercial or mining facilities could be sourced to provide the facility with water. This would depend on availability of suitable quality wastewater and agreements with the respective entities involved. It is also possible that water may be sourced from existing surrounding mining operations that are experiencing or anticipating mine water decant from their operations.
- Usutu pipeline (preferred option): Bulk water infrastructure currently feeding the surrounding coal mines and power stations (specifically Eskom Camden Power Station) may be utilised for construction and operational water. Initial water results indicate good quality supply in sufficient quantities is available. This option is the preferred water sourcing for the development.

Figure 2-9: Typical water reservoir (left - concrete, right - steel)

WATER PIPELINE

As mentioned above, the preferred water source will be to connect to the Usutu Pipeline. Therefore, an above or below ground water pipeline will be constructed for the continuous or intermittent supply of water to the GH&A facility.

The pipeline will comprise a concrete pressure pipe, ductile iron pipe, galvanised iron or steel pipe, GRP/GRE pipe, Poly Vinyl Chloride Pipes, High Density Poly Ethylene pipes or other suitable material as required by the detailed design phase, situated (where buried) within a trench of up to 3m wide and up to 2m deep. The pipe will carry up to 370 000m^3 per annum at a throughput of ~12 litres per second. The pipeline inner diameter will be up to 200mm. Major components will include:

- Pipeline segments comprising pipeline length of up to 9.5km.
- Concrete supports (where pipeline is located above ground)
- Pumps (including pump, electrical or oil engine and panel board) housed in pump house for security and safety
- Mains and sumps (if needed)

- Manholes for inspection, with concrete covers. To be spaced no further than 100 metres apart. ~90 manholes to be utilised given the pipeline length
- Valves (various, for example sluice, air, scour etc.) as required
- Water and flow meters
- Pipe fitting pieces, joints, clamps, adaptors and couplings as needed
- Bedding material as needed (concrete, sand, tamped down soil) where trenched
- Electrical source for pumps
- Protection systems (pipeline inner liner and outer coating), cathodic protection, pressure meters).

Four water supply pipeline alternatives are being considered, as follows:

- Alternative 1: Preferred Site to Usutu Scour 2 (~3.3km);
- Alternative 2: Alternate Site to Camden Power Station Confluence (~9.4km);
- Alternative 3: Alternate Site to Usutu Scour 2 (~8.5km); and
- Alternative 4: Preferred Site to Camden Power Station Confluence (~4.2km).

The surface area required for the trenching, assuming a 3m wide trench for the full length of the entire pipeline will be up to 3 ha.

2.3.2 WATER TREATMENT

Water is required for the production of hydrogen and for heating and cooling purposes. The water treatment facility will be housed in a warehouse with a footprint of 1 ha. The feedstock water will be treated using reverse osmosis (RO) to remove wastes such as brine salt.

The RO system consumes between 10 - 16 liters of water per kg - of hydrogen produced, however water consumption ultimately depends on the quality of the feed water. The water treatment facility is estimated to consume up to 192 000 tons per annum (tpa) of water per annum, with an additional estimated 2 000 tpa for utilities related to general running of the plant. This may increase, depending on the water source and qualities obtained, to approximately 320 000 tons per annum.

Purified water from the water treatment facility is the main input to the next step in the process, namely the electrolyser.

BRINE HANDLING

Water treatment is associated with the generation of concentrated wastes removed from the water, such as brine salt. The quantity of brine produced is directly related to the quality of the feedwater and efficiency of the RO process. Based on standard tap water, it can be assumed that for every 10 litres of purified water there will be 4 litres of bine produced. Liquid brine can be made into a solid through several available technologies such as, settlement tanks, cooling water circuits, and forced crystallization.

Based on the water samples taken to date and the quality of the Usutu pipeline feedwater, a total dissolved solids content of around 200mg/l is anticipated. Should the plant consume up to 192 000 tons of water, this would result in a maximum of 38 tons of sold salt being created per year (~105kg per day) assuming all salts are removed. This represents the worst-case scenario. This may increase, depending on the water source and qualities obtained, to approximately 320 000 tons per annum.

Liquid brine can be dewatered to recycle water and reduce the need for new input water. This dewatered, solid brine can be stored onsite in waste skips and can be readily disposed at the nearest suitably licenced waste disposal facility.

Alternatively, the wastewater can be used for irrigation water for the local famers by diluting the concentrated liquid brine with additional fresh water, or where possible re-used process water from the RO plant.

In addition, should sufficient quantities of feed water be available, brine can be diluted with fresh feedwater and used for Solar PV panel washing, dust suppression or similar use.

CRYSTALLIZATION

Crystallization is the production of a solid (crystal or precipitate) formed from a homogeneous, liquid which is concentrated to supersaturation levels (concentration > solubility) at that temperature. The crystallization processes utilised has not been selected and will be determined at detailed designed phase based on likely permeate constituents and concentration levels, however, may comprise any of the following:

- Supersaturation by cooling the solution with trivial evaporation;
- Supersaturation by evaporation of the solvent with little cooling;
- Evaporation by a combination of cooling and evaporation in adiabatic evaporators (vacuum crystallizers).

In addition, various crystaliser technologies may be utilised including steam driven, thermocompression driven, vapour compression cycling and calandria crystallisers, amongst others, depending on the final design.

Crystallisation essentially comprises three broad steps:

- Pre-concentration: Electrical, concentration-gradient or temperature gradient driven permeable membrane concentration step, which increases the TDS of the feedwater.
- Evaporation: Flash evaporation, multiple distillation or increased vapor pressure condensation of the concentrated brine to reduce the water content of the brine.
- Crystallization: achieving and promoting crystal development in the brine via heating or spray drying the until supersaturation is achieved.

Crystallisers typically comprise various interconnected modules placed on contained skid systems, which house heaters, vaporators, vapor washers, compressors, motors and zero liquid discharge packages. Ancillary equipment include pumps, platforms and decking, instrumentation, control panels, insulation, valving, electrical systems and wiring, piping, and starter motors (if required). **Figure 2-10** and **Figure 2-11** provide a 3D rendering and simplified flow diagram of a typical Zero Liquid Discharge system respectively.

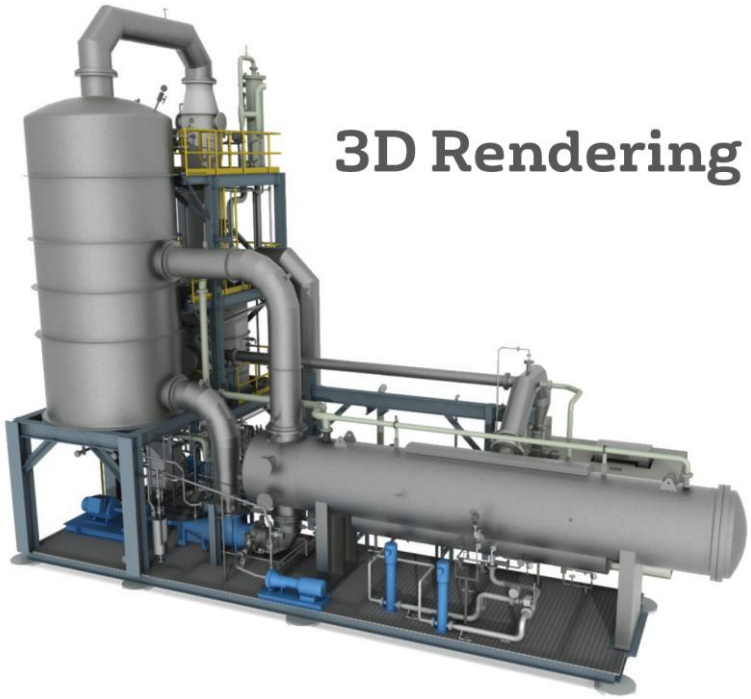


Figure 2-10: 3D Rendering of a typical Crystalliser (Source: Veolia)

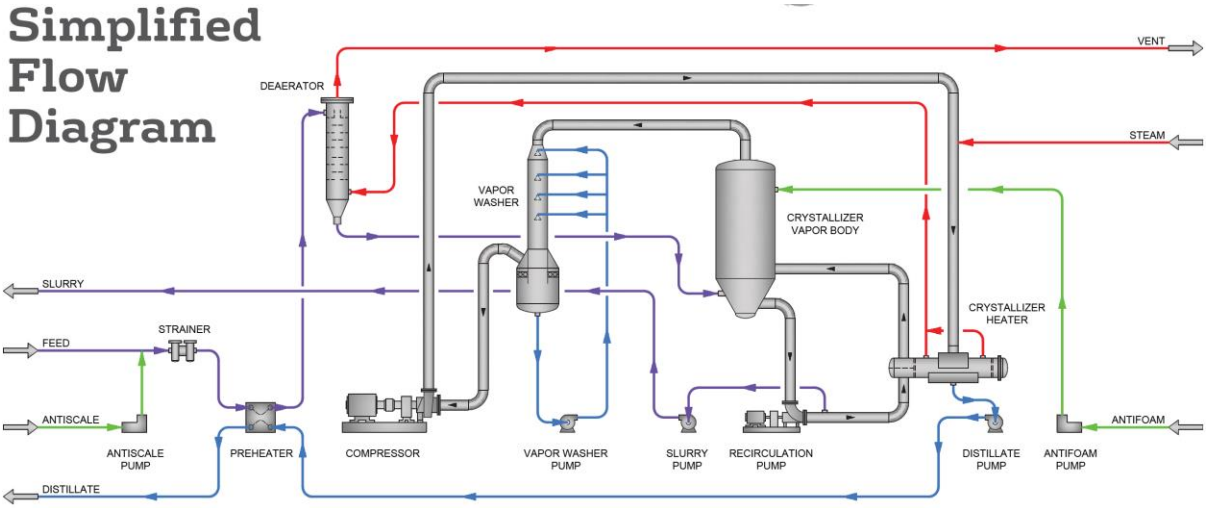


Figure 2-11: Simplified Flow Diagram of a typical Crystalliser (Source: Veolia)

The product of this zero liquid discharge (ZLD) crystallisation process is a salt 'cake' (i.e. solid block of typically mixed minerals and trace metals crystals of various sizes). The resulting cake is typically about 10% moisture. This can be somewhat controlled by adjusting the filtering and drying cycle times, reducing moisture content down to approximately 5%.

The resulting salt cake is then temporarily stored in a hazardous waste skip within a bund on-site which is then removed at regular intervals (no longer than two-weekly) by a third-party waste management company. This third-party waste management company will be suitably licenced for disposal and treatment of both general and hazardous waste. The waste contractor will take the necessary steps to treat the salt cake should it be required, prior to disposal. The third-party waste management company will provide a disposal certificate from a licenced landfill site that is authorised to accept and dispose of such waste.

2.3.3 ELECTROLYSER (UP TO 150MW)

The up to 150MW electrolyser will be housed in a warehouse building and will have a footprint of up to 1ha.

Purified water from the treatment plant will be fed through the electrolyser using electric current (renewable energy provided from the WEF) to separate water molecules ($2H_2O$) through a reduction-oxidation process, into hydrogen gas ($2H_2$ on that cathode side) and oxygen gas (O_2 on the anode side). Electrolysers are modular and currently range in size from 5MW – 20MW. It is proposed that 15 sets of 10 MW electrolysers (150 MW in total) be installed with the capacity to produce 20,000 tonnes per annum (tpa) of 'green' hydrogen and 100,000 tpa of 'green' ammonia. Each electrolyser unit will be powered through its own set of transformers and rectifiers. Oxygen will either be released to atmosphere or stored and sold as a by-product. Hydrogen will either be directed to the ammonia production plant or sold directly to interested parties

Two electrolysis technologies may be considered, namely alkaline- and polymer electrolyte membrane electrolysis ('PEM') (**Figure 2-12**). The most likely technology to be used in the PEM, however this will only be confirmed once detailed engineering design has been completed and EPC contractual arrangements concluded.

Figure 2-12: Example of an Electrolyser Unit (Nel Proton PEM)

2.3.4 AIR SEPARATOR UNIT

The air separation until will occupy a footprint of up to 0.5ha and the intake tower will have a maximum height of up to 40m (due to the height of the 'cold box' – the tallest vertical component of the air separation unit) (**Figure 2-13**).

Air from the atmosphere (approximately 78% nitrogen, 21% oxygen and 1% trace gases) is separated into mainly nitrogen and oxygen using cryogenics (air compression and temperature manipulation), pressure swing adsorption (pressure control) and membrane separation. The air separation unit will have a capacity of 110,000 tpa.

Alternative technologies exist (including Pressure Swing Adsorption (PSA) and Membrane Separation Technologies) and are being evaluated; the most efficient process will be implemented in the final project design.

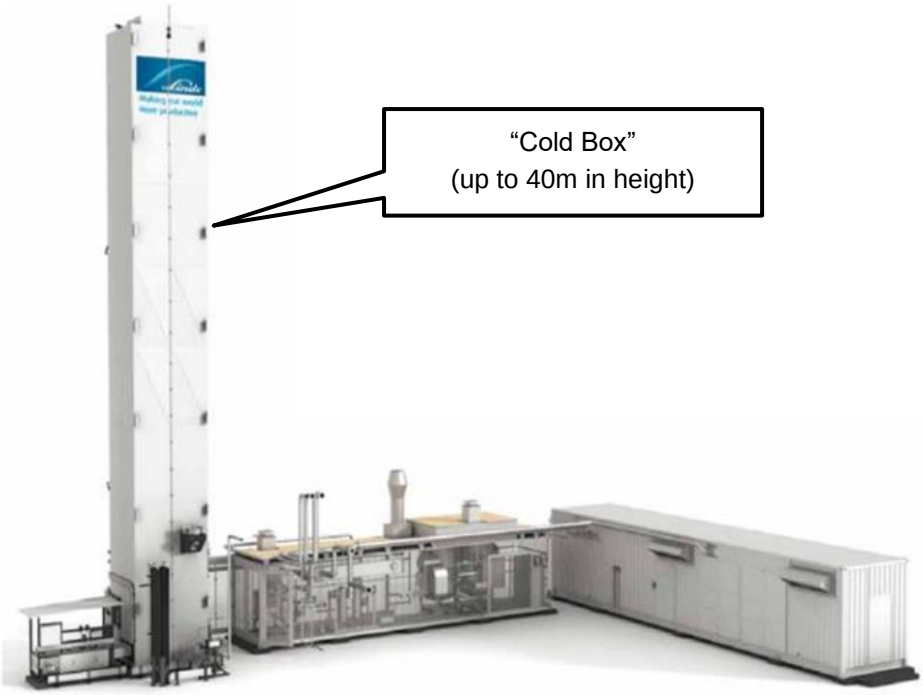


Figure 2-13: Example of an Air Separation Unit (Linde ECOGAN Containerized System)

2.3.5 LIQUID AIR ENERGY SYSTEM (LAES) FOR NITROGEN PRODUCTION:

The LAES will be used to store excess nitrogen collected from the air separation unit. Nitrogen will be cooled and stored in liquid form in insulated vessels at low pressure. The LAES will double as a backup energy source when needed. The system uses pressure changes from the superheating and evaporation of liquified air to turn gas turbines and generate electricity

Components in the LAES include compressors, ambient and cryogenic heat exchangers, expansion valves, storage vessels, pumps, small turbines and generators.

2.3.6 AMMONIA PROCESSING UNIT

Nitrogen from the air separation unit and hydrogen from the electrolyser will be reacted over a bed of catalyst to form ammonia – as per the standard Haber-Bosch method. This is where stoichiometric amounts of nitrogen and hydrogen are reacted to produce ammonia. The conversion is typically achieved at 100 barg and between 400 - 500 °C to favour the formation of ammonia at equilibrium. A catalyst is also used to favour the production of ammonia.

The ammonia gas will be rapidly cooled to form anhydrous ammonia. Unreacted nitrogen and hydrogen will be recycled back to the reactor. At full capacity, the facility will produce up to 100,000 tpa of Green Ammonia for market.

Typical components of an ammonia production plant include compressors, filters, reactor chamber and beds, heat exchangers, water storage vessels, condensers, separators, circulators, absorbers and gas release valves (**Figure 2-14**).

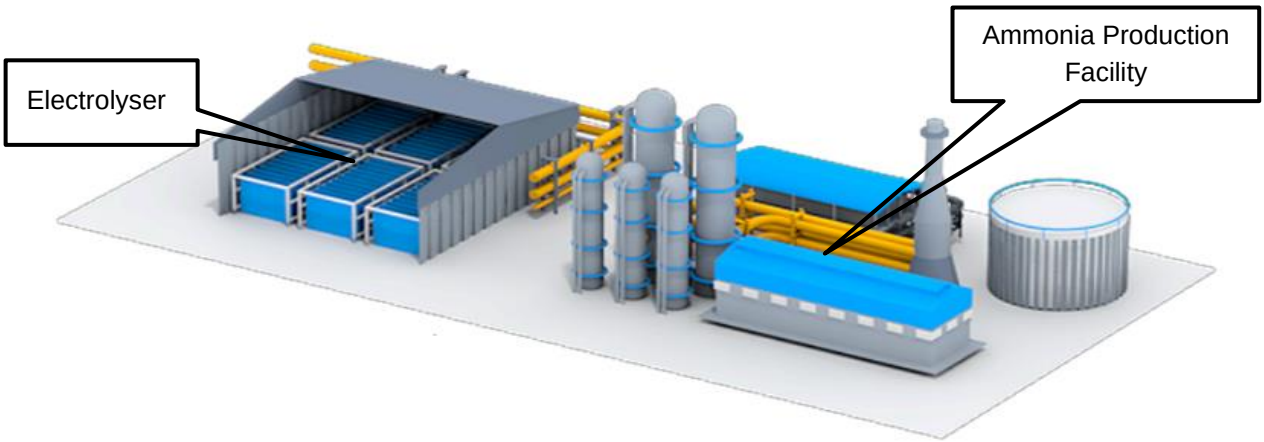


Figure 2-14: Example of integrated hydrogen and ammonia complex (ThyssenKrupp)

2.3.7 STORAGE TANKS – GENERAL

Storage Tanks can be stored in pressurised as or gas in liquid form through the utilisation of a variety of specialised tanks. There are different kinds of storage tanks designs to store anhydrous ammonia, these include but are not limited to:

- *Fixed roof tanks:* Fixed roof storage tanks are cylindrical storage containers that have flat or conical roofs joined to the shell. These storage tanks are often used to store large quantities of petroleum distillates, petrochemicals, and other liquid chemicals at atmospheric pressure. When the level of fluid in the tank rises and falls, air and vapor are pushed out and drawn into the tank headspace. Consequently, the vapor is lost into the atmosphere during the process of emptying the tank. A double-walled tank is designed to provide secondary containment by enhancing the protection against tank failure. It can be customized by adding ultrasonic level indicators, leak detectors, and tank ladder assemblies to identify and monitor in case of any leakage. Below are examples of fixed roof storage tanks

- *Floating roof tanks*: The roof of floating roof tanks floats above the liquid stored at atmospheric pressure. The roof rises and falls as the fluid does. Consequently, floating roof tanks reduce vapor loss, fire, and tank collapse hazards of fixed roof storage tanks.
- *Low-temperature storage tanks*: Low-pressure storage tanks are insulated tanks. These kinds of tanks are more suitable to store volatile liquids for atmospheric storage. They are often used to store ammonia, and liquified gases such as butane at a pressure set by their vapor pressure at the working temperature.
- *Pressure tanks:* Pressure tanks are horizontal-welded pressure vessels with elliptical or hemispherical heads known as bullet tanks (**Figure 2-15**). A bullet tank is a storage container that stores natural gas liquids. Bullet tanks are used for high-pressure fluids. Pressure tanks also include spherical pressure tanks known as Horton Spheres and are used to store large quantities of high-pressure fluids.

Figure 2-15: Bullet storage tank (ammonia storage)

2.3.8 STORAGE REQUIREMENTS FOR THE DEVELOPMENT

NITROGEN

Nitrogen will be stored (7-14 days) as a liquid with in large cylindrical cryogenic storage tanks with a combine volume of approximately 4 100 tons of nitrogen. A storage tank is usually considered to have 85% usable capacity, this is to allow 15% vapor space to allow for expansion. It is proposed that the facility will house up to two cylindrical cryogenic storage tanks. Each tank will have a diameter of up to 14m and a height of up to 15m with a capacity of up to 2032 tons.

AMMONIA

Green ammonia will be stored as anhydrous liquid ammonia, using similar storage equipment as that utilised for storage of Liquid Natural Gas (LNG), i.e. in a storage tank farm (**Figure 2-16**). Ammonia storage tanks are containers used to store ammonia as liquid or compressed gases. Anhydrous ammonia (gas or liquid) is a colourless gas with a sharp smell under atmospheric conditions. The temperature of anhydrous ammonia increases with the increase of surrounding temperature resulting in the vapor pressure in the tank to increase. Thus, it is important to store anhydrous ammonia in containers that can withstand the physical and chemical properties of the liquid form.

Figure 2-16: An example of a Liquid Ammonia Storage System (Source: Energas)

Anhydrous ammonia will be stored within large cylindrical cryogenic storage tanks with a combined volume of 3 750 tons of ammonia. A storage tank is usually considered to have 85% usable capacity, this is to allow 15% vapor space to allow for expansion.

It is proposed that the facility will house up to three cylindrical cryogenic storage tanks. Each tank will have a diameter of up to 14m and a height of up to 15m with a capacity of up to 1250 tons each.

HYDROGEN

Hydrogen is stored in vertical or horizontal storage bullets (**Figure 2-17**). Compressed hydrogen can be storage as a gas or in liquid form. Compressed hydrogen can be stored at ambient temperature. Up to 800 tons of hydrogen will be stored at the facility, in conjunction with that of the oxygen stored on site, in a tank farm of up to 12 ha. The facility will house up to 20 horizontal pressure bullets for the storage of hydrogen. Each bullet will have a diameter of up to 4m and a length of up to 15m.

Figure 2-17: Example of a compressed Hydrogen Storage – horizontal tank

OXYGEN

Oxygen will be stored in vertical or horizontal storage bullets and stored under high-pressures. The tanks have a vacuum-insulated double wall consisting of two concentric vessels, a steel inner tank and an outer jacket in carbon steel. Up to 800 tons of oxygen will be stored at the facility, in conjunction with that of the hydrogen stored on site, in a tank farm of up to 12 ha. It is proposed that the facility will house up to 16 vertical cryogenic

storage bullets for the storage of oxygen. Each bullet will have a diameter of up to 4m and a length of up to 15m.

2.3.9 GANTRY AND LOADING BAY

Ammonia is easily transported by truck and rail as a pressurized liquid. Three loading gantries were assumed where international organisation for standardisation (ISO) containers can be filled with anhydrous ammonia and trucked to an export port location, or similar consumer or off-take point (for example nearby railroad sidings). The following equipment forms part of these gantries:

- Custody transfer metering.
- Loading arm with coupling.
- Control valve.
- Control unit.

2.3.10 TRANSPORT

Liquid Ammonia may readily be transported via road, rail or a combination of the two

Standard 40ft pressurised road tanker trucks or ISOtainer (20ft length each) are being considered. Volumes will be up to 24 tons per truck load depending on pressured tanker or Isotainer, therefore 12 daily 24ton ISOtainer trucks envisaged. Depending on the final volumes transported, technical and financial feasibility, between 1 – 24 ton road tankers (pressured tanker trucks or ISOtainers) may be utilised.

Railway transport options are also being investigated.

2.4 GENERAL CONSTRUCTION ACTIVITIES

The construction process will follow industry standard methods and techniques. Key activities associated with the construction phase are described in **Table 2-3.**

Table 2-3: Construction Activities

ACTIVITY	DESCRIPTION
Site preparation and establishment	Site establishment will include clearing of vegetation and topsoil at the authorised site, including laydown area and access routes. The temporary laydown area will be constructed, including establishment of the construction camp (temporary offices, storage containers, concrete batching plant etc). Site establishment will also entail the installation and/or connection of services (sanitation, electricity etc).
Transport of components and equipment to site	Bulk materials (aggregate, steel etc.), infrastructure components, lifting and construction equipment (excavators, trucks, compaction equipment etc.) will be sourced and transported to site via suitable National and provincial routes and designated access roads. The infrastructure components may be defined as abnormal loads in terms of the Road Traffic Act (Act 29 of 1989) due to their large size and abnormal lengths and loads for transportation. A permit may be required for the transportation of these loads on public roads.
Excavation and earthworks	Subject to the determination of founding specifications, earthworks will be required. This is likely to entail: – Excavation necessary for concrete foundations – Levelling of the plant area, construction camp area, substation area, and O&M building area, and excavation of foundations prior to construction. – Excavation of trenches for the installation of underground cables and material pipelines as needed.
Construction of GH&A facility	A large lifting crane will be required to lift the various components into place. The lifting crane/s will be brought on site.

ACTIVITY	DESCRIPTION
Establishment of ancillary infrastructure	Ancillary infrastructure will include construction site office, temporary laydown area and workshop area for contractor's equipment.
Rehabilitation	Once all construction is completed on site and all equipment and machinery has been removed from the site, the site will be rehabilitated.

2.5 ALTERNATIVES

The EIA Regulations of 2014 (as amended) require that the S&EIA process must identify and describe alternatives to the proposed activity that were considered, or motivation for not considering alternatives. Different types or categories of alternatives could be considered including different locations, technology types, and project layouts. At the scoping level the evaluation of alternatives is provided at a high level in the absence of detailed environmental comparators for each alternatives; due to the two-staged nature of the S& EIA process it is more suitable to identify and describe the potential alternatives on a high level basis within scoping, and to perform a more detailed analysis of alternatives (with environmental comparators) in the EIA phase of the project. As such, the S&EIA will holistically assess the impacts and risks of each alternative in a comparative way, as suggested by Appendix 2 of the EIA Regulations of 2014 (as amended).

2.5.1 SITE ALTERNATIVES

There are two site alternatives for the Camden I GH&A Facility within the Camden I project area (**Figure 2-18**). Both sites will be investigated in the EIA phase. The corner co-ordinates for the preferred site are outlined in **Table 2-4.**

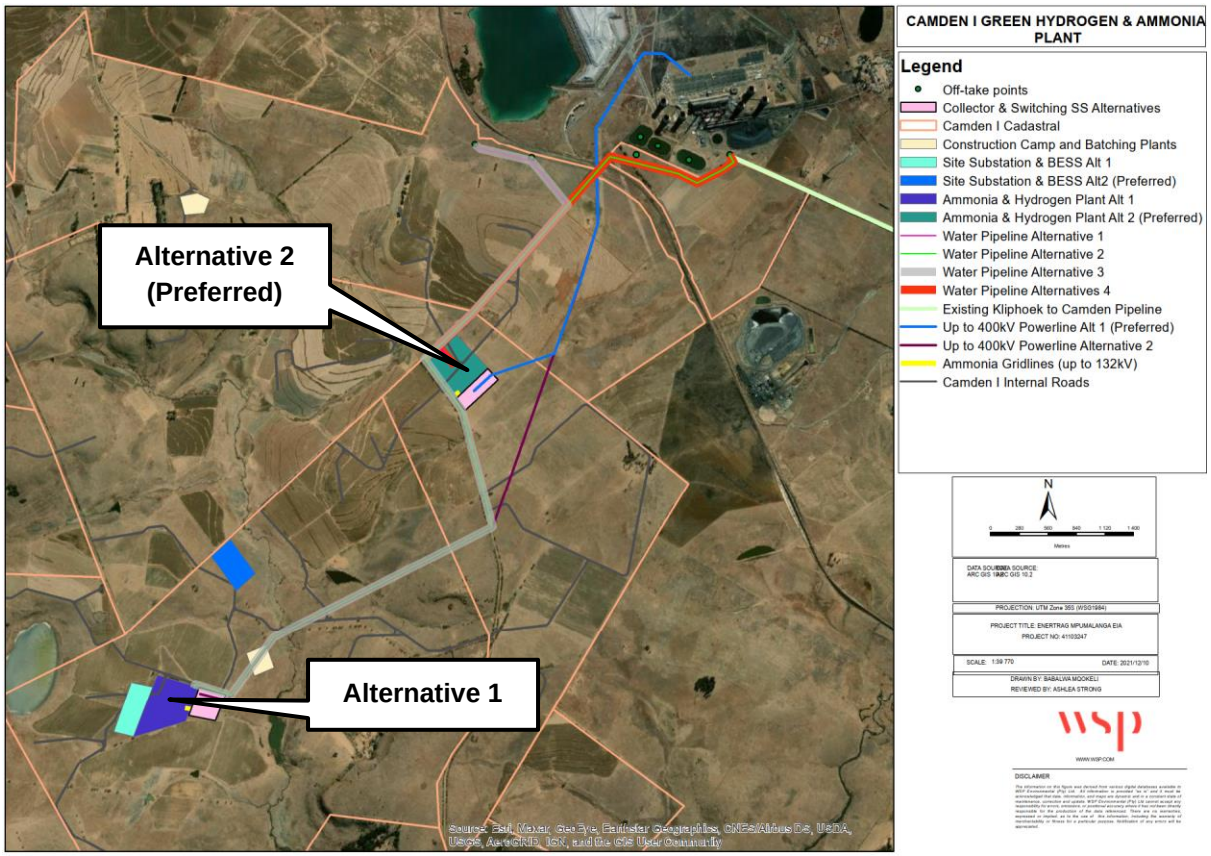
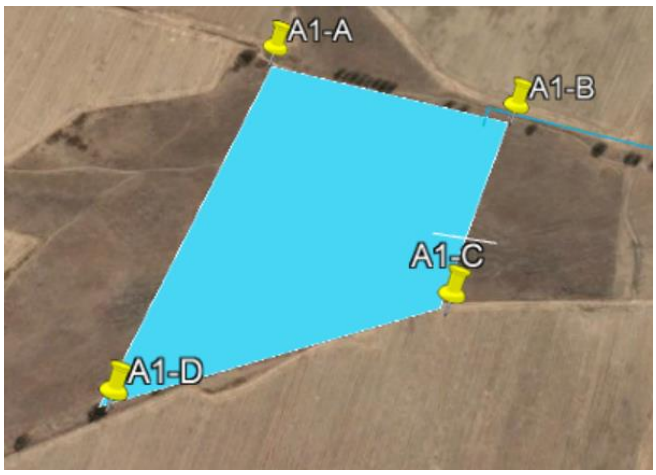
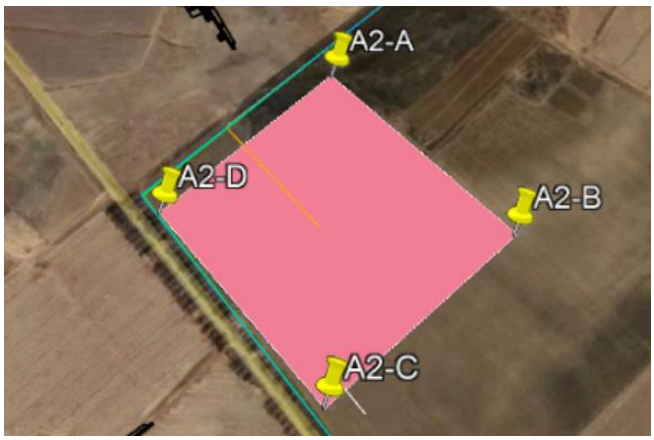


Figure 2-18: Camden I GH&A Alternative Sites

Table 2-4: Camden I GH&A Alternative Site – Co-ordinates

POINT	LATITUDE	LONGITUDE
Alternative 1		
		
A1-A	26°40'22.84"S	30° 2'16.42"E
A1-B	26°40'26.30"S	30° 2'31.37"E
A1-C	26°40'37.63"S	30° 2'27.54"E
A1-D	26°40'43.16"S	30° 2'9.18"E
Alternative 2		
		
A2-A	26°38'31.32"S	30° 3'57.33"E
A2-B	26°38'41.40"S	30° 4'8.52"E
A2-C	26°38'51.30"S	30° 3'57.81"E

A2-D	26°38'40.37"S	30° 3'47.55"E

2.5.2 LINEAR ALTERANTIVES

There are four water pipeline alternatives being considered for the supply of water to the Camden I GH&A Facility (**Figure 2-18**). The alterantives being considered are as follows:

- Alternative 1: Preferred Site to Usutu Scour 2 (~3.3km) (Preferred Alignment);
- Alternative 2: Alternate Site to Camden Power Station Confluence (~9.4km);
- Alternative 3: Alternate Site to Usutu Scour 2 (~8.5km); and
- Alternative 4: Preferred Site to Camden Power Station Confluence (~4.2km).

All four alignments will be investigated in the EIA phase. The co-ordinates for the alignments are outlined in **Table 2-5.**

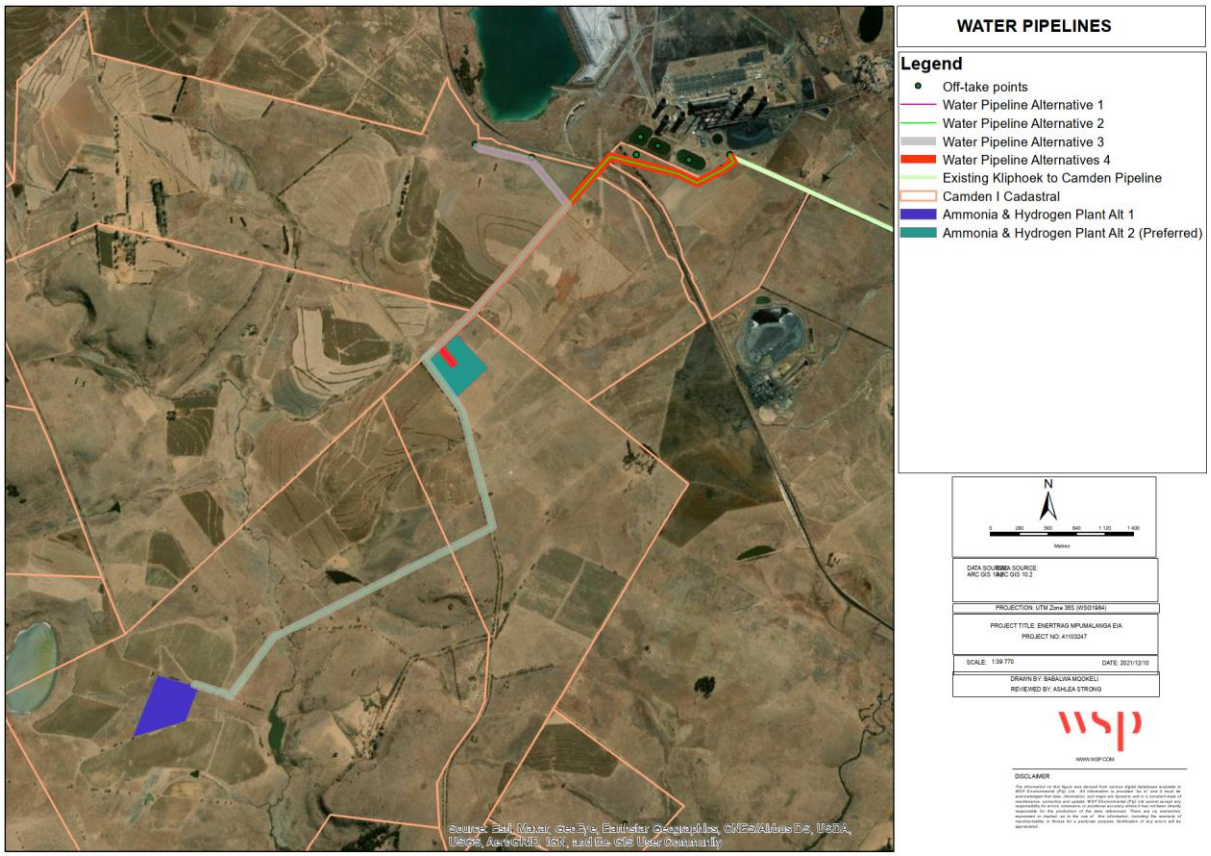
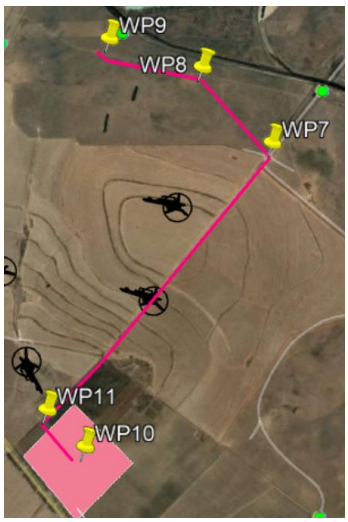
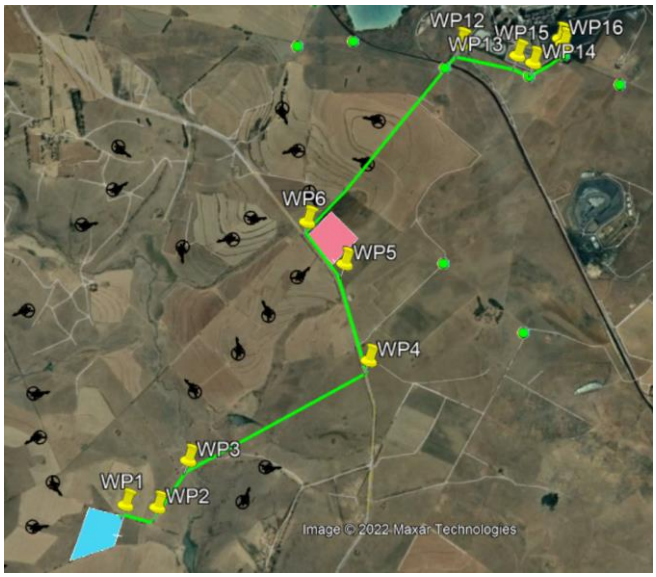
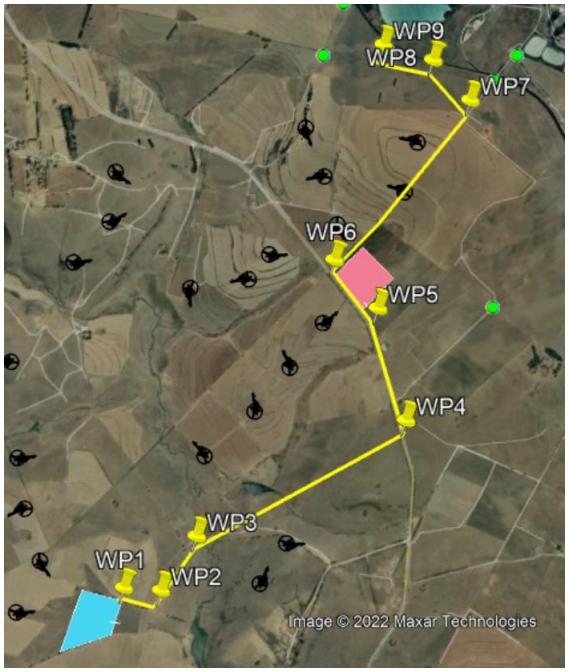


Figure 2-19: Camden I GH&A Water Pipeline Alternative Alignments

Table 2-5: Camden I GH&A Alternative Site – Co-ordinates

POINT	LATITUDE	LONGITUDE
Alternative 1 (Preferred)		
		
WP10	26°38'40.97"S	30° 3'58.68"E
WP11	26°38'34.67"S	30° 3'51.33"E
WP7	26°37'48.45"S	30° 4'34.26"E
WP8	26°37'35.50"S	30° 4'20.72"E
WP9	26°37'30.69"S	30° 4'2.75"E
Alternative 2		
		

POINT	LATITUDE	LONGITUDE
WP1	26°40'26.95"S	30° 2'30.15"E
WP2	26°40'27.77"S	30° 2'43.54"E
WP3	26°40'10.14"S	30° 2'56.36"E
WP4	26°39'32.22"S	30° 4'11.77"E
WP5	26°38'56.03"S	30° 4'1.36"E
WP6	26°38'40.44"S	30° 3'45.49"E
WP12	26°37'33.14"S	30° 4'49.22"E
WP13	26°37'37.40"S	30° 5'13.24"E
WP14	26°37'40.09"S	30° 5'19.93"E
WP15	26°37'32.95"S	30° 5'32.56"E
WP16	26°37'30.92"S	30° 5'31.14"E
Alternative 3		
		
WP1	26°40'26.95"S	30° 2'30.15"E
WP2	26°40'27.77"S	30° 2'43.54"E

POINT	LATITUDE	LONGITUDE
WP3	26°40'10.14"S	30° 2'56.36"E
WP4	26°39'32.22"S	30° 4'11.77"E
WP5	26°38'56.03"S	30° 4'1.36"E
WP6	26°38'40.44"S	30° 3'45.49"E
WP7	26°37'48.45"S	30° 4'34.26"E
WP8	26°37'35.50"S	30° 4'20.72"E
WP9	26°37'30.69"S	30° 4'2.75"E
Alternative 4		
		
WP10	26°38'40.97"S	30° 3'58.68"E
WP11	26°38'34.67"S	30° 3'51.33"E
WP12	26°37'33.14"S	30° 4'49.22"E
WP13	26°37'37.40"S	30° 5'13.24"E
WP14	26°37'40.09"S	30° 5'19.93"E
WP15	26°37'32.95"S	30° 5'32.56"E
WP16	26°37'30.92"S	30° 5'31.14"E

2.5.3 TECHNOLOGY ALTERNATIVES

The project is being developed on the basis that a GH&A facility will be established on this site. Therefore, no technology alternatives are being considered for this project. The motivation behind the development of this facility is outlined in Section 2.6 below.

2.5.4 LAYOUT ALTERNATIVES

A conceptual layout of the Camden I GH&A Facility has been compiled and is included in **Figure 2-8** above**.** The layout is likely to be updated and refined as the project engineering progresses, and depending on the sensitivity and technical inputs from the specialists during the EIA phase studies. The developed of the Camden I GH&A Facility layout is not yet final.

2.5.5 'NO PROJECT' ALTERNATIVE

In the "no project" alternative, the Camden I GH&A Facility project will not be developed. In this scenario, there could be a missed opportunity to address the need for the green production of hydrogen and ammonia for commercial use in an effort to mitigate against concerns of climate change and exploitation of non-renewable resources. The no-go alternative would not assist in responding to the global call to reduce GHG emissions in the industrial sector. Conversely, negative environmental impacts of the project (as outlined in **Section 6**) associated with the development of the Camden I GH&A Facility would be avoided.

The "no project" alternative will be considered in the EIA phase as a baseline against which the impacts of the Camden I GH&A Facility project will be assessed.

2.6 NEED AND DESIRABILITY

In October 2021, at the second Sustainable Infrastructure Development Symposium, President Cyril Ramaphosa said that green energy had the potential to drive industrialisation and establish a whole new industrial reality. Furthermore, the President stated that "We stand ready to be a major exporter in this market, to use hydrogen to rapidly decarbonise our existing industries, and attract industrial investment from across the globe seeking to meet new standards of green power in the production process".

The proposed development of the Camden I GH&A Facility directly addresses the President's statements and the need to implement renewable energy technologies and green fuels and/or products in Mpumalanga.

2.6.1 WHAT IS GREEN HYDROGEN AND AMMONIA PRODUCTION

Green hydrogen is hydrogen fuel that is created using renewable energy instead of fossil fuels. It has the potential to provide clean power for manufacturing, transportation, and more and its only by-product is water.

Hydrogen energy is very versatile, as it can be used in gas or liquid form, be converted into electricity or fuel, and there are many ways of producing it. Approximately 70 million metric tons of hydrogen are already produced globally every year for use in oil refining, ammonia production, steel manufacturing, chemical and fertilizer production, food processing, metallurgy, and more.

Hydrogen is the most abundant chemical in the universe. Two atoms of hydrogen paired with an atom of oxygen creates water. Alone, though, hydrogen is an odourless and tasteless gas, and highly combustible.

There are three types of Hydrogen, namely brown, grey, and green hydrogen. These are named based on the process used to make them, and the emissions each process emits:

- **Brown hydrogen** requires the burning of fossil fuels (coal) in order to complete the gasification process. This processes releases vast greenhouse gases (GHG) emissions into the atmosphere.
- **Grey hydrogen** is extracted from natural gases through a process known as steam reforming. This process also releases GHG emissions into the atmosphere.

- **Green hydrogen and ammonia production** differs from traditional production technologies in that the process relies exclusively on renewable resources (renewable energy) and for input air and water (feedstock), to produce commercially usable green hydrogen and ammonia. This method has **no associated GHG emissions.**

WHAT ARE HYDROGEN AND AMMONIA USED FOR?

Commercially, hydrogen is used as a fuel for transport in hydrogen fuel cells. Alternatively, hydrogen is used for welding and in the production of other chemicals such as methanol and hydrochloric acid and also has other commercial uses like the filling of balloons. It is also a primary input to the production of ammonia. Ammonia in turn is primarily used in the production of ammonium nitrate (fertiliser) and is also used as refrigerant gas and the manufacture of plastics, explosives, textiles, pesticides and other chemicals. Ammonia can also be used as a stable 'carrier' of hydrogen, allowing hydrogen to be readily stored and transported.

ADVANTAGES AND DISADVANTAGES OF GREEN HYDROGEN[6]

The green hydrogen energy source has advantages and disadvantages that we must be aware of. The most notable advantages include:

- **100 % sustainable:** green hydrogen does not emit polluting gases either during combustion or during production.
- **Storable**: hydrogen is easy to store, which allows it to be used subsequently for other purposes and at times other than immediately after its production.
- **Versatile:** green hydrogen can be transformed into electricity or synthetic gas and used for domestic, commercial, industrial or mobility purposes.
- **Transportable:** it can be mixed with natural gas at ratios of up to 20 % and travel through the same gas pipes and infrastructure - increasing this percentage would require changing different elements in the existing gas networks to make them compatible.

However, green hydrogen also has negative aspects, including:

- **High cost**: energy from renewable sources, which are key to generating green hydrogen through electrolysis, is more expensive to generate, which in turn makes hydrogen more expensive to obtain.
- **High energy consumption**: the production of hydrogen in general and green hydrogen in particular requires more energy than other fuels.
- **Safety issues**: hydrogen is a highly volatile and flammable element and extensive safety measures are therefore required. .

2.6.2 GREEN ECONOMY

THE PARIS AGREEMENT

Climate change is a global emergency that goes beyond national borders. It is an issue that requires international cooperation and coordinated solutions at all levels. To tackle climate change and its negative impacts, world leaders at the UN Climate Change Conference (COP21) in Paris reached a breakthrough on 12 December 2015: the historic Paris Agreement.

The Agreement sets long-term goals to guide all nations:

- substantially reduce global greenhouse gas emissions to limit the global temperature increase in this century to 2 degrees Celsius while pursuing efforts to limit the increase even further to 1.5 degrees;
- review countries' commitments every five years;
- provide financing to developing countries to mitigate climate change, strengthen resilience and enhance abilities to adapt to climate impacts.

[6] https://www.iberdrola.com/sustainability/green-hydrogen

The Agreement is a legally binding international treaty. It entered into force on 4 November 2016. Today, 192 Parties (191 countries plus the European Union) have joined the Paris Agreement.

The Agreement includes commitments from all countries to reduce their emissions and work together to adapt to the impacts of climate change, and calls on countries to strengthen their commitments over time. The Agreement provides a pathway for developed nations to assist developing nations in their climate mitigation and adaptation efforts while creating a framework for the transparent monitoring and reporting of countries' climate goals.

The Paris Agreement provides a durable framework guiding the global effort for decades to come. It marks the beginning of a shift towards a net-zero emissions world. Implementation of the Agreement is also essential for the achievement of the Sustainable Development Goals.

Most experts agree that green hydrogen will be essential to meeting the goals of the Paris Agreement, since there are certain portions of the economy whose emissions are difficult to eliminate such as transportation, electricity generation and industry.

NATIONAL PERSPECTIVE

The Project will aid in the increase of exports from South Africa through the production of green hydrogen that has become popular globally. Hydrogen has become one of the latest buzzes for meeting the world's growing energy needs and a vital component for meeting the global decarbonization goals. Hydrogen is a clean fuel; however, the manufacturing of hydrogen fuel is energy-intensive and traditionally uses fossil fuels to power the production plant. There are four types of hydrogen and are classified in the manufacturing process. These types are brown, blue, grey and green hydrogen. Brown hydrogen is created through coal gasification, blue hydrogen uses carbon capture and storage for the greenhouse gases produced in the creation of grey hydrogen, producing grey hydrogen from natural gas produces carbon waste, and green hydrogen production uses renewable energy to create hydrogen fuel without carbon input.

The Project will produce green hydrogen of which can be used for various purposes and products which include fertilizers, shipping fuel, aviation fuel, and green steel. The Project can help contribute towards South Africa's exports and tap into the emerging multi-billion market, which is predicted to grow exponentially over the next few decades. The production of green hydrogen also requires a large solar and wind power input (both at the Project site). It is estimated that with the growth of the green hydrogen industry half a million jobs in the solar and wind industry will be created. Furthermore, in South Africa, green hydrogen has been identified by the Presidency as the first of the five "Big Frontier' strategic investment opportunities and will be involved in the finalization of the much anticipated 'Hydrogen Strategy and investor Roadmap'. It has been estimated that the green hydrogen industry in South Arica will be producing more than 3.8-million tonnes per anum and reducing the countries greenhouse gas emissions by 75%- by 2050 and could support the creation of around 370 000 additional direct and indirect jobs.

Studies have shown that the manufacturing and use of hydrogen, using the available low-carbon technologies, will substantially support South Africa to progress to deeper decarbonization than current policies envisage. The production of green hydrogen will support greater domestic decarbonization and allow the country to meet its international obligations by (not limited to):

- Reforming carbon dioxide emissions in coal- and gas-to-liquids synthetic fuels refineries in Mossel Bay and Secunda and potentially supporting the use of biogenic, non-fossil, or direct-air-capture sources of CO2 to be used to source sustainable synthetic fuels;
- Replacing the use of coking and other coal in steel production;
- Displacing the existing unabated gas use for chemicals and refinery hydrogen;
- Supporting the roll-out of fuel cells for remote and heavy-duty vehicles where battery solutions are not viable; and
- Fuelling industrial processes where electrification cannot meet the specific combustion or heat needs.

With South Africa being ranked in the top ten globally for its wind and solar potential- there is high potential for green hydrogen production. South Africa has excellent resources of land, wind, and sun that are fundamental to the large-scale development of renewable electricity— and are also the key inputs for green hydrogen. Based on having these key resources allowing for the construction of the hydrogen facility will ensure the country is taking the right steps towards the Presidency 2050 aspirations. This Project will serve as one of the anchor or foundation projects to the establishment of the South African green hydrogen industry

2.6.3 DESIRABILITY OF THE SITE

ENVIRONMENT

The environment is a key factor when it comes to the development of its projects. It is critical to ensure that its projects are developed in a sustainable manner. All the environmental factors were considered in the area when potential sites were being considered. After a thorough evaluation of the regional farms, the specific farms were selected because they were already heavily disturbed by agricultural and coal mining activities. Thus, it was concluded that the development of these farms would have a minimal impact on the region's flora, fauna and water resources.

TOPOGRAPHY AND SITE ACCESS

The surrounding landscape has a rolling hill topography which is suitable for the development of a GH&A facility. The Project site can be accessed easily via either the tarred N2 and N11 national roads which run along the eastern and western boundaries of the site. There is an existing road that goes through the land parcels to allow for direct access to the project development area. The site is also situated close to the renewable energy projects that are being proposed in parallel with this facility and therefore, the GH&A facility will be close to a reliable source of electricity.

LAND AVAILABILITY

With this region being home to some of the biggest coal power stations in the country (Komati and Camden among many others), most land parcels have been given mining rights for coal beneficiation to provide fuel stock supply these power stations. Thus, there is very limited land available for the development of the GH&A facility. However, sufficient land has been secured for the development of the proposed project with landowners within the respective cadastral portions comprising the development footprint indicating their support and willingness for the project to proceed to development via entering into agreement with the developer.

2.6.4 NEED AND DESIRABILITY FOR GREEN HYDROGEN AND AMMONIA

Sustainable energy conversion requires zero emissions of greenhouse gases and criteria pollutants using primary energy sources that the earth naturally replenishes quickly, like renewable resources. Solar and wind power conversion technologies have become cost effective recently, but challenges remain to manage electrical grid dynamics and to meet end-use requirements for energy dense fuels and chemicals.

Renewable hydrogen provides the best opportunity for a zero emissions fuel and is the best feedstock for production of zero emission liquid fuels and some chemical and heat end-uses. Renewable hydrogen can be made at very high efficiency using electrolysis systems that are dynamically operated to complement renewable wind and solar power dynamics.

Hydrogen can be stored within the existing natural gas system to provide low-cost massive storage capacity that (1) could be sufficient to enable a 100% zero emissions grid; (2) has sufficient energy density for end-uses including heavy duty transport; (3) is a building block for zero emissions fertilizer and chemicals; and (4) enables sustainable primary energy in all sectors of the economy.

2.6.5 NEED AND DESIRABILITY FOR RENEWABLE ENERGY

As the Camden I GH&A facility will be powered by renewable energy, the need and desirability of renewable energy is therefore linked to the project as a whole. The GH&A Facility will serve to support these proposed neighbouring renewable facilities through guaranteed off-take.

Renewable energy development is regarded as an important contribution to meeting international and national targets of reducing reliance on fossil fuels, such as coal, which contribute towards greenhouse gas emissions and resultant climate change. The need and desirability of proposed Camden I GH&A Facility has been considered from an international, national and regional perspective.

INTERNATIONAL PERSPECTIVE

The proposed project will align with internationally recognised and adopted agreements, protocols and conventions. This includes the Kyoto Protocol (1997) which calls for countries internationally to reduce their greenhouse gas emissions through cutting down on their reliance on fossil fuels and investing in renewable energy technologies for electricity generation.

The project will also greatly contribute to the countries' efforts to reduce their carbon emissions and play their role as part of the Paris Climate Accord. The Paris Agreement is a legally binding international treaty signed by 196 countries at the COP 21 in Paris, on the 12th of December 2015 to combat climate change. The goal of the Paris Accord is to limit global warming to well below 2 degrees Celsius, compared to industrial levels to avoid catastrophic natural disasters which are driven by the global temperature increase. Therefore, to achieve this long-term temperature goal, countries aim to reach global peaking of greenhouse gas emissions as soon as possible to achieve a climate-neutral world by 2050.

The authorization of the Project will further align with South Africa's National Climate Response White Paper which outlines the countries efforts to manage the impacts of climate change and to contribute to the global efforts to stabilize the Greenhouse gases concentrations in the atmosphere.

NATIONAL PERSPECTIVE

The South African Government, through the IRP, has set a target to secure 17 800 MW of renewable energy by 2030. This is an effort to diversify the country's energy mix in response to the growing electricity demand and promote access to clean sources of energy.

The National Development Plan (NDP) is aimed at reducing and eliminating poverty in South Africa by 2030. The NDP also outlines the need to increase electricity production by 2030, with 20 000 MW of electricity capacity generated from renewable sources in order to move to less carbon-intensive electricity production. The Plan also envisages that South Africa will have an energy sector that provides reliable and efficient energy service at competitive rates, while supporting economic growth through job creation.

The authorisation of the Camden I GH&A Facility will further align with South Africa's National Climate Response White Paper which outlines the countries efforts to manage the impacts of climate change and to contribute to the global efforts to stabilize the greenhouse gases concentrations in the atmosphere.

The proposed Camden Renewable Energy Complex, which includes the Camden I GH&A Facility, will pave the way for the Just Energy Transition (JET)[7] in South Africa and promote the transition from a fossil fuel-based economy to a low carbon economy. The proposed Camden Renewable Energy Complex aims towards the aforementioned national energy targets of diversification of energy supply and the promotion of clean energy. Wind and solar energy developments contribute to reduced emissions and subsequently climate change whilst promoting industrial development and job creation.

In addition, the Council for Scientific and Industrial Research (CSIR) reported that renewable energy assisted in relieving pressure on the constrained South African power system during load shedding in the first quarter of 2019. This indicates that renewable energy is a key factor in ensuring that the country does not face further load shedding in the future.

REGIONAL AND LOCAL PERSPECTIVE

JUST ENERGY TRANSITION

Coal power stations and the coal mining industry play a vital component in the economic and social components of the local Mpumalanga economy. Shifting to a low carbon economy will thus need to offset or exceed the benefits being realized by fossil fuels in the province. Thus, a key factor to ensuring the success of the Just Energy Transition is not only to focus on the transition from fossil fuels to renewable energy resources but to simultaneously ensure the Just Transition of jobs and skills.

[7] The Just Transition is described as the transition towards a low-carbon and climate-resilient economy that maximizes the benefits of climate action while simultaneously improving the welfare of the workers and their communities.

The transition towards renewable energy will improve the socio-economic conditions of the Gert Sibande District Municipality. The Gert Sibande District Municipality recorded an unemployment rate of 26.7% in 2017, with the majority of its employed in the trade and community services sectors. The Project will aid in solving two of the leading challenges faced by the Gert Sibande District Municipality, namely the cost of electricity and lack of adequate employment opportunities. As various career opportunities are presented by the wind industry, and these are divided into four pillars that are aligned with the value chain. These four pillars are project development, component manufacturing, construction, and operation & maintenance as shown in **Figure 2-20**.

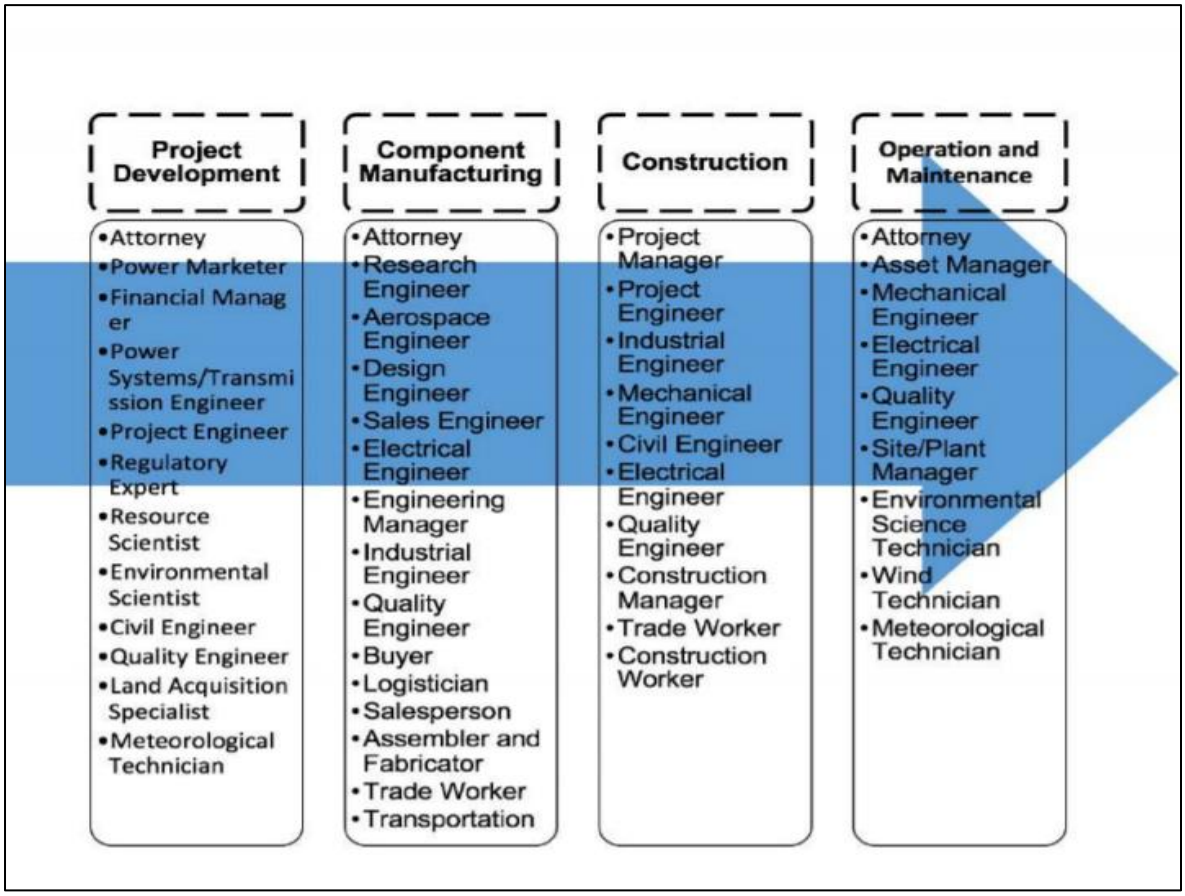


Figure 2-20: Career Opportunities presented by the Wind Industry (Source: https://www.res4africa.org/wp-content/uploads/2020/09/RES4Africa-Foundation-A-Just-Energy-Transition-in-South-Africa.pdf)

Figure 2-20 shows that the wind industry will create job opportunities throughout the supply chain. The wind industry will contribute to the Just transition in South Africa to ensure that there are no job losses but rather job transfers and skill exchange. For these opportunities to arise, renewable energy projects need to be approved in Mpumalanga to ensure that the transition from fossil fuels to renewable energy happens gradually and takes off effectively.

3 GOVERNANCE FRAMEWORK

3.1 NATIONAL ENVIRONMENTAL LEGAL FRAMEWORK

The South African regulatory framework establishes well-defined requirements and standards for environmental and social management of industrial and civil infrastructure developments. Different authorities at both national and regional levels carry out environmental protection functions. The applicable legislation and policies are shown in **Table 3-1**.

Table 3-1: Applicable National Legislation

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
The Constitution of South Africa (No. 108 of 1996)	The Constitution cannot manage environmental resources as a stand-alone piece of legislation hence additional legislation has been promulgated in order to manage the various spheres of both the social and natural environment. Each promulgated Act and associated Regulations are designed to focus on various industries or components of the environment to ensure that the objectives of the Constitution are effectively implemented and upheld in an on-going basis throughout the country. In terms of Section 7, a positive obligation is placed on the State to give effect to the environmental rights.
National Environmental Management Act (No. 107 of 1998)	In terms of Section 24(2) of the NEMA, the Minister may identify activities, which may not commence without prior authorisation. The Minister thus published GNR 983 (as amended) (Listing Notice 1), GNR 984 (as amended) (Listing Notice 2) and GNR 985 (as amended) (Listing Notice 3) listing activities that may not commence prior to authorisation. The regulations outlining the procedures required for authorisation are published in the EIA Regulations of 2014 (GNR 982) (as amended). Listing Notice 1 identifies activities that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 2 identifies activities that require an S&EIR process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. Listing Notice 3 identifies activities within specific areas that require a BA process to be undertaken, in terms of the EIA Regulations, prior to commencement of that activity. WSP undertook a legal review of the listed activities according to the proposed project description to conclude that the activities listed in in this section are considered applicable to the development: A S&EIR process must be followed. An EA is required and will be applied for with the MDARDLEA.
Listing Notice 1: GNR 983	***Activity 9(i)*** *The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water—* *(i) with an internal diameter of 0,36 metres or more; or* *(ii) with a peak throughput of 120 litres per second or more;* *excluding where—* *(a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or* *(b) where such development will occur within an urban area.* **Description**: The Facility is located outside an urban area and will require, depending on the water source and water quality obtained, an above or below ground water supply pipeline exceeding 1 000 metres in length, of internal diameter in excess of 0,36m towards feed water supply of the Facility.

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	The exact pipeline specifications will be confirmed once final designs have been provided.
	Activity 10(i) *The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes –* *(i) with an internal diameter of 0,36 metres or more; or* *(ii) with a peak throughput of 120 litres per second or more;* *excluding where—* *(a) such infrastructure is for the bulk transportation of sewage, effluent, process* *water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or* *(b) where such development will occur within an urban area.* **Description**: The Facility is located outside an urban area and road/railway line reserve, and will require infrastructure exceeding 1000m in length for the bulk transportation of effluent/process water for crystalisation, associated with the Reverse Osmosis plant. The exact pipeline specifications will be confirmed once final designs have been provided.
	Activity 11(i) *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 275 kilovolts; or* *(ii) inside urban areas or industrial complexes with a capacity of 275 kilovolts or more;* **Description**: The Facility is located outside urban areas and will be supplied with electricity by a single up to 132kV overhead or underground power line from a common Collector Substation. In addition, electrical substation infrastructure associated with the Facility is rated at 33/132kV whilst being located outside urban areas or industrial complexes.
	Activity 12(ii)(a)(c) *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or* *(ii) infrastructure or structures with a physical footprint of 100 square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;*

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	Description: The physical footprint of access roads, stormwater control infrastructure, electrical cabling and water supply pipelines related to the Facility will exceed 100m2 within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site. The exact footprint will be confirmed once final designs have been provided.
	Activity 16 *The development and related operation of facilities for the desalination of water with a design capacity to produce more than 100 cubic metres of treated water per day.* **Description**: The Facility's Reverse Osmosis (RO) infrastructure (with a design capacity to produce ~900 m3 purified/treated water per day) will be required to supply the electrolysis process with sufficient quality feed water.
	Activity 19 *The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse;* **Description**: Access roads, stormwater control infrastructure, electrical cabling and water supply pipelines related to the Facility will collectively require the excavation, infilling or removal of soil exceeding 10m3 from delineated watercourses on site. The exact values will be confirmed once final designs have been provided.
	Activity 24(ii) *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;* **Description**: Internal and access roads required by the Facility will be between 5m and 6m wide, and exceed 1km in length in a rural area. Where required for turning circle/bypass areas, however, access or internal roads may be up to 20m to allow for larger component transport. The exact values will be confirmed once final designs have been provided.
	Activity 25 *The development and related operation of facilities or infrastructure for the treatment of effluent, wastewater or sewage with a daily throughput capacity of more than 2 000 cubic metres but less than 15 000 cubic metres.* **Description**:

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	Depending on the water source and water quality obtained, an evaporator / crystaliser for the treatment of more than 2 000m3 effluent at any one time will be constructed and operated as part of the Facility.
	Activity 27 *The clearance of an area of 1 hectares or more, but less than 20 hectares of indigenous vegetation* **Description**: The power lines, water pipelines and access/internal roads related to the Facility are considered linear activities and therefore is excluded from this activity. However, the respective infrastructure components related to the Facility individually require in excess of 1 ha but not more than 20ha of indigenous vegetation clearance. The exact values will be confirmed once final designs have been provided.
	Activity 28(ii) *Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:* *(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or* *(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;* **Description**: The Facility development footprint is collectively approximately 30ha (subject to finalisation based on technical and environmental requirements). As part of this buildable area, infrastructure such as the individual components will have footprints of between 1 ha and 12ha, all located outside an urban area and which is currently used for agriculture.
	Activity 30 Any process or activity identified in terms of section 53(1) of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). The Facility and associated infrastructure is located within, and will require vegetation clearance or disturbance of Eastern Highveld Grassland and Chrissiesmeer Panveld, both ecosystems of which are listed in the National List of Ecosystems That Are Threated And In Need of Protection (GNR 1002 of 9 December 2011), and subsequently listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004).
	Activity 48(i)(a)(c) *The expansion of—* *(i) infrastructure or structures where the physical footprint is expanded by 100 square metres or more; or* *(ii) dams or weirs, where the dam or weir, including infrastructure and water surface area, is expanded by 100 square metres or more;* *where such expansion occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;*

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	Description: Transport of large infrastructure components related to the Facility will require the expansion of existing access and/or internal roads, culverts or similar drainage crossing infrastructure collectively exceeding 100m2 or more beyond existing road or road reserves located within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site. The exact values will be confirmed once final designs have been provided.
	Activity 56(i)(ii) *The widening of a road by more than 6 metres, or the lengthening of a road by more than 1 kilometre—* *(i) where the existing reserve is wider than 13,5 meters; or* *(ii) where no reserve exists, where the existing road is wider than 8 metres;* **Description**: The Facility is located within a rural area. Transport of large infrastructure components related to the facility will require the widening of existing access and/or internal roads where no reserve exists and where such road is wider than 8 metres.
Listing Notice 2: GNR 984	***Activity 4*** *The development and related operation of facilities or infrastructure, for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of more than 500 cubic metres.* **Description**: Dangerous goods product stores related to the operation of the Facility include Nitrogen, Oxygen, Hydrogen and Ammonia storage tanks (of varying sizes, pressures and temperatures) in excess of 500m^3. In addition, fuel, cement, transformer oil and other chemicals will be stored onsite. Collectively all storage and handling of dangerous goods on site will exceed 500m^3.
	Activity 6 *The development of facilities or infrastructure for any process or activity which requires a permit or licence or an amended permit or licence in terms of national or provincial legislation governing the generation or release of emissions, pollution or effluent,* *excluding—* *(i) activities which are identified and included in Listing Notice 1 of 2014;* *(ii) activities which are included in the list of waste management activities published in terms of section 19 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) in which case the National Environmental Management: Waste Act, 2008 applies;* *(iii) the development of facilities or infrastructure for the treatment of effluent, polluted water, wastewater or sewage where such facilities have a daily throughput capacity of 2 000 cubic metres or less; or* *(iv) where the development is directly related to aquaculture facilities or infrastructure where the wastewater discharge capacity will not exceed 50 cubic metres per day.* **Description**:

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	The Facility will produce up to 100,000 tons per annum of liquid ammonia and therefore potentially requires licensing in terms of the NEM: AQA (specifically Category 7, subcategory 7.1: "Production and or Use in Manufacturing of Ammonia, Fluorine, Fluorine Compounds, Chlorine, and Hydrogen Cyanide", with a threshold trigger value of greater than 100 tons per annum). The activity identified in the NEM: AQA however relates to the production of Ammonia, regardless of the nature of the process undertaken in production. During operation of the Facility, gases purged are: — Not altered in the process; — Not considered ambient pollutants; and — Not regulated by the Minimum Emissions Standards (MES); The applicant is therefore seeking exemption from Atmospheric Emissions Licensing (AEL) requirements. However, should the AELA consider an AEL required under the NEM:AQA regulations for this project, this activity will be triggered and is therefore applied for.
	Activity 7 *The development and related operation of facilities or infrastructure for the bulk transportation of dangerous goods—* *(i) in gas form, outside an industrial complex, using pipelines, exceeding 1 000 metres in length, with a throughput capacity of more than 700 tons per day;* *(ii) in liquid form, outside an industrial complex, using pipelines, exceeding 1 000 metres in length, with a throughput capacity of more than 50 cubic metres per day; or* *(iii) in solid form, outside an industrial complex, using funiculars or conveyors with a throughput capacity of more than 50 tons per day.* **Description**: Liquid ammonia of up to ~402 m^3 per day will be produced by the Facility, which will be transported within the Facility as a liquid in pipelines exceeding 1000m in length. In addition, up to 800 m^3 per day of liquid hydrogen will be produced by the Facility, which will be transported within the Facility as a liquid in pipelines exceeding 1000m in length. Both Hydrogen and Ammonia are substances listed in SANS10234.
	Activity 15 *The clearance of an area of 20 hectares or more of indigenous vegetation, excluding where such clearance of indigenous vegetation is required for—* *(i) the undertaking of a linear activity; or* *(ii) maintenance purposes undertaken in accordance with a maintenance management plan.* **Description**: The non-linear infrastructure components of the development footprint (buildable area) is approximately 25ha (subject to finalisation based on technical, final design and environmental requirements), within areas containing indigenous vegetation.
Listing Notice 3: GNR 985	***Activity 4(f)(i)(aa)(cc)(ee)(ff)*** *The development of a road wider than 4 metres with a reserve less than 13,5 metres.* *f. Mpumalanga* *i. Outside urban areas:*

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	(aa) A protected area identified in terms of NEMPAA, excluding disturbed areas; *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves; or* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, excluding disturbed areas, where such areas comprise indigenous vegetation; or* *ii. Inside urban areas:* *(aa) Areas zoned for use as public open space; or* *(bb) Areas designated for conservation use in Spatial Development Frameworks* *adopted by the competent authority or zoned for a conservation purpose.* **Description**: Internal and access roads required by the Facility will be between 5m and 6m wide, and exceed 1km in length in a rural area. Where required for turning circle/bypass areas, however, access or internal roads may be up to 20m to allow for larger component transport. The exact values will be confirmed once final designs have been provided. In addition, the Facility Infrastructure is located in the Mpumalanga Province outside urban areas, and partly on Portion 1 & 2 of Farm No. 322 (Welgelegen), which are a declared Private Nature Reserve (Langcarel Private Nature Reserve) under the Game Ordinance, 1949 (No. 23 of 1949) and the Native Flora Protection Ordinance, 1940 (No. 9 of 1940). The Facility Infrastructure is therefore both located within the extent, and within 5km of the abovementioned private nature reserve. This reserve is noted as having farming activity present, and is currently managed and actively utilised for agriculture. The terrestrial ecologist furthermore considers the designation of the area as protected an error, while confirming the presence of Critical Biodiversity and Ecological Support Areas. The land owner further is not aware of any protected area on these properties. Furthermore, roads required for the Facility will be located within, and will require vegetation clearance or disturbance of, Eastern Highveld Grassland and Chrissiesmeer Panveld, both ecosystems of which are listed in the National List of Ecosystems That Are Threated And In Need of Protection (GNR 1002 of 9 December 2011), and subsequently listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Similarly, roads required for the Facility will be located within, and will require vegetation clearance or disturbance within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA).
	Activity 10(f)(i)(aa)(cc)(ee)(gg)(hh) *The development and related operation of facilities or infrastructure for the storage, or storage and handling of a dangerous good, where such storage occurs in containers with a combined capacity of 30 but not exceeding 80 cubic metres.* *f. Mpumalanga* *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;*

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority; *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core areas of a biosphere reserve, where such areas comprise indigenous vegetation; or* *(hh) Areas within a watercourse or wetland, or within 100 metres of a watercourse or wetland;* **Description**: Dangerous goods product stores related to the operation of the Facility include Nitrogen, Oxygen, Hydrogen and Ammonia storage tanks (of varying sizes, pressures and temperatures) in excess of $500m^3$. In addition, fuel, cement, transformer oil and other chemicals will be stored onsite. Collectively all storage and handling of dangerous goods on site will exceed $500m^3$,however individual component capacities may be between 30 - $80m^3$. The storage contemplated above will all occur within the Mpumalanga Province outside urban areas, and partly on Portion 1 & 2 of Farm No. 322 (Welgelegen), which are a declared Private Nature Reserve (Langcarel Private Nature Reserve) under the Game Ordinance, 1949 (No. 23 of 1949) and the Native Flora Protection Ordinance, 1940 (No. 9 of 1940). The storage contemplated is therefore both located within the extent, and within 5km of the abovementioned private nature reserve. This reserve is noted as having farming activity present, and is currently managed and actively utilised for agriculture. The terrestrial ecologist furthermore considers the designation of the area as protected an error, while confirming the presence of Critical Biodiversity and Ecological Support Areas. The land owner further is not aware of any protected area on these properties. Furthermore, storage contemplated above will be located within, and will require vegetation clearance or disturbance of, Eastern Highveld Grassland and Chrissiesmeer Panveld, both ecosystems of which are listed in the National List of Ecosystems That Are Threated And In Need of Protection (GNR 1002 of 9 December 2011), and subsequently listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Similarly, storage contemplated above will be located within, and will require vegetation clearance or disturbance within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA) as well as being located within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site. The exact footprint will be confirmed once final designs have been provided.
	Activity 12(f)(i)(ii) *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.* *f. Mpumalanga* *i. 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;* *ii. Within critical biodiversity areas identified in bioregional plans; or*

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	iii. On land, where, at the time of the coming into effect of this Notice or thereafter such land was zoned open space, conservation or had an equivalent zoning or proclamation in terms of NEMPAA. **Description**: The clearance required for the Facility will be up to approximately 30ha (subject to finalisation based on technical, final design and environmental requirements) of indigenous vegetation. Such clearance will therefore be in excess of 300m2 and be partly located within Eastern Highveld Grassland and Chrissiesmeer Panveld, both ecosystems of which are listed in the National List of Ecosystems That Are Threated And In Need of Protection (GNR 1002 of 9 December 2011), and subsequently listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Similarly, vegetation clearance required for the Facility and associated infrastructure will be located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA), in excess of 300m^2. While the Facility and associated infrastructure is located partly on Portion 1 & 2 of Farm No. 322 (Welgelegen), which are a declared Private Nature Reserve (Langcarel Private Nature Reserve) under the Game Ordinance, 1949 (No. 23 of 1949) and the Native Flora Protection Ordinance, 1940 (No. 9 of 1940), the proclamation thereof is not considered to be in terms of the NEMPAA and therefore sub-activity (iii) of this activity is not considered applicable. In addition, the terrestrial ecologist considers the designation of the area as protected an error. The exact values will be confirmed once final designs have been provided.
	Activity 14(ii)(a)(c)(f)(i)(aa)(dd)(ff)(hh) *The development of—* *(i) dams or weirs, where the dam or weir, including infrastructure and water surface area exceeds 10 square metres; or* *(ii) infrastructure or structures with a Physical footprint of 10 Square metres or more;* *where such development occurs—* *(a) within a watercourse;* *(b) in front of a development setback; or* *(c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;* *f. Mpumalanga* *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) World Heritage Sites;* *(dd) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(ee) Sites or areas identified in terms of an international convention;* *(ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(gg) Core areas in biosphere reserves; or* *(hh) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation;*

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	Description: The physical footprint of internal and access roads, stormwater control infrastructure, electrical cabling and water supply pipelines related to the Facility will exceed 10m2 within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site. In addition, the Facility and associated infrastructure is located in the Mpumalanga Province outside urban areas, and partly on Portion 1 & 2 of Farm No. 322 (Welgelegen), which are a declared Private Nature Reserve (Langcarel Private Nature Reserve) under the Game Ordinance, 1949 (No. 23 of 1949) and the Native Flora Protection Ordinance, 1940 (No. 9 of 1940). The Facility and associated infrastructure is therefore both located within the extent, and within 5km of the above mentioned private nature reserve. This reserve is noted as having farming activity present, and is currently managed and actively utilised for agriculture. The terrestrial ecologist furthermore considers the designation of the area as protected an error, while confirming the presence of Critical Biodiversity and Ecological Support Areas. The landowner further is not aware of any protected area on these properties. Furthermore, the physical footprint of internal and access roads, stormwater control infrastructure, electrical cabling and water supply pipelines related to the Facility will exceed 10m2 within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site, which infrastructure will be located within Eastern Highveld Grassland and Chrissiesmeer Panveld, both ecosystems of which are listed in the National List of Ecosystems That Are Threated And In Need of Protection (GNR 1002 of 9 December 2011), and subsequently listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Finally, the physical footprint of internal and access roads, stormwater control infrastructure, electrical cabling and water supply pipelines related to the Facility will exceed 10m2 within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site, located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA). The exact footprint will be confirmed once final designs have been provided.
	Activity 15 (d)(ii) *The transformation of land bigger than 1000 square metres in size, to residential, retail, commercial, industrial or institutional use, where, such land was zoned open space, conservation or had an equivalent zoning, on or after 02 August 2010.* *d. Mpumalanga* *i. Inside urban areas; or* *ii. A protected area identified in terms of NEMPAA, excluding conservancies.* **Description**: The Facility is considered a commercial and/or industrial development, and will require the transformation of land bigger than 1000 square metres in size (subject to finalisation based on technical, final design and environmental requirements) within several farm portions outside an urban area, currently zoned for agriculture, while being partly located on Portion 1 & 2 of Farm No. 322 (Welgelegen), which is a declared Private Nature Reserve (Langcarel Private Nature Reserve) under the Game Ordinance, 1949 (No. 23 of 1949) and the Native Flora Protection Ordinance, 1940 (No. 9 of 1940). This reserve is noted as having farming activity present, and is currently managed and actively utilised for agriculture. The terrestrial ecologist furthermore considers the designation of the area as protected an error, while confirming the presence of Critical Biodiversity and Ecological Support Areas. The landowner further is not aware of any protected area on these properties.
	Activity 18(f)(i)(aa)(cc)(ee)(gg) *The widening of a road by more than 4 metres, or the lengthening of a road by more than 1 kilometre.*

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	f. Mpumalanga *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves; or* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation;* **Description**: Transport of large infrastructure components related to the Facility will require the widening of existing access and/or internal roads by more than 4 metres or in excess of 1km within the Mpumalanga Province and outside urban areas. Such widening will be occur partly on Portion 1 & 2 of Farm No. 322 (Welgelegen), which are a declared Private Nature Reserve (Langcarel Private Nature Reserve) under the Game Ordinance, 1949 (No. 23 of 1949) and the Native Flora Protection Ordinance, 1940 (No. 9 of 1940). The Facility and related infrastructure is therefore both located within the extent, and within 5km of the above mentioned private nature reserve. This reserve is noted as having farming activity present, and is currently managed and actively utilised for agriculture. The terrestrial ecologist furthermore considers the designation of the area as protected an error, while confirming the presence of Critical Biodiversity and Ecological Support Areas. The landowner further is not aware of any protected area on these properties. Furthermore, such widening will occur within Eastern Highveld Grassland and Chrissiesmeer Panveld, both ecosystems of which are listed in the National List of Ecosystems That Are Threated And In Need of Protection (GNR 1002 of 9 December 2011), and subsequently listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Finally, such widening will be located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA). The exact footprint will be confirmed once final designs have been provided.
	Activity 23(ii)(a)(c)(f)(i)(aa)(cc)(ee)(gg) *The expansion of—* *(i) dams or weirs where the dam or weir is expanded by 10 square metres or more; or* *(ii) infrastructure or structures where the physical footprint is expanded by 10 square metres or more;* *where such expansion occurs —* *(a) within a watercourse;* *(b) in front of a development Setback adopted in the prescribed manner; or* *(c) if no development setback has been adopted,* *within 32 metres of a watercourse, measured* *from the edge of a watercourse;*

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	f. Mpumalanga *i. Outside urban areas:* *(aa) A protected area identified in terms of NEMPAA, excluding conservancies;* *(bb) National Protected Area Expansion Strategy Focus areas;* *(cc) Sensitive areas as identified in an environmental management framework as contemplated in chapter 5 of the Act and as adopted by the competent authority;* *(dd) Sites or areas identified in terms of an international convention;* *(ee) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans;* *(ff) Core areas in biosphere reserves;* *(gg) Areas within 10 kilometres from national parks or world heritage sites or 5 kilometres from any other protected area identified in terms of NEMPAA or from the core area of a biosphere reserve, where such areas comprise indigenous vegetation;* **Description**: The physical footprint of internal and access roads, stormwater control infrastructure, electrical cabling and water supply pipelines related to the Facility will exceed 10m2 within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site. In addition, the Facility and associated infrastructure is located in the Mpumalanga Province outside urban areas, and partly on Portion 1 & 2 of Farm No. 322 (Welgelegen), which are a declared Private Nature Reserve (Langcarel Private Nature Reserve) under the Game Ordinance, 1949 (No. 23 of 1949) and the Native Flora Protection Ordinance, 1940 (No. 9 of 1940). The Facility and associated infrastructure is therefore both located within the extent, and within 5km of the above mentioned private nature reserve. This reserve is noted as having farming activity present, and is currently managed and actively utilised for agriculture. The terrestrial ecologist furthermore considers the designation of the area as protected an error, while confirming the presence of Critical Biodiversity and Ecological Support Areas. The landowner further is not aware of any protected area on these properties. Furthermore, the physical footprint of internal and access roads, stormwater control infrastructure, electrical cabling and water supply pipelines related to the Facility will exceed 10m2 within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site, which infrastructure will be located within Eastern Highveld Grassland and Chrissiesmeer Panveld, both ecosystems of which are listed in the National List of Ecosystems That Are Threated And In Need of Protection (GNR 1002 of 9 December 2011), and subsequently listed in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004). Finally, the physical footprint of internal and access roads, stormwater control infrastructure, electrical cabling and water supply pipelines related to the Facility will exceed 10m2 within delineated watercourses on site, or within 32m of the outer extent of the delineated watercourses on site, located within Critical Biodiversity Areas (CBA) and Ecological Support Areas (ESA). The exact footprint will be confirmed once final designs have been provided.
National Environmental Management: Waste Act (59 of 2008) (NEM:WA)	This Act provides for regulating waste management in order to protect health and the environment by providing reasonable measures for the prevention of pollution and ecological degradation. The Act also provides for the licensing and control of waste management activities through GNR. 921 (2013): List of Waste Management Activities that have, or are likely to have, a detrimental effect on the environment. The water treatment process is associated with the generation of concentrated wastes removed from the water, such as brine salt. Liquid brine can be made into a solid through several available technologies such as, settlement tanks, cooling water circuits, and forced crystallization. Given the proposed brine treatment and Zero Liquid Discharge system, as well as the use of a third-party contractor for the treatment and disposal of the produced salt cake, and the relatively

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	small temporary storage facility envisaged and regular removal (< 80m^3 at any one point in time), it is understood that no waste activities are triggered for either the treatment or storage of waste. It is however noted that the proponent will be required to comply with the general duties provided for at section 16 of NEM:WA relating to the management of waste as well as the legal requirements relating to the storage of waste as provided for at sections 21 and 22 respectively. The proposed project (Camden I GH&A Facility) does not constitute a Listed Activity requiring a Waste Management Licence (WML) as defined in GNR 921. The contents of this Scoping Report will include reasonable measures for the prevention of pollution and good international industry practice (GIIP).
National Environmental Management: Air Quality Act (Act 39 of 2004) (NEM:AQA)	Until 2004, South Africa's approach to air pollution control was driven by the Atmospheric Pollution Prevention Act 45 of 1965 (APPA) which was repealed with the promulgation of NEM:AQA . NEM:AQA represents a shift in South Africa's approach to air quality management, from source-based control to integrated effects-based management. The objectives of NEM:AQA are to: — Protect the environment by providing reasonable measures for: — The protection and enhancement of air quality; — The prevention of air pollution and ecological degradation; — Securing ecologically sustainable development while promoting justifiable economic and social development; and — Give effect to everyone's right "to an environment that is not harmful to their health and well-being" Significant functions detailed in NEM:AQA include: — The National Framework for Air Quality Management ; — Institutional planning matters, including: — The establishment of a National Air Quality Advisory Committee; — The appointment of Air Quality Officers (AQOs) at each level of government; and — The development, implementation and reporting of Air Quality Management Plans (AQMP) at national, provincial and municipal levels; — Air quality management measures including: — The declaration of Priority Areas where ambient air quality standards are being, or may be, exceeded; — The listing of activities that result in atmospheric emissions and which have the potential to impact negatively on the environment and the licensing thereof through an Atmospheric Emissions License (AEL); — The declaration of Controlled Emitters; — The declaration of Controlled Fuels; — Procedures to enforce Pollution Prevention Plans or Atmospheric Impact Reporting for the control and inventory of atmospheric pollutants of concern; and — Requirements for addressing dust and offensive odours Ammonia production in excess of 100 tons per annum triggers listed activity Subcategory 7.1: Production and or use in Manufacturing of Ammonia, Fluorine, Fluorine Compounds, Chlorine and Hydrogen Cyanide of Government Notice Regulation 893 of 2013, promulgated in line with Section 21 of the NEM:AQA. As per Section 22 of NEM:AQA, all activities listed by Section 21 require an Atmospheric Emissions License (AEL).
National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) was promulgated in June 2004 within the framework of NEMA to provide for the management and conservation of national biodiversity. The NEMBA's primary aims are for the protection of species and ecosystems that warrant national protection, the sustainable use of indigenous biological resources, the fair and equitable sharing of benefits arising from

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	bioprospecting involving indigenous biological resources. In addition, the NEMBA provides for the establishment and functions of a South African National Biodiversity Institute (SANBI). SANBI was established by the NEMBA with the primary purpose of reporting on the status of the country's biodiversity and conservation status of all listed threatened or protected species and ecosystems. The biodiversity assessment identifies CBAs which represent biodiversity priority areas which should be maintained in a natural to near natural state. The CBA maps indicate the most efficient selection and classification of land portions requiring safeguarding in order to meet national biodiversity objectives. Based on the preliminary desktop assessment and the terrestrial ecology report, a significant part of the Project Area falls within CBA (Irreplaceable and Optimal) and a large wetland area adjacent and to the north of the Vaal River (near the southern part of the site) is mapped as an Ecological Support Area (ESA). According to the description for the MBSP Terrestrial Assessment categories, CBAs are areas that are required to meet biodiversity targets (for biodiversity pattern and ecological process features). The policy is that they should remain in a natural state. CBAs are areas of high biodiversity value which are usually at risk of being lost and usually identified as important in meeting biodiversity targets, except for Critically Endangered Ecosystems or Critical Linkages. CBAs in the Province can be divided into two sub-categories: – Irreplaceable (parts of the site are within this sub-category), and – Optimal (northern parts of the site are within this sub-category). Supplementary baseline terrestrial ecology studies will be undertaken during the EIA phase to inform the assessment of impacts and will include flora surveys of the project footprint to determine the presence of flora species of concern (SoC), and bird surveys of the area to define the potential risks to bird SoC. The Conservation of Agricultural Resources Act (No. 43 of 1983) (CARA) Regulations with regards to alien and invasive species have been superseded by the National Environmental Management: Biodiversity Act, 2004 (Act no. 10 of 2004) – Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014. Specific management measures for the control of alien and invasive plants will be included in the Environmental Management Programme (EMPr).
National Environmental Management Protected Areas Act (No. 57 of 2003)	The purpose of the National Environmental Management Protected Areas Act (No. 57 of 2003) (NEMPAA) is to, inter alia, provide for the protection and conservation of ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes. To this end, it provides for the declaration and management of various types of protected areas. Section 50(5) of NEMPAA states that "*no development, construction or farming may be permitted in a nature reserve or world heritage site without the prior written approval of the management authority*." As discussed in Activity 4 of Listing Notice 3 above, the designation of the of the portion of the site as protected in the Mpumalanga Biodiversity Sector Plan (MBSP) is an error. According to the National Parks Area Expansion Strategy (NPAES), there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. The study area is therefore outside the NPAES focus area.
The National Water Act (No. 36 Of 1998)	The National Water Act, 1998 (Act No. 36 of 1998) (NWA) provides the framework to protect water resources against over exploitation and to ensure that there is water for social and economic development, human needs and to meet the needs of the aquatic environment. The Act defines water source to include watercourses, surface water, estuary or aquifer. A watercourse is defined in the Act as a river or spring, a natural channel in which water flows regularly or intermittently, a wetland, lake or dam into which or from which water flows, and any collection of water that the Minister may declare a watercourse. Section 21 of the Act outlines a number of categories that require a water user to apply for a Water Use License (WUL) and Section 22 requires water users to apply for a General

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	Authorisation (GA) with the Department of Water and Sanitation (DWS) if they are under certain thresholds or meet certain criteria. The list of water uses applicable to the proposed Project include: *a) Taking water from a water resource;* *c) Impeding or diverting the flow of water in a watercourse;* *g) Disposing of waste in a manner which may detrimentally impact on a water resource;* *i) Altering the bed, banks, course or characteristics of a watercourse;* The DWS will make the final decision on water uses that are applicable to the project through a pre-application meeting after which a Water Use Authorisation Application (WUA) as determined by the risk assessment will be undertaken in compliance with procedural regulations published by the DWS within General Notice 267 (GN267). These regulations specify required information per water use and the reporting structure of required supporting technical information.
The National Heritage Resources Act (No. 25 Of 1999)	The National Heritage Resource Act (Act No. 25 of 1999) (NHRA) serves to protect national and provincial heritage resources across South Africa. The NHRA provides for the protection of all archaeological and palaeontological sites, the conservation and care of cemeteries and graves by the South African Heritage Resources Agency (SAHRA), and lists activities that require any person who intends to undertake to notify the responsible heritage resources agency and furnish details regarding the location, nature, and extent of the proposed development. Part 2 of the NHRA details specific activities that require a Heritage Impact Assessment (HIA) that will need to be approved by SAHRA. Parts of Section 35, 36 and 38 apply to the proposed project, principally: — Section 35 (4) - 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 or any meteorite; — destroy, damage, excavate, remove from its original position, collect or own any archaeological or palaeontological material or object or any meteorite. — Section 38 (1) Subject to the provisions of subsections (7), (8) and (9), any person who intends to undertake a development categorised as- — any development or other activity which will change the character of a site— (i) exceeding 5 000 m^2 in extent, must at the very earliest stages of initiating such a development, notify the responsible heritage resources authority and furnish it with details regarding the location, nature and extent of the proposed development. In terms of Section 38(8), approval from the heritage authority is not required if an evaluation of the impact of such development on heritage resources is required in terms of any other legislation (such as NEMA), provided that the consenting authority ensures that the evaluation of impacts fulfils the requirements of the relevant heritage resources authority in terms of Section 38(3) and any comments and recommendations of the relevant resources authority with regard to such development have been taken into account prior to the granting of the consent. However, should heritage resources of significance be affected by the proposed Camden I GH&A Facility, a permit is required to be obtained prior to disturbing or destroying such resources as per the requirements of Section 48 of the NHRA, and the SAHRA Permit Regulations (GN R668). A desktop Heritage Scoping Report (**Appendix D**) has been carried out by a suitably qualified specialist, revealing: — no Stone Age or Iron Age archaeological sites are on record within the immediate study area but this could be due to a lack of focused research in the area. — no grave sites are indicated on archival maps or the genealogical society database within the impact areas, but burial sites can occur across the landscape and can be expected. — The study area is of low to moderate to high paleontological sensitivity and according to the South African Heritage Resources Information System (SAHRIS) palaeontological sensitivity map must be subjected to a palaeontological assessment in the impact assessment phase.

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
	— the study area forms part of a landscape characterised by wide scale cultivation and industrial facilities like power plants and mines. — the project area has been cultivated from prior to 1968 as indicated on historical maps and has remained under cultivation until present these activities would have impacted on surface indicators of heritage sites if any were ever present in the area. The proposed project will be loaded onto the SAHRIS portal for comment by SAHRA
Mineral and Petroleum Resources Development Act (No. 28 of 2002)	The aim of the Mineral and Petroleum Resources Development Act (No. 28 of 2002) (MPRDA) is to make provision for equitable access to and sustainable development of the nation's mineral and petroleum resources. Section 53(1) of the MPRDA provides that any person who intends to use the surface of any land in any way that may be contrary to any object of the MPRDA, or which is likely to impede any such object, must apply to the Minister of Mineral Resources (the Minister) for approval. Section 53 of the MPRDA provides a mechanism for ensuring that, inter alia, the mining of mineral resources is not detrimentally affected through the use of the surface of land and which may, for example, result in the sterilisation of a mineral resource. A Section 53 approval will be required due to the fact that the project is located on various mining right areas. The Amendment Regulations (GNR 420 of 27 March 2020) introduced a template for section 53 applications (Form Z) and the specific information that applicants will need to provide as part of a section 53 application.
Noise Control Regulations in terms of the Environmental Conservation, 1989 (Act 73 of 1989)	In South Africa, environmental noise control has been in place for three decades, beginning in the 1980s with codes of practice issued by the South African National Standards (formerly the South African Bureau of Standards, SABS) to address noise pollution in various sectors of the country. Under the previous generation of environmental legislation, specifically the Environmental Conservation Act 73 of 1989 (ECA), provisions were made to control noise from a National level in the form of the Noise Control Regulations (GNR 154 of January 1992). In later years, the ECA was replaced by the National Environmental Management Act 107 of 1998 (NEMA) as amended. The National Environmental Management: Air Quality Act 39 of 2004 (NEMAQA) was published in line with NEMA and contains noise control provisions under Section 34: *(1) The minister may prescribe essential national standards –* *(a) for the control of noise, either in general or by specific machinery or activities or in specified places or areas; or* *(b) for determining –* *(i) a definition of noise; and* *(ii) the maximum levels of noise.* *(2) When controlling noise, the provincial and local spheres of government are bound by any prescribed national standards.* Under NEMAQA, the Noise Control Regulations were updated and are to be applied to all provinces in South Africa. The Noise Control Regulations give all the responsibilities of enforcement to the Local Provincial Authority, where location specific by-laws can be created and applied to the locations with approval of Provincial Government. Where province-specific regulations have not been promulgated, acoustic impact assessments must follow the Noise Control Regulations. Furthermore, NEMAQA prescribes that the Minister must publish maximum allowable noise levels for different districts and national noise standards. These have not yet been accomplished and as a result all monitoring and assessments are done in accordance with the South African National Standards (SANS) 10103:2008 and 10328:2008.

LEGISLATION	DESCRIPTION OF LEGISLATION AND APPLICABILITY
Conservation of Agricultural Resources Act (No. 43 of 1983)	The Conservation of Agricultural Resources Act (Act 43 of 1983) (CARA) provides for the implementation of control measures for soil conservation works as well as alien and invasive plant species in and outside of urban areas. In terms of the amendments to the regulations under the CARA, landowners are legally responsible for the control of alien species on their properties. Various Acts administered by the DFFE and the DWS, as well as other laws (including local by-laws), spell out the fines, terms of imprisonment and other penalties for contravening the law. Although no fines have yet been placed against landowners who do not remove invasive species, the authorities may clear their land of invasive alien plants and other alien species entirely at the landowners' cost and risk. The CARA Regulations with regards to alien and invasive species have been superseded by NEMBA Alien and Invasive Species (AIS) Regulations which became law on 1 October 2014.
Civil Aviation Act (No. 13 of 2009)	Civil aviation in South Africa is governed by the Civil Aviation Act (Act 13 of 2009). This Act provides for the establishment of a stand-alone authority mandated with controlling, promoting, regulating, supporting, developing, enforcing and continuously improving levels of safety and security throughout the civil aviation industry. This mandate is fulfilled by South African Civil Aviation Authority (SACAA) as an agency of the Department of Transport (DoT). SACAA achieves the objectives set out in the Act by complying with the Standards and Recommended Practices (SARPs) of the International Civil Aviation Organisation (ICAO), while considering the local context when issuing the South African Civil Aviation Regulations (SA CARs). As of the 1st of May 2021, Air Traffic and Navigation Services (ATNS) has been appointed as the new Obstacle application Service Provider for Windfarms and later Solar Plants. Their responsibility would pertain to the assessments, maintenance, and all other related matters in respect to Windfarms and in due time Power Plant assessments. The DEA Screening Tool Report identified Civil Aviation as having low sensitivity for the proposed Camden I GH&A Facility, and as being located between 8 and 15km of other civil aviation arerodrome. . SACAA and ATNS will be included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought from these authorities as applicable.
Occupational Health and Safety Act (No. 85 of 1993)	The National Occupational Health and Safety Act (No. 85 of 1993) (OHSA) and the relevant regulations under the Act are applicable to the proposed project. This includes the Construction Regulations promulgated in 2014 under Section 43 of the Act. Adherence to South Africa's OHSA and its relevant Regulations is essential. The ammonia and hydrogen facilities as well as oxygen facilities will likely be Major Hazard Installations (MHI) and will require a fill quantitative risk assessment (QRA) and emergency response plan (ERP). Under the current MHI Regulations notification of various authorities and the public is required. Should the proposed new MHI Regulations be promulgated prior to commencement of construction of this facility it is possible that in addition to a QRA and ERP, the hydrogen, ammonia and oxygen facilities will necessitate an application for a Licence to Operate from the Department of Employment and Labour. There will likely be a requirement for implementation of a Process Safety Management Systems and submission of a Safety Report providing evidence of the effectiveness of this management system.

3.2 POLICIES AND PLANS

Table 5 summarised key policies and plans as an outline of the governance framework for the project.

Table 3-2: Applicable Regional Policies and Plans

APPLICABLE POLICY	DESCRIPTION OF POLICY
National Development Plan	The National Development Plan aims to eliminate poverty and reduce inequality by 2030. The NDP identifies a number of enabling milestones. Of relevance to the proposed development the NDP refers to the need to produce sufficient energy to support industry at competitive prices and ensure access for poor households, while reducing carbon emissions per unit of power by about one-third. In this regard the infrastructure is not just essential for faster economic growth and higher employment. It also promotes inclusive growth, providing citizens with the means to improve their own lives and boost their incomes. Infrastructure is essential to development. Chapter 3, Economy and Employment, identifies some of the structural challenges specific to South Africa, including an energy constraint that will act as a cap on growth and on options for industrialisation. The NDP notes that from an environmental perspective South Africa faces several related challenges. The reduction of greenhouse gas emissions and shift to a green low-carbon economy, is one of these challenges. In terms of implementation the NDP identifies three phases. The first two are of specific relevance to the proposed project. The first phase (2012–2017) notes that ensuring the supply of energy and water is reliable and sufficient for a growing economy. The second phase (2018–2023) involves building on the first phase to lay the foundations for more intensive improvements in productivity. The provision of affordable and reliable energy is a key requirement for this to take place. Chapter 4, Economic infrastructure, notes that economic infrastructure provides the foundation for social and economic development. In this regard South Africa must invest in a strong network of economic infrastructure designed to support the country's medium- and long-term economic and social objectives. The plan envisages that, by 2030, South Africa will have an energy sector that promotes: – Economic growth and development through adequate investment in energy infrastructure. The sector should provide reliable and efficient energy service at competitive rates, while supporting economic growth through job creation. – Environmental sustainability through efforts to reduce pollution and mitigate the effects of climate change. More specifically, South Africa should have adequate supply security in electricity and in liquid fuels, such that economic activity, transport, and welfare are not disrupted. The plan sets out steps that aim to ensure that, in 20 years, South Africa's energy system looks very different to the current situation. In this regard coal will contribute proportionately less to primary-energy needs, while gas and renewable energy resources, will play a much larger role.
Integrated Resource Plan 2010 – 2030	The IRP is an electricity capacity plan which aims to provide an indication of the country's electricity demand, how this demand will be supplied and what it will cost. On 6 May 2011, the then Department of Energy (DoE) released the Integrated Resource Plan 2010-2030 (IRP 2010) in respect of South Africa's forecast energy demand for the 20-year period from 2010 to 2030. 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 greenhouse gas (GHG) emissions, reduced water consumption, diversified electricity generation sources, localisation and regional development. The IRP recognises that Solar photovoltaic (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.
New Growth Path	Government released the New Economic Growth Path Framework on 23 November 2010. The aim of the framework is to enhance growth, employment creation and equity. The policy's principal target is to create five million jobs over the next 10 years and reflects government's commitment to prioritising employment creation in all economic policies. The framework identifies strategies that will enable South Africa to grow in a more

APPLICABLE POLICY	DESCRIPTION OF POLICY
	equitable and inclusive manner while attaining South Africa's developmental agenda. Central to the New Growth Path is a massive investment in infrastructure as a critical driver of jobs across the economy. In this regard the framework identifies investments in five key areas namely: energy, transport, communication, water, and housing.
National Infrastructure Plan	The South African Government adopted a National Infrastructure Plan (NIP) in 2012. The NIP aims to transform the South African economic landscape while simultaneously creating significant numbers of new jobs and strengthening the delivery of basic services. It outlines the challenges and enablers which needs to be addressed in the building and developing of infrastructure. The Presidential Infrastructure Coordinating Commission (PICC) was established by the Cabinet to integrate and coordinate the long-term infrastructure build. The plan also supports the integration of African economies. In terms of the plan Government will invest R827 billion over the next three years to build new and upgrade existing infrastructure. The aim of the investments is to improve access by South Africans to healthcare facilities, schools, water, sanitation, housing and electrification. The plan also notes that investment in the construction of ports, roads, railway systems, ***electricity plants***, hospitals, schools and dams will contribute to improved economic growth.
Integrated Energy Plan	The development of a National IEP was envisaged in the White Paper on the Energy Policy of the Republic of South Africa of 1998 and, in terms of the National Energy Act, 2008 (Act No. 34 of 2008), the Minister of Energy is mandated to develop and, on an annual basis, review and publish the IEP in the Government Gazette. The purpose of the IEP is to provide a roadmap of the future energy landscape for South Africa which guides future energy infrastructure investments and policy development. The IEP notes that South Africa needs to grow its energy supply to support economic expansion and in so doing, alleviate supply bottlenecks and supply-demand deficits. In addition, it is essential that all citizens are provided with clean and modern forms of energy at an affordable price. As part of the Integrated Energy Planning process, eight key objectives are identified, namely: — Objective 1: Ensure security of supply. — Objective 2: Minimise the cost of energy. — Objective 3: Promote the creation of jobs and localisation. — Objective 4: Minimise negative environmental impacts from the energy sector. — Objective 5: Promote the conservation of water. — Objective 6: Diversify supply sources and primary sources of energy. — Objective 7: Promote energy efficiency in the economy. — Objective 8: Increase access to modern energy. The IEP provides an assessment of current energy consumption trends within different sectors of the economy (i.e., agriculture, commerce, industry, residential and transport) and uses this information to identify future energy requirements, based on different scenarios. The scenarios are informed by different assumptions on economic development and the structure of the economy and also take into account the impact of key policies such as environmental policies, energy efficiency policies, transport policies and industrial policies, amongst others. Based on this information the IEP then determines the optimal mix of energy sources and technologies to meet those energy needs in the most cost-effective manner for each of the scenarios. The associated environmental impacts, socio-economic benefits and macroeconomic impacts are also analysed. The IEP is therefore focused on determining the long-term energy pathway for South Africa, taking into account a multitude of factors which are embedded in the eight objectives. As part of the analysis four key scenarios were developed, namely the Base Case, Environmental Awareness, Resource Constrained and Green Shoots scenarios: — The Base Case Scenario assumes that existing policies are implemented and will continue to shape the energy sector landscape going forward. It assumes moderate economic growth in the medium to long term.

APPLICABLE POLICY	DESCRIPTION OF POLICY
	— The Environmental Awareness Scenario is characterised by more stringent emission limits and a more environmentally aware society, where a higher cost is placed on externalities caused by the supply of energy. — The Resource Constrained Scenario in which global energy commodity prices (i.e. coal, crude oil and natural gas) are high due to limited supply. — The Green Shoots Scenario describes an economy in which the targets for high economic growth and structural changes to the economy, as set out in the National Development Plan (NDP), are met. The IEP notes that South Africa should continue to pursue a diversified energy mix which reduces reliance on a single or a few primary energy sources. In terms of existing electricity generation capacity, the IEP indicates that existing capacity starts to decline notably from 2025, with significant plant retirement occurring in 2031, 2041 and 2048. By 2050 only 20% of the current electricity generation capacity remains. As a result, large investments are required in the electricity sector in order to maintain an adequate supply in support of economic growth. By 2020, various import options become available, and some new coal capacity is added along with new wind, solar and gas capacity. The mix of generation capacity technologies by 2050 is considerably more diverse than the current energy mix, across all scenarios. The main differentiating factors between the scenarios are the level of demand, constraints on emission limits and the carbon dioxide externality costs. In all scenarios the energy mix for electricity generation becomes more diverse over the period to 2050, with coal reducing its share from about 85% in 2015 to 15–20% in 2050 (depending on the scenario). Solar, wind, nuclear, gas and electricity imports increase their share. The Environmental Awareness and Green Shoots scenarios take on higher levels of renewable energy. An assessment of each scenario against the eight objectives with reference to renewable energy notes while all scenarios seek to ensure that costs are minimised within the constraints and parameters of each scenario, the Base Case Scenario presents the least cost followed by the Environmental Awareness, Resource Constrained and Green Shoots scenarios respectively when total energy system costs are considered. In terms of promoting job creation and localisation potential the Base Case Scenario presents the greatest job creation potential, followed by the Resource Constrained, Environmental Awareness and Green Shoots scenarios respectively. In all scenarios, approximately 85% of total jobs are localisable. For electricity generation, most jobs result from solar technologies followed by nuclear and wind, with natural gas and coal making a smaller contribution. The Environmental Awareness Scenario, due to its stringent emission constraints, shows the lowest level of total emissions over the planning horizon. This is followed by the Green Shoots, Resource Constrained and Base Case scenarios. These trends are similar when emissions are considered cumulatively and individually by type.
National Protected Area Expansion Strategy, 2010	The National Protected Area Expansion Strategy 2010 (NPAES) areas were identified through a systematic biodiversity planning process. They present the best opportunities for meeting the ecosystem-specific protected area targets set in the NPAES and were designed with strong emphasis on climate change resilience and requirements for protecting freshwater ecosystems. These areas should not be seen as future boundaries of protected areas, as in many cases only a portion of a particular focus area would be required to meet the protected area targets set in the NPAES. They are also not a replacement for fine scale planning which may identify a range of different priority sites based on local requirements, constraints and opportunities (NPAES, 2010). According to the NPAES, there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. The study area is therefore **outside the NPAES focus area**.

3.3 PROVINCIAL AND MUNICIPAL LEGAL AND REGULATORY FRAMEWORK

Table 3-3: Provincial Plans

APPLICABLE PLAN	DESCRIPTION OF PLAN
Mpumalanga Growth and Development Path	The primary objective of the Mpumalanga Economic Growth and Development Path (MEGDP) (2011) is to foster economic growth that creates jobs, reduce poverty and inequality in the Province. The MEGDP identifies supporting the development of clean forms of energy such as wind and hydro power generation opportunities, as well as opportunities including gas production from landfill and organic waste, as one of the key interventions to facilitate growth and job creation in the manufacturing sector. A focal point of the MEGDP is massive investments in infrastructure as a key driver of job creation across the economy, with alternative energy production identified as one of the key opportunities in the Mpumalanga Economic sectors.
Mpumalanga Spatial Development Framework (MSDF), 2019	The Mpumalanga Spatial Development Framework (SDF) (2019) identifies that tourism is an important economic sector and has emerged as a robust driver of growth for emerging economies. The SDF also notes that a significant portion of Mpumalanga's land area is classified as Moderate to High-Very High agricultural potential which can be utilised for agricultural production. However, there are other factors affecting the agricultural sector including loss of agricultural land to other activities, availability of water, contamination of the water used for irrigation by other economic activities, and access to the market. The SDF further notes that mining is the largest economic sector in the province and has assisted other sectors such as manufacturing and power generation, to grow in the province. However, the mining sector has posed some key challenges, including soil and water contamination and environmental pollution, development of mines on good agricultural soil thus threatening food security, restriction of animal movement due to open cast mining thus affecting the ecosystem etc. It also notes that Mpumalanga's manufacturing plants and coal fired power plants are the key polluters of air, with climate change also identified as a key challenge in the province. Therefore, the province must carefully design interventions that provide a gradual shift from mining oriented sectors to the sustainable economic sectors to maintain sustained growth of the provincial economy. The SDF notes that a significant amount of the country's electricity comes from coal-fired stations in Mpumalanga. It also observes that there is a steady increase in the demand for electricity in the province, mostly attributed to residential, commercial and industrial development, including mining and heavy industry. The Provincial SDF also notes that the abundance of coal has led to the development of many coal-fired power stations in the province, however these coalfields are depleting, therefore making it necessary to consider renewable power sources in Mpumalanga. The SDF also recognises that Mpumalanga's Coal Mining and Coal Fired Power Plant region (mainly the Highveld area) will be under immense pressure for environmental considerations and as a result, the region will witness a possible decline in demand of coal and large-scale employment. The SDF proposes to diversify the regional economy and facilitate the gradual transition of economic activities in the region.
Mpumalanga Industrial Development Plan	In terms of industry, the purpose of the Mpumalanga Industrial Development Plan (MIDP) (2015) is to promote the establishment of new industries and promote growth of existing industries in the province. It is however noted that the Msukaligwa Municipality (within which the project falls under) is not directly impacted by the 2025 MIDP and its proposed priority hubs

Table 3-4: District and Local Municipality Plans

APPLICABLE PLAN	DESCRIPTION OF PLAN
Gert Sibande Municipality Integrated Development Plan	According to the Municipal Systems Act (Act 32 of 2000) (MSA), all municipalities have to undertake an Integrated Development Plan (IDP) process. The IDP is a legislative requirement thus it has legal status and supersedes all other plans that guide development at local government level. The Gert Sibande Municipality (GSM) IDP Review(2019/ 2020) and Final IDP (2020/2021) has identified the following development priorities: — Municipal Transformation and Organisational Development — Basic Service Delivery and Infrastructure Development — Local Economic Development — Municipal Financial Viability and Management — Good Governance and Public Participation — Spatial Development Analysis and Rationale The main goal and strategic objective of the Basic Service Delivery and Infrastructure Development priority is a reliable and sustainable service. One of the main strategic objectives for reaching the goal is the provision of basic services such as water and electricity to an approved minimum level of standards in a sustainable manner; as per the national guidelines.
Msukaligwa Local Municipality IDP	The Msukaligwa Local Municipality Revised IDP (2020/2021) has identified the following key Municipal priorities: — Revenue collection. — Access to basic services by communities. — Job creation and economic development. — Infrastructure maintenance and upgrading. — Community participation in the affairs of the municipality. — Fight against fraud and corruption. — Capable and responsive organizational structure. — Capabilities of the municipal ICT. — Integrated human settlements One of the main strategic objectives for the access to basic services priority is to provide sustainable and reliable services to communities. Most of the basic services are rendered within the municipality, however some rural areas are still faced with some challenges in the provision water, sanitation and electricity. The Municipality, through the IDP, aims to facilitate the provision of electricity, with a number of key projects planned to be implemented over the period of five years linked to the Municipal IDP.
Msukaligwa Spatial Development Framework	The Msukaligwa SDF is informed by a number of spatial objectives, including: — Providing a spatial structure that facilitates access to services for all communities. — Protecting strategic water sources and sensitive eco-systems. — Providing space for the diversification of the local economy. — Eliminating past spatial settlement patterns. The provision of space of the diversification of the local economy is of specific relevance to the proposed development. The SDF highlights the key role and spatial extent of mining in the Msukaligwa Municiaplity, including reference to the Camden coal-fired power station located in proximity to the proposed development. Over the longer term the rehabilitation of mining areas and a range of alternative peri-urban uses should be considered for the impacted areas in view of the decrease reliance on coal. Commercial Agriculture also represents a key economic activity in the Municipality. However, the SDF notes that climate change will pose a risk to the agricultural sector.

3.4 INTERNATIONAL ENVIRONMENTAL AND SOCIAL STANDARDS

3.4.1 IFC PERFORMANCE STANDARDS

The International Finance Corporation (IFC) is an international financial institution that offers investment, advisory, and asset management services to encourage private sector development in developing countries. The IFC is a member of the World Bank Group (WBG) and is headquartered in Washington, D.C., United States. It was established in 1956 as the private sector arm of the WBG to advance economic development by investing in strictly for-profit and commercial projects that purport to reduce poverty and promote development.

The IFC's stated aim is to create opportunities for people to escape poverty and achieve better living standards by mobilizing financial resources for private enterprise, promoting accessible and competitive markets, supporting businesses and other private sector entities, and creating jobs and delivering necessary services to those who are poverty-stricken or otherwise vulnerable. Since 2009, the IFC has focused on a set of development goals that its projects are expected to target. Its goals are to increase sustainable agriculture opportunities, improve health and education, increase access to financing for microfinance and business clients, advance infrastructure, help small businesses grow revenues, and invest in climate health.

The IFC is owned and governed by its member countries but has its own executive leadership and staff that conduct its normal business operations. It is a corporation whose shareholders are member governments that provide paid-in capital and which have the right to vote on its matters. Originally more financially integrated with the WBG, the IFC was established separately and eventually became authorized to operate as a financially autonomous entity and make independent investment decisions. It offers an array of debt and equity financing services and helps companies face their risk exposures, while refraining from participating in a management capacity. The corporation also offers advice to companies on making decisions, evaluating their impact on the environment and society, and being responsible. It advises governments on building infrastructure and partnerships to further support private sector development.

The IFC’s Sustainability Framework articulates the Corporation’s strategic commitment to sustainable development and is an integral part of IFC’s approach to risk management. The Sustainability Framework comprises IFC’s Policy and Performance Standards on Environmental and Social Sustainability, and IFC’s Access to Information Policy. The Policy on Environmental and Social Sustainability describes IFC’s commitments, roles, and responsibilities related to environmental and social sustainability. IFC’s Access to Information Policy reflects IFC’s commitment to transparency and good governance on its operations and outlines the Corporation’s institutional disclosure obligations regarding its investment and advisory services. The Performance Standards (PSs) are directed towards clients, providing guidance on how to identify risks and impacts, and are designed to help avoid, mitigate, and manage risks and impacts as a way of doing business in a sustainable way, including stakeholder engagement and disclosure obligations of the client in relation to project-level activities. In the case of its direct investments (including project and corporate finance provided through financial intermediaries), IFC requires its clients to apply the PSs to manage environmental and social risks and impacts so that development opportunities are enhanced. IFC uses the Sustainability Framework along with other strategies, policies, and initiatives to direct the business activities of the Corporation to achieve its overall development objectives. The PSs may also be applied by other financial institutions (FIs).

The Project is considered a Category B project in terms of the IFC Policy on E&S Sustainability (2012), having the potential to cause limited adverse environmental or social risks and/or impacts that are few in number, generally site specific, largely reversible, and readily addressed through mitigation measures.

The objectives and applicability of the eight PSs are outlined in **Table 3-5.**

Table 3-5: IFC Performance Standards Applicability to the Project

REFERENCE	REQUIREMENTS	PROJECT SPECIFIC APPLICABILITY
Performance Standard 1: Assessment and Management of Environmental and Social Risks and Impacts		

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
Overview	Performance Standard 1 underscores the importance of managing environmental and social performance throughout the life of a project. An effective Environmental and Social Management System (ESMS) is a dynamic and continuous process initiated and supported by management, and involves engagement between the client, its workers, local communities directly affected by the project (the Affected Communities) and, where appropriate, other stakeholders.		
Objectives	— To identify and evaluate environmental and social risks and impacts of the project. — To adopt a mitigation hierarchy to anticipate and avoid, or where avoidance is not possible, minimize, and, where residual impacts remain, compensate/offset for risks and impacts to workers, Affected Communities, and the environment. — To promote improved environmental and social performance of clients through the effective use of management systems. — To ensure that grievances from Affected Communities and external communications from other stakeholders are responded to and managed appropriately. — To promote and provide means for adequate engagement with Affected Communities throughout the project cycle on issues that could potentially affect them and to ensure that relevant environmental and social information is disclosed and disseminated.		
Aspects	1.1	Policy	The IFC Standards state under PS 1 (Guidance Note 23) that "*the breadth, depth and type of analysis included in an ESIA must be proportionate to the nature and scale of the proposed project's potential impacts as identified during the course of the assessment process*." This document is the draft deliverable from the Scoping and EIA process undertaken for the proposed Project. The impact assessment comprehensively assesses the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition, an EMPr will be compiled during the EIA phase of the project.
	1.2	Identification of Risks and Impacts	
	1.3	Management Programmes	
	1.4	Organisational Capacity and Competency	
	1.5	Emergency Preparedness and Response	
	1.6	Monitoring and Review	
	1.7	Stakeholder Engagement	
	1.8	External Communication and Grievance Mechanism	
	1.9	Ongoing Reporting to Affected Communities	
Performance Standard 2: Labour and Working Conditions;			
Overview	Performance Standard 2 recognises that the pursuit of economic growth through employment creation and income generation should be accompanied by protection of the fundamental rights of workers.		
Objectives	— To promote the fair treatment, non-discrimination, and equal opportunity of workers. — To establish, maintain, and improve the worker-management relationship. — To promote compliance with national employment and labour laws. — To protect workers, including vulnerable categories of workers such as children, migrant workers, workers engaged by third parties, and workers in the client's supply chain. — To promote safe and healthy working conditions, and the health of workers. — To avoid the use of forced labour.		
Aspects	2.1	— Working Conditions and Management of Worker Relationship	The construction activities will require contractors for completion. A safe working environment and fair contractual agreements must be in place. The operational phase will have permanent employees

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
		— Human Resources Policy and Management — Working Conditions and terms of Engagement — Workers organisation — Non- Discrimination and Equal Opportunity — Retrenchment — Grievance Mechanism	for day-to-day activities as well as contractors who will all need a safe working environment and fair contractual agreements. Whilst PS2 will be applicable to the Project, it is not intended to be addressed in detail at the ESIA stage. Recommendations are provided concerning development of a detailed Human Resources (HR) and Occupational Health and Safety (OHS) system by the developer and its partners as the Project moves towards implementation. In addition, measures to address the Interim Advice for IFC Clients on Supporting Workers in the Context of COVID-19 are referenced. The EMPr will incorporate the requirements for compliance with local and international Labour and Working legislation and good practice on the part of the contractors.
	2.2	— Protecting the Workforce — Child Labour — Forced Labour	
	2.3	Occupational health and Safety	
	2.4	Workers Engaged by Third Parties	
	2.5	Supply Chain	
Performance Standard 3: Resource Efficiency and Pollution Prevention			
Overview	Performance Standard 3 recognises that increased economic activity and urbanisation often generate increased levels of pollution to air, water, and land, and consume finite resources in a manner that may threaten people and the environment at the local, regional, and global levels. There is also a growing global consensus that the current and projected atmospheric concentration of greenhouse gases (GHG) threatens the public health and welfare of current and future generations. At the same time, more efficient and effective resource use and pollution prevention and GHG emission avoidance and mitigation technologies and practices have become more accessible and achievable in virtually all parts of the world.		
Objectives	— To avoid or minimise adverse impacts on human health and the environment by avoiding or minimising pollution from project activities. — To promote more sustainable use of resources, including energy and water. — To reduce project related GHG emissions.		
Aspects	3.1	— Policy Resource Efficiency — Greenhouse Gases — Water Consumption	PS3-related impacts, such as the management of construction waste, hazardous substances, and stormwater are assessed in **Section 6** of this report. There are no material resource efficiency issues associated with the Project. The EMPr will include general resource efficiency measures. The project is not GHG emissions intensive and a climate resilience study or a GHG emissions-related assessment is not deemed necessary for a project of this nature. However, the Camden I GH&A Facility seeks to facilitate resource efficiency and pollution prevention by contributing to the South African green economy. Dust air pollution in the construction phase will be addressed in the EMPr. The Project will not result in the release of industrial effluents. Potential pollution associated with brine and sanitary wastewater is low and mitigation measures will be included in the EMPr. Land contamination of the site from historical land use (i.e. low intensity agricultural / grazing) is not considered to be a cause for concern. The waste generation profile of the project is not complex. Waste mitigation and management measures will be included in EMPr.
	3.2	— Pollution Prevention — Air Emissions — Stormwater — Waste Management — Hazardous Materials Management — Pesticide use and Management	

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
			The ammonia and hydrogen facilities as well as oxygen facilities will likely be Major Hazard Installations and will require a full quantitative risk assessment (QRA) that complies with SANS 1461: MHI QRA as well as an emergency response plan (ERP) that complies with SANS 1514: MHI Emergency Response Planning. Under the current MHI Regulations notification of various authorities and the public is required. The EMPr will also take anticipated hazardous materials into account and recommend relevant mitigation and management measures.
Performance Standard 4: Community Health, Safety, and Security			
Overview	Performance Standard 4 recognizes that project activities, equipment, and infrastructure can increase community exposure to risks and impacts.		
Objectives	— To anticipate and avoid adverse impacts on the health and safety of the Affected Community during the project life from both routine and non-routine circumstances. — To ensure that the safeguarding of personnel and property is carried out in accordance with relevant human rights principles and in a manner that avoids or minimizes risks to the Affected Communities.		
Aspects	4.1	— Community Health and Safety — Infrastructure and Equipment Design and Safety — Hazardous Materials Management and Safety — Ecosystem Services — Community Exposure to Disease — Emergency Preparedness and Response	The requirements included in PS 4 will be addressed in the S&EIA process and the development of the EMPr. During the construction phase there will be an increase in vehicular traffic along public roads, largely due to the need for importation of construction material. Pedestrian and road safety risks will be qualitatively evaluated in the S&EIA process and the clients' standard safety and security measures, as well as potential additional measures recommended by WSP, will be detailed in the EMPr.
	4.2	Security Personnel	
Performance Standard 5: Land Acquisition and Involuntary Resettlement			
Overview	Performance Standard 5 recognises that project-related land acquisition and restrictions on land use can have adverse impacts on communities and persons that use this land. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or other means of livelihood) as a result of project-related land acquisition and/or restrictions on land use.		
Objectives	— To avoid, and when avoidance is not possible, minimise displacement by exploring alternative project designs. — To avoid forced eviction. — To anticipate and avoid, or where avoidance is not possible, minimise adverse social and economic impacts from land acquisition or restrictions on land use by (i) providing compensation for loss of assets at replacement cost and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected. — To improve, or restore, the livelihoods and standards of living of displaced persons. — To improve living conditions among physically displaced persons through the provision of adequate housing with security of tenure at resettlement sites.		
Aspects	5.1	— Displacement — Physical Displacement	PS5 is not applicable to the proposed Camden I GH&A Facility as no physical or economic displacement or livelihood restoration will be required.

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
		— Economic Displacement — Private Sector Responsibilities under Government Managed Resettlement	The proposed Camden I GH&A Facility is located on privately owned land that is utilised for agriculture by the landowners. The significance of all potential agricultural impacts is kept low by the very small proportion of the land that is impacted.
Performance Standard 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources			
Overview	Performance Standard 6 recognizes that protecting and conserving biodiversity, maintaining ecosystem services, and sustainably managing living natural resources are fundamental to sustainable development.		
Objectives	— To protect and conserve biodiversity. — To maintain the benefits from ecosystem services. — To promote the sustainable management of living natural resources through the adoption of practices that integrate conservation needs and development priorities.		
Aspects	6.1	Protection and Conservation of Biodiversity	A significant part of the Project Area falls within CBAs (Irreplaceable and Optimal) and a large wetland area adjacent and to the north of the Vaal River (near the southern part of the site) is mapped as an ESA. A Biodiversity Impact Assessment as well as an Avifaunal Impact Assessment and Freshwater Ecology Impact Assessment have been included in the proposed scope. The methodologies for the specialist assessments include a combination of literature review, in-field surveys and sensitivity mapping. This substantively complies with the PS 6 general requirements for scoping and baseline assessment for determination of biodiversity and ecosystem services issues. The determination of habitat sensitivity was undertaken within the legal and best practice reference framework for South Africa. The prevalence of invasive alien species will be determined and mitigation and management measures will be included in the EMPr.
Performance Standard 7: Indigenous People			
Overview	Performance Standard 7 recognizes that Indigenous Peoples, as social groups with identities that are distinct from mainstream groups in national societies, are often among the most marginalized and vulnerable segments of the population. In many cases, their economic, social, and legal status limits their capacity to defend their rights to, and interests in, lands and natural and cultural resources, and may restrict their ability to participate in and benefit from development. Indigenous Peoples are particularly vulnerable if their lands and resources are transformed, encroached upon, or significantly degraded.		
Objectives	— To ensure that the development process fosters full respect for the human rights, dignity, aspirations, culture, and natural resource-based livelihoods of Indigenous Peoples. — To anticipate and avoid adverse impacts of projects on communities of Indigenous Peoples, or when avoidance is not possible, to minimize and/or compensate for such impacts. — To promote sustainable development benefits and opportunities for Indigenous Peoples in a culturally appropriate manner. — To establish and maintain an ongoing relationship based on Informed Consultation and Participation (ICP) with the Indigenous Peoples affected by a project throughout the project's life-cycle. — To ensure the Free, Prior, and Informed Consent (FPIC) of the Affected Communities of Indigenous Peoples when the circumstances described in this Performance Standard are present. — To respect and preserve the culture, knowledge, and practices of Indigenous Peoples.		
Aspects	7.1	General — Avoidance of Adverse Impacts — Participation and Consent	As per the international instruments under the United Nations (UN) Human Rights Conventions, no indigenous peoples are present within the study area. The Project does not involve displacement. PS7 will not be triggered.

REFERENCE	REQUIREMENTS		PROJECT SPECIFIC APPLICABILITY
	7.2	Circumstances Requiring Free, Prior, and Informed Consent — Impacts on Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use — Critical Cultural Heritage — Relocation of Indigenous Peoples from Lands and Natural Resources Subject to Traditional Ownership or Under Customary Use	
	7.3	Mitigation and Development Benefits	
	7.4	Private Sector Responsibilities Where Government is Responsible for Managing Indigenous Peoples Issues	
Performance Standard 8: Cultural Heritage			
Overview	Performance Standard 8 recognizes the importance of cultural heritage for current and future generations.		
Objectives	— To protect cultural heritage from the adverse impacts of project activities and support its preservation. — To promote the equitable sharing of benefits from the use of cultural heritage.		
Aspects	8.1	Protection of Cultural Heritage in Project Design and Execution	A desktop Heritage Scoping Report (**Appendix D**) has been carried out by a suitably qualified specialist, revealing that archaeological sites (Stone Age and Historic Archaeological), cultural heritage sites, burial grounds or isolated artifacts are unlikely to be present on the affected landscape. A Chance Find Procedure will be included in the EMPr during the EIA phase of the project.

3.4.2 WORLD BANK GROUP ENVIRONMENTAL HEALTH AND SAFETY GUIDELINES

In support of the Performance Standards, the World Bank Group (WBG) has published a number of Environmental Health and Safety (EHS) Guidelines. The EHS Guidelines are technical reference documents that address IFC's expectations regarding the industrial pollution management performance of its projects. They are designed to assist managers and decision makers with relevant industry background and technical information. This information supports actions aimed at avoiding, minimising, and controlling EHS impacts during the construction, operation, and decommissioning phase of a project or facility. The EHS Guidelines serve as a technical reference source to support the implementation of the IFC Performance Standards, particularly in those aspects related to PS3: Pollution Prevention and Abatement, as well as certain aspects of occupational and community health and safety.

Where host country regulations differ from the levels and measures presented in the EHS Guidelines, projects seeking international funding may be expected to achieve whichever is more stringent. If less stringent levels or measures are appropriate in view of specific project circumstances, a full and detailed justification for any proposed alternatives is required.

The following IFC / WBG EHS Guidelines have been generally consulted during the preparation of the EIA in order to aid the identification of EHS aspects applicable to the project:

- *Electric Power Transmission and Distribution (2007)* - information relevant to power transmission between a generation facility and a substation located within an electricity grid, in addition to power distribution from a substation to consumers located in residential, commercial, and industrial areas
- *General EHS Guidelines* (2007) – this includes a section on a range of environmental, occupational health and safety, community health and safety, and construction activities that would apply to the project. The guideline also contains recommended guidelines adopted form the World Health Organisation (WHO) for ambient air and water quality, which are referred to in the relevant impact assessment sections in the ESIA report. Some of the more relevant sub-sections include:
  - *Section 1.1 - Air Emissions and Ambient Air Quality* - This guideline applies to facilities or projects that generate emissions to air at any stage of the project life-cycle. This guideline provides an approach to the management of significant sources of emissions, including specific guidance for assessment and monitoring of impacts. It is also intended to provide additional information on approaches to emissions management in projects located in areas of poor air quality, where it may be necessary to establish project-specific emissions standards.
  - *Section 1.5 - Hazardous Materials Management* - These guidelines apply to projects that use, store, or handle any quantity of hazardous materials (Hazmats), defined as materials that represent a risk to human health, property, or the environment due to their physical or chemical characteristics. Hazmats can be classified according to the hazard as explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material; and corrosive substances. Guidance on the transport of hazardous materials is covered in Section 3 of this document.
  - *Section 2 - Occupational Health and Safety* - Employers and supervisors are obliged to implement all reasonable precautions to protect the health and safety of workers. This section provides guidance and examples of reasonable precautions to implement in managing principal risks to occupational health and safety. Although the focus is placed on the operational phase of projects, much of the guidance also applies to construction and decommissioning activities.
  - *Section 3.5 - Community Health and Safety – Transport of Hazardous Materials* - This section complements the guidance provided in the preceding environmental and occupational health and safety sections, specifically addressing some aspects of project activities taking place outside of the traditional project boundaries, but nonetheless related to the project operations, as may be applicable on a project basis.

3.4.3 EQUATOR PRINCIPLES

The Equator Principles (EPs) is a risk management framework, adopted by financial institutions, for determining, assessing, and managing environmental and social risk in projects and is primarily intended to provide a minimum standard for due diligence to support responsible risk decision-making.

The EPs apply globally to all industry sectors and to five financial products 1) Project Finance Advisory Services, 2) Project Finance, 3) Project-Related Corporate Loans, 4) Bridge Loans and 5) Project-Related Refinance and Project-Related Acquisition Finance. The relevant thresholds and criteria for application is described in detail in the Scope section of the EP. Currently 125 Equator Principles Financial Institutions (EPFIs) in 37 countries have officially adopted the EPs, covering the majority of international project finance debt within developed and emerging markets. EPFIs commit to implementing the EPs in their internal environmental and social policies, procedures and standards for financing projects and will not provide Project Finance or Project-Related Corporate Loans to projects where the client will not, or is unable to, comply with the EPs.

While the EPs are not intended to be applied retroactively, EPFIs apply them to the expansion or upgrade of an existing project where changes in scale or scope may create significant environmental and social risks and impacts, or significantly change the nature or degree of an existing impact. The EPs have greatly increased the attention and focus on social/community standards and responsibility, including robust standards for indigenous peoples, labour standards, and consultation with locally affected communities within the Project Finance market.

The EPs have also helped spur the development of other responsible environmental and social management practices in the financial sector and banking industry and have supported member banks in developing their own Environmental and Social Risk Management Systems.

The requirements and applicability of the EPs are outlined in **Table 3-6**.

It should be noted that Principles 8 and 10 relate to a borrower's code of conduct and are therefore not considered relevant to the S&EIA process and have not been included in this discussion.

Table 3-6: Requirements and Applicability of the Equator Principles

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
Principle 1: Review and Categorisation		
Overview	When a project is proposed for financing, the EPFI will, as part of its internal social and environmental review and due diligence, categorise such project based on the magnitude of its potential impacts and risks in accordance with the environmental and social screening criteria of the IFC. Using categorisation, the EPFI's environmental and social due diligence is commensurate with the nature, scale, and stage of the Project, and with the level of environmental and social risks and impacts. The categories are: – Category A: Projects with potential significant adverse environmental and social risks and/or impacts that are diverse, irreversible or unprecedented; – Category B: Projects with potential limited adverse environmental and social risks and/or impacts that are few in number, generally site-specific, largely reversible and readily addressed through mitigation measures; and – Category C: Projects with minimal or no adverse environmental and social risks and/or impacts.	Based upon the significance and scale of the Project's environmental and social impacts, the proposed project is regarded as a Category B project i.e. a project with potential limited adverse environmental or social risks and/or impacts that are few in number, generally site-specific, largely reversible, and readily addressed through mitigation measures.
Principle 2: Environmental and Social Assessment		
Overview	For all Category A and Category B Projects, the EPFI will require the client to conduct an appropriate Assessment process to address, to the EPFI's satisfaction, the relevant environmental and social risks and scale of impacts of the proposed Project (which may include the illustrative list of issues found in Exhibit II). The Assessment Documentation should propose measures to minimise, mitigate, and where residual impacts remain, to compensate/ offset/ remedy for risks and impacts to Workers, Affected Communities, and the environment, in a manner relevant and appropriate to the nature and scale of the proposed Project. The Assessment Documentation will be an adequate, accurate and objective evaluation and presentation of the environmental and social risks and impacts, whether prepared by the client, consultants or external experts. For Category A, and as appropriate, Category B Projects, the Assessment Documentation includes an Environmental and Social Impact Assessment (ESIA). One or more specialised studies may also need to be undertaken. For other Category B and potentially C Projects, a limited or focused environmental or social assessment may be appropriate, applying applicable risk management standards relevant to the risks or impacts identified during the categorisation process.	This document is the first draft deliverable (i.e. Draft Scoping Report) from the S&EIA process undertaken for the proposed Project. The impact assessment will be undertaken during the next phase of the S&EIA process. The assessment will comprehensively assess the key environmental and social impacts and complies with the requirements of the South African EIA Regulations. In addition, an EMPr will also be compiled.

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
	The client is expected to include assessments of potential adverse Human Rights impacts and climate change risks as part of the ESIA or other Assessment, with these included in the Assessment Documentation.	
Principle 3: Applicable Environmental and Social Standards		
Overview	The Assessment process should, in the first instance, address compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues. The EPFI's due diligence will include, for all Category A and Category B Projects globally, review and confirmation by the EPFI of how the Project and transaction meet each of the Principles. For Projects located in Non-Designated Countries, the Assessment process evaluates compliance with the then applicable IFC PS and WBG EHS Guidelines. For Projects located in Designated Countries, compliance with relevant host country laws, regulations and permits that pertain to environmental and social issues.	As South Africa has been identified as a non-designated country, the reference framework for environmental and social assessment is based on the IFC PS. In addition, this S&EIA process has been undertaken in accordance with NEMA (the host country's relevant legislation).
Principle 4: Environmental and Social Management System and Equator Principles Action Plan		
Overview	For all Category A and Category B Projects, the EPFI will require the client to develop or maintain an Environmental and Social Management System (ESMS). Further, an Environmental and Social Management Plan (ESMP) will be prepared by the client to address issues raised in the Assessment process and incorporate actions required to comply with the applicable standards. Where the applicable standards are not met to the EPFI's satisfaction, the client and the EPFI will agree on an Equator Principles Action Plan (EPAP). The EPAP is intended to outline gaps and commitments to meet EPFI requirements in line with the applicable standards.	A formal project specific ESMS will be compiled in the event that the project is developed in the future. Management and monitoring plans outlines in the EMPr will serve as the basis for an ESMS for the proposed Project.
Principle 5: Stakeholder Engagement		
Overview	EPFI will require the client to demonstrate effective Stakeholder Engagement as an ongoing process in a structured and culturally appropriate manner with Affected Communities Workers and, where relevant, Other Stakeholders. For Projects with potentially significant adverse impacts on Affected Communities, the client will conduct an Informed Consultation and Participation process. To accomplish this, the appropriate assessment documentation, or non-technical summaries thereof, will be made available to the public by the borrower for a reasonable minimum period in the relevant local language and in a culturally appropriate manner. The borrower will take account of and document the process and results of the consultation, including any actions agreed resulting from the consultation. Disclosure of environmental or social risks and adverse impacts should occur early in the Assessment process,	The S&EIA process includes an extensive stakeholder engagement process which complies with the South African EIA Regulations. The process includes consultations with local communities, nearby businesses, and a range of government sector stakeholders (state owned enterprises, national, provincial and local departments). The stakeholder engagement process solicits interest from potentially interested parties through the placement of site notices and newspaper advertisements as well as written and telephonic communication. The stakeholder engagement process is detailed in **Section 4.6.**

REQUIREMENT		PROJECT SPECIFIC APPLICABILITY
	in any event before the Project construction commences, and on an ongoing basis. All Projects affecting Indigenous Peoples will be subject to a process of Informed Consultation and Participation, and will need to comply with the rights and protections for Indigenous Peoples contained in relevant national law, including those laws implementing host country obligations under international law.	
Principle 6: Grievance Mechanism		
Overview	For all Category A and, as appropriate, Category B Projects, the EPFI will require the client, as part of the ESMS, to establish effective grievance mechanisms which are designed for use by Affected Communities and Workers, as appropriate, to receive and facilitate resolution of concerns and grievances about the Project's environmental and social performance. The borrower will inform the Affected Communities and Workers about the grievance mechanism in the course of the stakeholder engagement process and ensure that the mechanism addresses concerns promptly and transparently, in a culturally appropriate manner, and is readily accessible, at no cost, and without retribution to the party that originates the issue or concern.	The EMPr will include a *Grievance Mechanism Process for Public Complaints and Issues*. This procedure effectively allows for external communications with members of the public to be undertaken in a transparent and structured manner.
Principle 7: Independent Review		
Overview	For all Category A and, as appropriate, Category B Projects, an Independent Environmental and Social Consultant, not directly associated with the client, will carry out an Independent Review of the Assessment Documentation including the ESMPs, the ESMS, and the Stakeholder Engagement process documentation in order to assist the EPFI's due diligence, and assess Equator Principles compliance.	This principle will only become applicable in the event that that the project is developed in the future.
Principle 9: Independent Monitoring and Reporting		
Overview	To assess Project compliance with the Equator Principles after Financial Close and over the life of the loan, the EPFI will require independent monitoring and reporting for all Category A, and as appropriate, Category B projects. Monitoring and reporting should be provided by an Independent Environmental and Social Consultant; alternatively, the EPFI will require that the client retain qualified and experienced external experts to verify its monitoring information, which will be shared with the EPFI in accordance with the frequency required.	This principle will only become applicable in the event that that the project is developed in the future.

4 SCOPING METHODOLOGY

The scoping process was initiated in accordance with Appendix 2 of GNR 982, as amended, pertaining to applications subject to an S&EIR process.

4.1 S&EIR PROCESS AND PHASING

The S&EIR process consists of various phases with associated timelines as defined in GNR 982. The process can generally be divided into four main phases, namely; (i) a Pre-application Phase, (ii) an Application and Scoping Phase (current phase), (iii) an Impact Assessment Phase and (iv) Authorisation and Appeal Phase. The S&EIR process is shown in **Figure 4-1**.

The main objectives of the phases can be described as follows:

- Pre-Application Phase:
  - Undertake consultation meetings with the relevant authorities to confirm the required process, the general approach to be undertaken and to agree on the public participation plan;
  - Identify stakeholders, including neighbouring landowners/residents and relevant authorities;
- Application and Scoping Phase:
  - Compile and submit application forms to the CA and pay the relevant application fees;
  - Compile a Draft Scoping Report (DSR) describing the affected environment and present an analysis of the potential environmental issues and benefits arising from the proposed project that may require further investigation in the Impact Assessment Phase;
  - Develop draft terms of reference for the specialist studies to be undertaken in the Impact Assessment Phase; and
  - Inform stakeholders of the proposed project, feasible alternatives and the S&EIR process and afford them the opportunity to register and participate in the process and identify any issues and concerns associated with the proposed project.
  - Incorporate comments received from stakeholders during the DSR comment period;
  - Should significant amendments be required, release the updated DSR for a 30-day comment period to provide stakeholders with the opportunity to review the amendments as well as provide additional input if required; and
  - Submit the Final Scoping Report (FSR), following the consultation period, to the relevant authorities, in this case the MDARDLEA, for acceptance/rejection.
- Impact Assessment Phase:
  - Continue to inform and obtain contributions from stakeholders, including relevant authorities, stakeholders, and the public and address their relevant issues and concerns;
  - Assess in detail the potential environmental and socio-economic impacts of the project as defined in the DSR;
  - Identify environmental and social mitigation measures to avoid and/or address the identified impacts;
  - Develop and/or amend environmental and social management plans based on the mitigation measures developed in the Environmental Impact Assessment Report (EIAR);
  - Submit the EIAR and the associated EMPr to the CA to undertake the decision making process;
  - Authorisation and Appeal Phase;
  - The MDARDLEA to provide written notification of the decision to either grant or refuse EA for the proposed project; and
  - Notify all registered stakeholders of the decision and right to appeal.

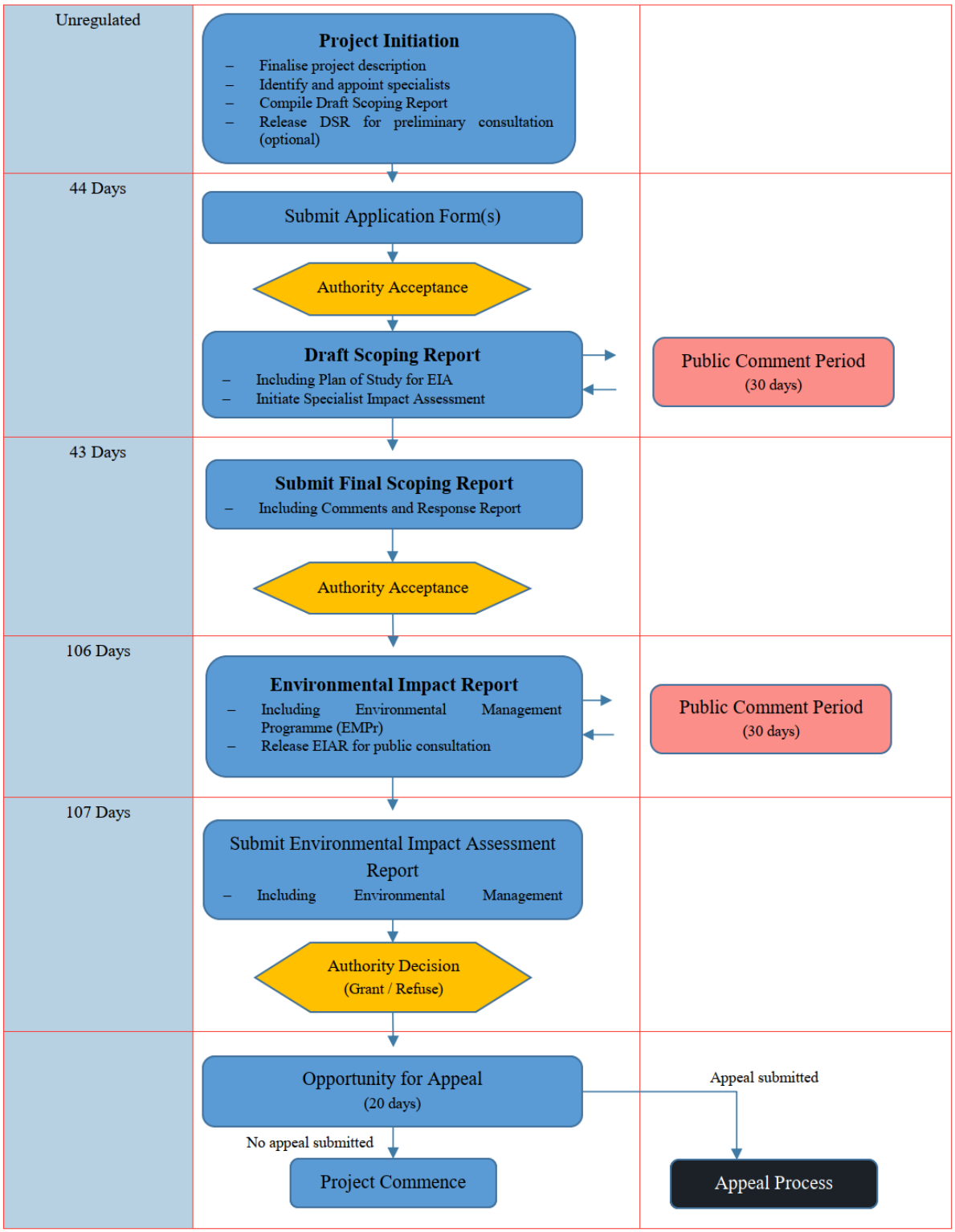


Figure 4-1: S&EIR Process

4.2 DFFE WEB-BASED ENVIRONMENTAL SCREENING TOOL

DFFE has developed the National Web-based Environmental Screening Tool in order to flag areas of potential environmental sensitivity related to a site as well as a development footprint and produces the screening report required in terms of regulation 16 (1)(v) of the EIA Regulations (2014, as amended). The *Notice of the requirement to submit a report generated by the national web-based environmental screening tool in terms of section 24(5)(h) of the NEMA, 1998 (Act No 107 of 1998) and regulation 16(1)(b)(v) of the EIA regulations, 2014, as amended* (GN 960 of July 2019) states that the submission of a report generated from the national web-based environmental screening tool, as contemplated in Regulation 16(1)(b)(v) of the EIA Regulations, 2014, published under Government Notice No. R982 in Government Gazette No. 38282 of 4 December 2014, as amended, is compulsory when submitting an application for environmental authorisation in terms of regulation 19 and regulation 21 of the EIA Regulations, 2014 as of 04 October 2019.

The Screening Report generated by the National Web-based Environmental Screening Tool contains a summary of any development incentives, restrictions, exclusions or prohibitions that apply to the proposed development footprint as well as the most environmentally sensitive features on the footprint based on the footprint sensitivity screening results for the application classification that was selected.

A screening report for the proposed Camden I GH&A Facility was generated on 15 September 2021 and is attached as **Appendix E**. The Screening Report for the project identified various sensitivities for the site. The report also generated a list of specialist assessments that should form part of the BA based on the development type and the environmental sensitivity of the site. Assessment Protocols in the report provide minimum information to be included in a specialist report to facilitate decision-making.

Table 4-1 below provides a summary of the sensitivities identified for the development footprint.

Table 4-1: Sensitivities identified in the screening report

THEME	VERY HIGH SENSITIVITY	HIGH SENSITIVITY	MEDIUM SENSITIVITY	LOW SENSITIVIY
Agricultural Theme	✓			
Animal Species Theme		✓		
Aquatic Biodiversity Theme	✓			
Archaeological and Cultural Heritage Theme				✓
Civil Aviation Theme				✓
Defence Theme				✓
Palaeontology Theme	✓			
Plant Species Theme			✓	
Terrestrial Biodiversity Theme	✓			

Based on the selected classification, and the environmental sensitivities of the proposed development footprint, the following list of specialist assessments have been identified for inclusion in the assessment report as

determined by the screening tool (please refer to Section 4.2.1 below for the EAP motivation applicable to this list):

- Agricultural Impact Assessment
- Landscape/Visual Impact Assessment
- Archaeological and Cultural Heritage Impact Assessment
- Palaeontology Impact Assessment
- Terrestrial Biodiversity Impact Assessment
- Freshwater Impact Assessment (including aquatic biodiversity and hydrology)
- Avifauna Impact Assessment
- Social Impact Assessment
- A Geotechnical Assessment
- Plant Species Assessment
- Animal Species Assessment

4.2.1 MOTIVATION FOR SPECIALIST STUDIES

The report recognises that "it is the responsibility of the EAP to confirm this list and to motivate in the assessment report, the reason for not including any of the identified specialist study including the provision of photographic evidence of the footprint situation."

As summarised in **Table 1-4** above, the following specialist assessments have been commissioned for the project based on the environmental sensitivities identified by the Screening Report:

- Soils and Agricultural Potential Assessment;
- Archaeological and Cultural Heritage Assessment;
- Palaeontology Impact Assessment;
- Visual Impact Assessment;
- Biodiversity Impact Assessment (inclusive of terrestrial biodiversity, plant species and animal species);
- Freshwater Assessment;
- Avifauna Impact Assessment;
- Environmental Acoustic (Noise) Impact Assessment;
- Social Impact Assessment;
- Qualitative Risk Assessment (specific to the BESS);
- Desktop Geotechnical Assessment; and
- Desktop Traffic Assessment.

Four of the identified specialist studies will not be undertaken as part of the S&EIA process for the proposed Camden I GH&A Facility. Motivation for the exclusion of these specialist studies is provided below:

- **Detailed Geotechnical**

  A desktop Geotechnical Assessment has been commissioned and has been incorporated into the DSR. However, a detailed Geotechnical Assessment will not be undertaken as part of the S&EIA Process as this will be undertaken during the detailed design phase.

- **Civil Aviation**

  According to the DFFE Screening Tool Report, civil aviation is regarded as having low sensitivity. The proposed development site is located between 8 and 15 km of civil aviation aerodromes. A formal Civil Aviation Assessment will not be undertaken as part of the S&EIA Process. Nevertheless, the relevant Authorities will be included on the project stakeholder database.

- **Defence**

  The Department of Defence will be included on the project stakeholder database. They will be informed of the proposed Project, and comment will be sought from this authority as applicable.

4.3 APPLICATION

The application phase consists of the completion of the appropriate application form by the EAP and the Proponent as well as the subsequent submission and registration of the application for EA with MDARDLEA.

A virtual pre-application meeting was held on **4 November 2021**with the MDARDLEA to discuss the proposed Camden I GH&A Facility project. The minutes of the meeting (inclusive of the proposed public participation plan) are included in **Appendix F**.

4.4 BASELINE ENVIRONMENTAL ASSESSMENT

The description of the baseline environment has been compiled through a combination of site investigations, desktop reviews, georeferenced data and information obtained from the specialist assessments.

An understanding of the receiving environment is critical in order to identify aspects that may be affect by the project and in turn how the surrounding environment may affect project design considerations.

4.5 IDENTIFICATION AND EVALUATION OF POTENTIALLY SIGNIFICANT IMPACTS

The potential impacts associated with the proposed development were determined at both a desktop level based on existing information, as well as the field assessment. The following methodology was used:

- Identify potential sensitive environments and receptors that may be impacted on by the proposed development;
- Identify the type of impacts that are most likely to occur (including cumulative impacts);
- Determine the nature and extent of the potential impacts during the various developmental phases, including, construction, operation and decommissioning;
- Identify potential No-Go areas (if applicable); and
- Summarise the potential impacts that will be considered further in the EIA phase through detailed specialist studies.

Appendix 2 of GNR 982, as amended, requires the identification of the significance of potential impacts during scoping. To this end, an impact screening tool has been used in the scoping phase. The screening tool is based on two criteria, namely probability; and, consequence (

Table 4-4), where the latter is based on general consideration to the intensity, extent, and duration.

The scales and descriptors used for scoring probability and consequence are detailed in **Table 4-2** and

Table 4-3 respectively.

Table 4-2: Significance Screening Tool

CONSEQUENCE SCALE

PROBABILITY SCALE		1	2	3	4
	1	Very Low	Very Low	Low	Medium
	2	Very Low	Low	Medium	Medium
	3	Low	Medium	Medium	High
	4	Medium	Medium	High	High

Table 4-3: Probability Scores and Descriptors

SCORE	DESCRIPTOR
4	**Definite**: The impact will occur regardless of any prevention measures
3	**Highly Probable**: It is most likely that the impact will occur
2	**Probable**: There is a good possibility that the impact will occur
1	**Improbable:** The possibility of the impact occurring is very low

Table 4-4: Consequence Score Descriptions

SCORE	NEGATIVE	POSITIVE
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.
3	Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
2	Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e. beneficial) or negative (-ve) (i.e. harmful) to the receiving environment/receptor. For ease of reference, a colour reference system (**Table 4-5**) has been applied according to the nature and significance of the identified impacts.

Table 4-5: Impact Significance Colour Reference System to Indicate the Nature of the Impact

Negative Impacts (-ve)	Positive Impacts (+ve)
Negligible	**Negligible**
Very Low	**Very Low**
Low	**Low**

Negative Impacts (-ve)	Positive Impacts (+ve)
Medium	**Medium**
High	**High**

4.6 STAKEHOLDER ENGAGEMENT

Stakeholder engagement (public participation) is a requirement of the S&EIA process. It consists of a series of inclusive and culturally appropriate interactions aimed at providing stakeholders with opportunities to express their views, so that these can be considered and incorporated into the S&EIA decision-making process. Effective engagement requires the prior disclosure of relevant and adequate project information to enable stakeholders to understand the risks, impacts, and opportunities of the proposed project. The objectives of the stakeholder engagement process can be summarised as follows:

- Identify relevant individuals, organisations and communities who may be interested in or affected by the proposed project;
- Clearly outline the scope of the proposed project, including the scale and nature of the existing and proposed activities;
- Identify viable proposed project alternatives that will assist the relevant authorities in making an informed decision;
- Identify shortcomings and gaps in existing information;
- Identify key concerns, raised by Stakeholders that should be addressed in the specialist studies;
- Highlight the potential for environmental impacts, whether positive or negative; and
- To inform and provide the public with information and an understanding of the proposed project, issues, and solutions.

It is important to note that since the proposed five projects associated with the Camden Renewable Energy Complex, subject to a S&EIA Process, are located within the same geographical area, an integrated stakeholder engagement process (public participation) will be undertaken for these projects. A Stakeholder Engagement Report (SER) will be compiled and included in the FSR detailing the projects' compliance with Chapter 6 of the NEMA EIA Regulations 2014, as amended.

4.6.1 PUBLIC PARTICIPATION PLAN

As part of the pre-application consultation meeting held with MDARDLEA on 4 November 2021, the proposed plan for public participation was discussed and agreed. A formal public participation plan was also submitted to the DFFE, with reference to the rest of the projects included in the Camden Renewable Energy Complex for approval. The formal public participation plan was approved by DFFE on **22 November 2021**. The approved public participation plan is included in **Appendix F**.

4.6.2 STAKEHOLDER IDENTIFICATION

Stakeholders were identified and will continue to be identified through several mechanisms. These include:

- Utilising existing databases from other projects in the area;
- Networking with local business owners, non-governmental agencies, community based organisations, and local council representatives;
- Field work in and around the project area;
- Advertising in the press;
- Placement of community notices;
- Completed comment sheets; and

— Attendance registers at meetings.

All Stakeholders identified to date have been registered on the project stakeholder database. The EAP endeavoured to ensure that individuals/organisations from referrals and networking were notified of the Proposed Project. Stakeholders were identified at the horizontal (geographical) and vertical extent (organisations level).

A list of stakeholders captured in the project database is included in **Appendix G-1**.

4.6.3 STAKEHOLDER NOTIFICATION

DIRECT NOTIFICATION

Notification of the proposed Project will be issued to potential Stakeholders, via direct correspondence (i.e. site notices and e-mail) on **25 February 2022**. The notification letter to be circulated is included in **Appendix G-2** of this report. Proof of notification will be included in the FSR.

NEWSPAPER ADVERTISEMENTS

In accordance with the requirements of GNR 982, as amended, the proposed project was advertised in two local newspapers. The purpose of the advertisement was to notify the public about the proposed project and to invite them to register as stakeholders. A copy of the advertisements are included in **Appendix G-3**. The relevant scoping phase advertisement dates are listed in **Table 4-6**.

Table 4-6: Dates on which the Adverts were published

NEWSPAPER	PUBLICATION DATE	LANGUAGE
Standerton Advertiser	**25 February 2022**	English and Zulu
Highvelder	**25 February 2022**	Afrikaans

SITE NOTICES

The official site notices will be erected as per GNR 982, as amended, on the boundary fence of the proposed site. In addition, general project notices, announcing the Proposed Project and inviting stakeholders to register, will be placed at various locations in and around the project area. A copy of the site notice is included in **Appendix G-4.**

4.6.4 PUBLIC REVIEW

The DSR will be placed on public review for a period of 30 days from **25 February 2022** to **28 March 2022**, at the following public places:

— Gert Sibande District Municipality;
— Ermelo Public Library;
— Thusiville Public Library;
— Msukaligwa Local Municipality Ermelo Office;
— WSP website (https://www.wsp.com/en-ZA/services/public-documents); and
— Datafree Website (https://wsp-engage.com/).

4.6.5 COMMENT AND RESPONSE REPORT

All concerns, comments, viewpoints and questions (collectively referred to as 'issues') received during the comment period will be documented and responded to adequately in a Comment and Response Report (CRR) to be included in the FSR. Where comments are project specific, this will be noted in the Comments and Response Report (CRR). The CRR records the following:

- List of all issues raised;
- Record of who raised the issues;
- Record of where the issues were raised;
- Record of the date on which the issue was raised; and
- Response to the issues.

4.6.6 WAY FORWARD

FINAL SCOPING REPORT SUBMISSION

All issues raised during the scoping phase of the proposed project will be incorporated into the FSR and will be addressed during the EIR Phase.

The MDARDLEA will be allocated 43 days to review the FSR. The FSR will be placed on stakeholder review for a reasonable time period during the MDARDLEA's final review and decision-making process. The delegated CA must within this specified timeframe issue a decision on whether to proceed onto the next phase, the EIR phase

ONGOING CONSULTATION AND ENGAGEMENT

In addition to the public documents distributed to stakeholders, there will be ongoing communication between the proponent, the WSP and stakeholders throughout the S&EIR process. These interactions include the following:

- In addition to the project announcement letters, a letter will be sent out to all registered stakeholders providing them with an update of the proposed project once the FSR has been approved;
- Interactions with stakeholders will take place in English, Afrikaans and Zulu;
- Feedback to stakeholders, individually and collectively;
- Written responses (email, faxes or letters) will be provided to stakeholders acknowledging issues and providing information requested (dependent on availability); and
- As per the GNR 982, as amended, particular attention will be paid to landowners, and neighbouring communities, specifically where literacy levels and language barriers may be an issue.

5 DESCRIPTION OF BASELINE ENVIRONMENT

5.1 PHYSICAL ENVIRONMENT

5.1.1 CLIMATE AND METEOROLOGY

LOCAL METEOROLOGY OVERVIEW

According to the Köppen-Geiger Classification, the Camden/Ermelo area is classified as having a temperate climate with summer rainfall and dry winters. Meteorological variables, including hourly temperature, rainfall, humidity, wind speed and wind direction, were sourced for the South African Weather Service (SAWS) Ermelo ambient air quality monitoring (AAQM) station as well as Eskom's ambient air quality monitoring station (AQMS)[8] located ~6 km to the northeast. The datasets were analysed for the period January 2018 – December 2020 (i.e. three calendar years as required by the Regulations Regarding Air Dispersion Modelling[9], hereafter referred to as 'the Modelling Regulations'). The Ermelo AAQM station is located approximately 20 km to the northwest of the project site. Station details and data recovery information for the assessed period is given in **Table 12**.

Table 5-1 Details of the Ermelo AAQMI station

STATION NAME	LATITUDE (^{O}S)	LONGITUDE (^{O}E)	ALTITUDE (M)	DATA RECOVERY		
				Temperature	Rainfall	Wind
Ermelo	-26.497000°	29.983000°	1752	97%	98%	98%
Camden	-26.622600°	30.106000°	1646	97%	97%	96%

TEMPERATURE AND RAINFALL

Figure 5-1 and **Figure 5-2** presents average monthly temperature, rainfall and humidity as recorded at the Ermelo and Camden stations respectively. Both stations exhibit seasonal trends typical for the eastern half of South Africa. Higher rainfall occurs during the warmer summer months (December, January and February), with drier conditions during cooler winter months (June, July and August). Summer temperatures for the region average at 17.8°C while winter temperatures average at 11.0°C. Ermelo received 1 806 mm of rainfall over the three-year period, with approximately 49% of that received during the summer months and 3% during the winter months.

[8] This station's main function is the measurement of ambient air pollution, however, the station also measures an array of meteorological parameters. The nearest standalone SAWS meteorological station is Witbank (over 50 km to the north-northwest of the development site) and thus not representative of site conditions.

[9] Department of Environmental Affairs (2014): Regulations Regarding Air Dispersion Modelling (No. R. 533), Government Gazette, 11 July 2014, (No. 37804).

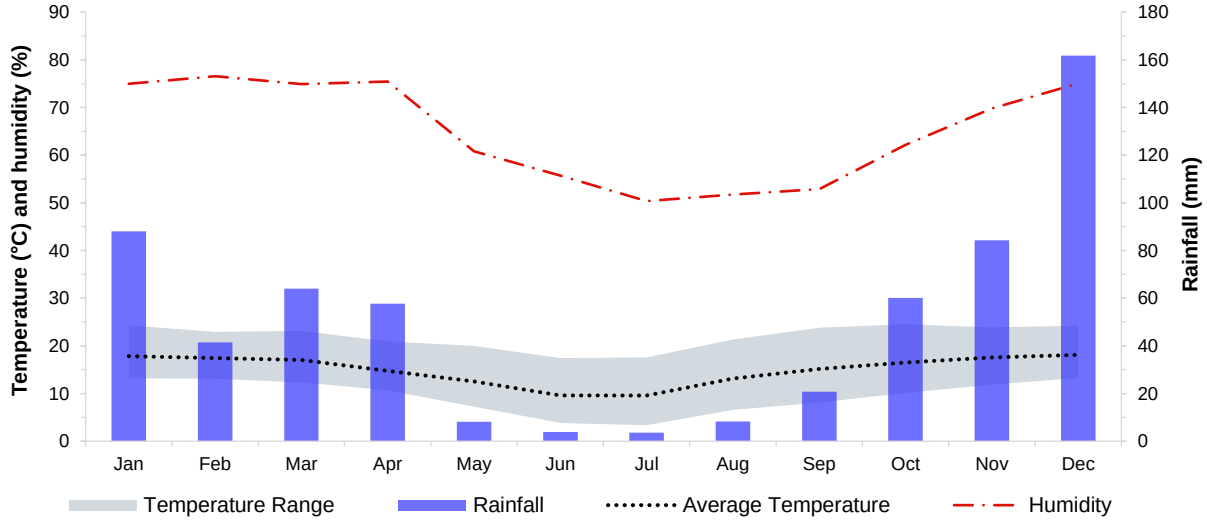


Figure 5-1 Meteorological summary for Ermelo (January 2018 - December 2020)

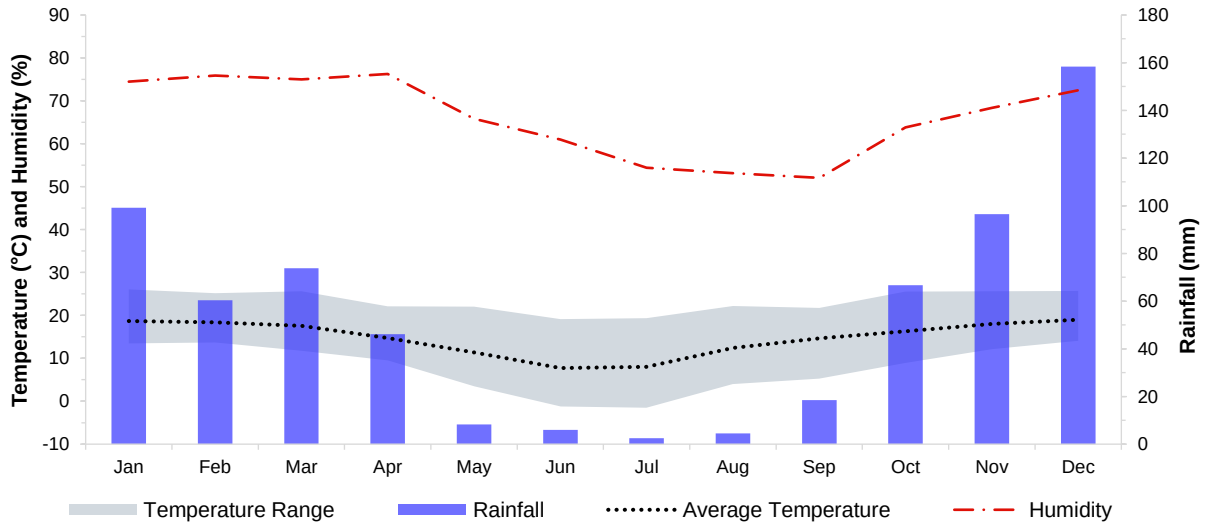


Figure 5-2: Meteorological summary for Camden (January 2018 - December 2020)

WIND

Wind roses summarize wind speed and directional frequency at a location. Calm conditions are defined as wind speeds less than 1.0 m/s (i.e. based on the typical sensitivity of the wind sensor installed at SAWS stations). Each directional branch on a wind rose represents wind originating from that direction. Each directional branch is divided into segments of colour, each representative of different wind speeds.

Typical wind fields are analysed for the full period (January 2018 – December 2020); diurnally for early morning (00h00–06h00), morning (06h00–12h00), afternoon (12h00–18h00) and evening (18h00–00h00); and seasonally for summer (December, January and February), autumn (March, April and May), winter (June, July and August) and Spring (September, October and November). Typical wind fields have been analysed using Lakes Environmental WRPlot Freeware (Version 7.0.0)

Wind roses for Ermelo are presented in **Figure 5-3**.

- Calm conditions (wind speeds <1.0 m/s) occurred 1.40% of the time;
- Moderate to strong easterlies and east-southeasterlies prevailed in the region;
- Peak (14 m/s) wind speeds occurred from the north-northwest;
- Winds from the east-northeast and north prevailed during the early morning (00h00 – 06h00);

- Easterly winds with components from the north-westerly quadrant prevailed during the morning (06h00 – 12h00);
- Winds from the west, west-northwest, northwest, east-southeast and east prevailed in the afternoon (12h00 – 18h00). Diurnal peak (12.9 m/s) wind speeds occurred during the afternoon;
- Easterlies prevail during the night (18h00 – 00h00);
- Winds from the east prevailed during the spring, summer and autumn months;
- Westerlies and north-north westerlies prevail during winter with higher directional variability noted for this period; and
- Highest average wind speeds of 4.9 m/s were observed during the spring months, with peak seasonal wind speeds of 12.9 m/s observed during winter.

Wind roses for Camden are presented in **Figure 5-4**.

- Calm conditions (wind speeds <1 m/s) occurred 14.13% of the time;
- Gentle to strong breezes from the east prevailed in the region;
- Peak (13.8 m/s) and highest average (5.5 m/s) wind speeds occurred from the west;
- Easterly winds prevail throughout the day and night with northwesterly components noted during the early morning (00h00-06h00), morning (06h00-12h00) and night-time (18h00-00h00) hours, as well as westerly components noted during the afternoon (12h00-18h00);
- Diurnal peak (13.3 m/s) and highest average (5.0 m/s) wind speeds occurred during the afternoon;
- Winds from the east prevailed during the spring and autumn months;
- Winds from the northwest, west-northwest, west and east prevailed during winter;
- Winds from the east and northwest prevailed during spring; and
- Seasonal peak (13.3 m/s) wind speeds occur during winter and highest average (4.0 m/s) wind speeds occur during spring

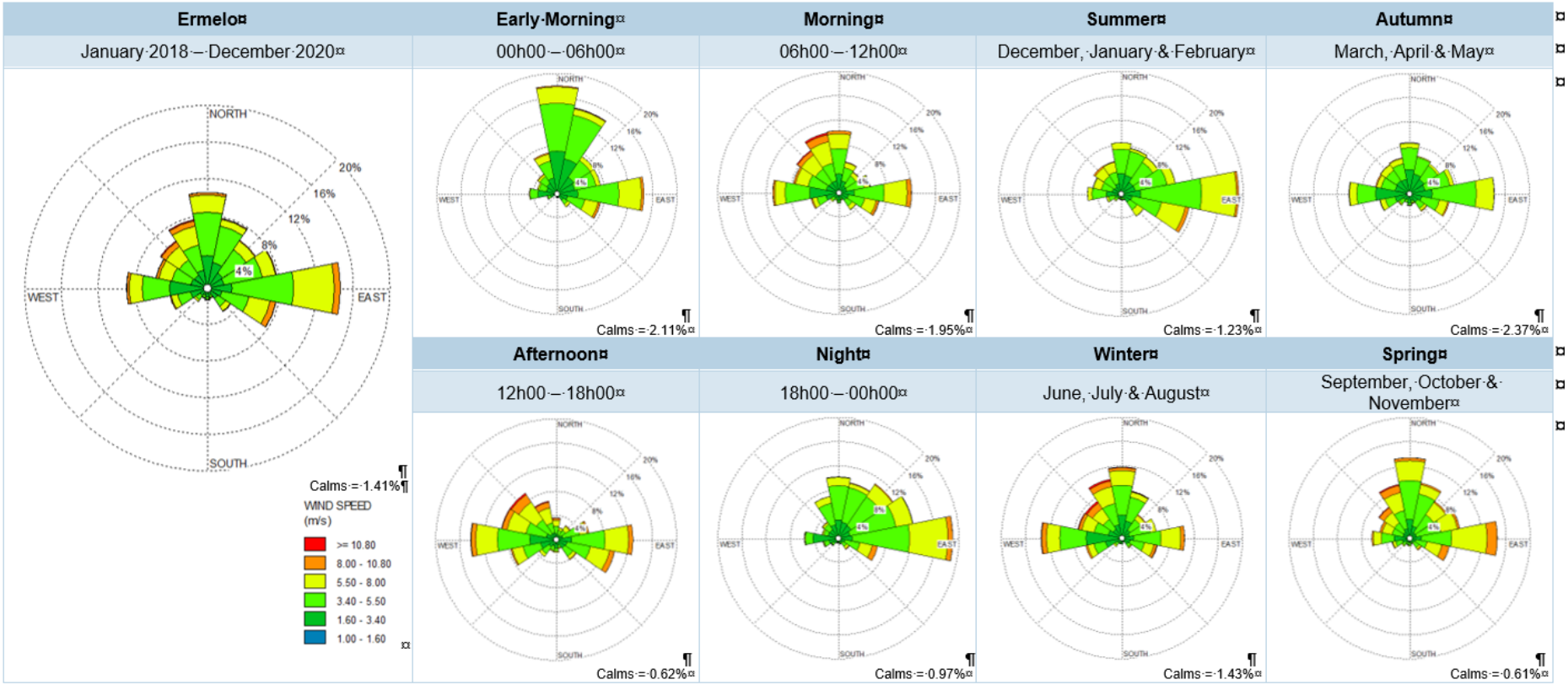


Figure 5-3: Local Wind Conditions at Ermelo

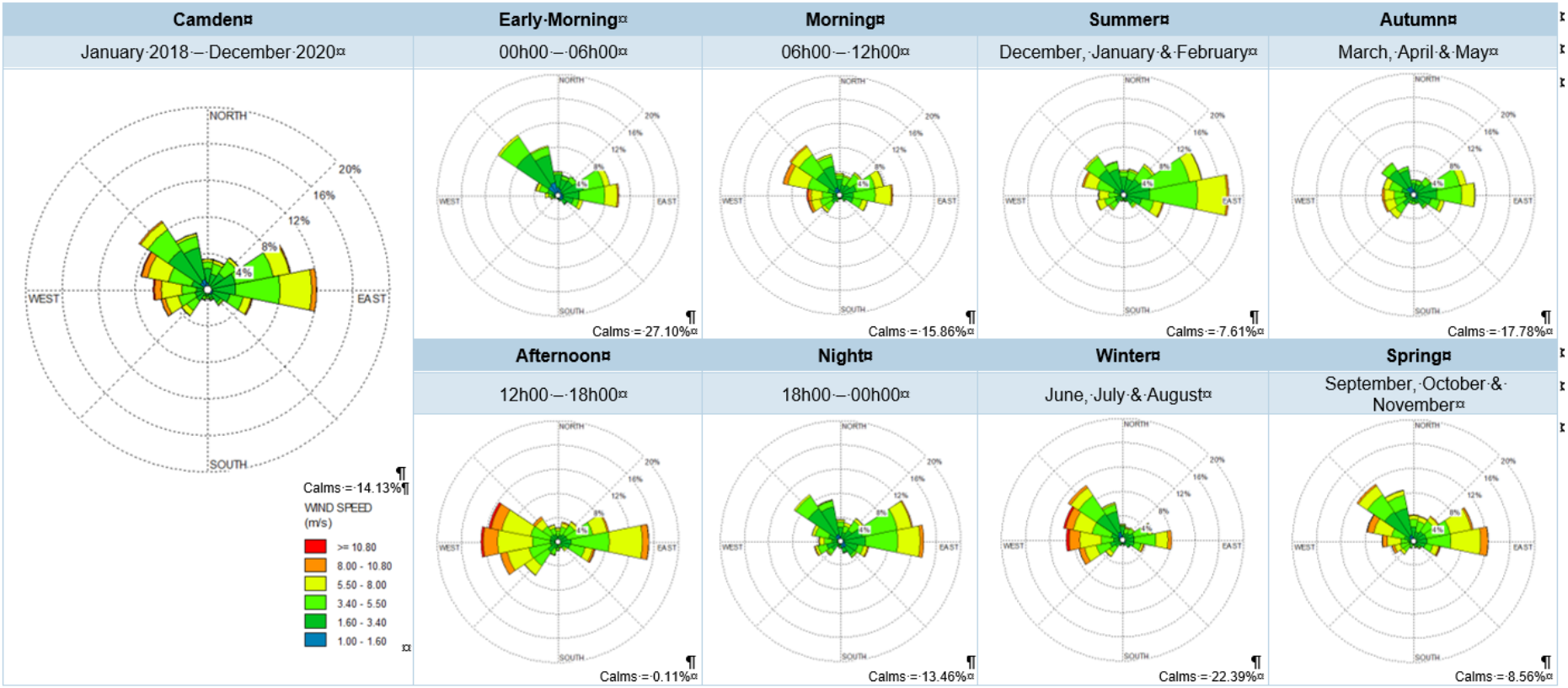


Figure 5-4: Local Wind Conditions at Camden

5.1.2 BACKGROUND AIR QUALITY

An evaluation of the existing air pollution situation provides an understanding of the potential risk for health impacts. The DFFE has identified District and Metropolitan Municipalities of concern with respect to air quality based on the prevalence of sources of emissions for each source category[10]. The National Framework for Air Quality Management in the Republic of South Africa[11] (hereafter referred to as '*The National Framework*') has rated the Gert Sibande District Municipality, as having "poor" air quality. The District area is thus identified as being in either the upper range of prevalence for one or more emission source categories[12] or middle range in two or more categories relative to other Districts. Municipalities that are classified as having poor air quality require priority attention in terms of air quality management planning.

The development site falls within one of South Africa's key air quality regions known as the Highveld Priority Area (HPA). The Highveld area is associated with poor air quality and elevated concentrations of criteria pollutants due to the high volume of both industrial and non-industrial emission sources. The HPA was declared on 23 November 2007, covers an area of 31,106 km2 and encompasses multiple municipal jurisdictions including a single metropolitan municipality and nine local municipalities across the Gauteng and Mpumalanga provinces .

The Air Quality Management Plan (AQMP) for the HPA[13] identifies the Gert Sibande District Municipality as one of the HPA's nine air quality hot spot areas. This classification is based on atmospheric dispersion modelling outputs verified by ambient air quality monitoring data. The Camden area is identified in the AQMP for modelled O_3 exceedances. Modelled ambient NOx and monitored NO_2 concentrations were relatively low, but exceedances of the 8-hour O_3 standard were recorded in Camden and Ermelo. It is highlighted that the HPA AQMP's assessment is limited to criteria pollutants (specifically, SO_2, NO_2, PM_{10} and O_3) none of which are relevant to the proposed renewable energy complex.

The nearest AAQM station to the study site is the Ermelo station owned and managed by SAWS, approximately 19 km to the north-west of the study site. Pollutants measured by this station include PM_{10}, $PM_{2.5}$, CO, NO_2, SO_2 and O_3. None of these pollutants are relevant to the proposed renewable energy complex. Since the SAWS monitoring station does not measure NH_3 and is located too far away for ambient air quality measurements to be considered representative of ambient pollution concentrations at site, this data is not considered further.

5.1.3 TOPOGRAPHY

The Project area is largely characterised by a mix of undulating plains and greater relief in the form of higher lying plateaus intersected by river valleys. Slopes across the study area are relatively gentle to moderate, with steeper slopes being largely associated with the more incised river valleys. The main water course in the study area is the Vaal River in the south-eastern portion of the study area. Gently undulating terrain prevails across much of the Camden I GH&A Facility development site.

The study area undulates over a wide elevation range from a minimum of around 1 620m above mean sea level (amsl) within the west to a maximum of approximately 1 735m amsl in the north, with an overall topographic fall from north to south. The eastern portion of the area lies on a ridge that largely topographically separates the site from Camden Power Station to the northeast.

The topography and slopes within and in the immediate vicinity of the Camden I GH&A Facility area are indicated in **Figure 5-5**and **Figure 5-6** respectively.

[10] Source categories include listed activities, domestic fuel burning, vehicle emissions and mining emissions
[11] Department of Environmental Affairs (2018): The 2017 National Framework for Air Quality Management in the Republic of South Africa (No.R.1144 of 2018) Government Gazette, 26 October 2018 (No. 41996).
[12] Emission source categories include listed activities, domestic fuel burning, traffic emissions and mining emissions (The National Framework, pg 50)
[13] DEA (2011): Highveld Priority Area Air Quality Management Plan (URL: https://screening.environment.gov.za/ScreeningDownloads/DevelopmentZones/HIGHVELD_PRIORITY_AREA_AQMP.pdf)

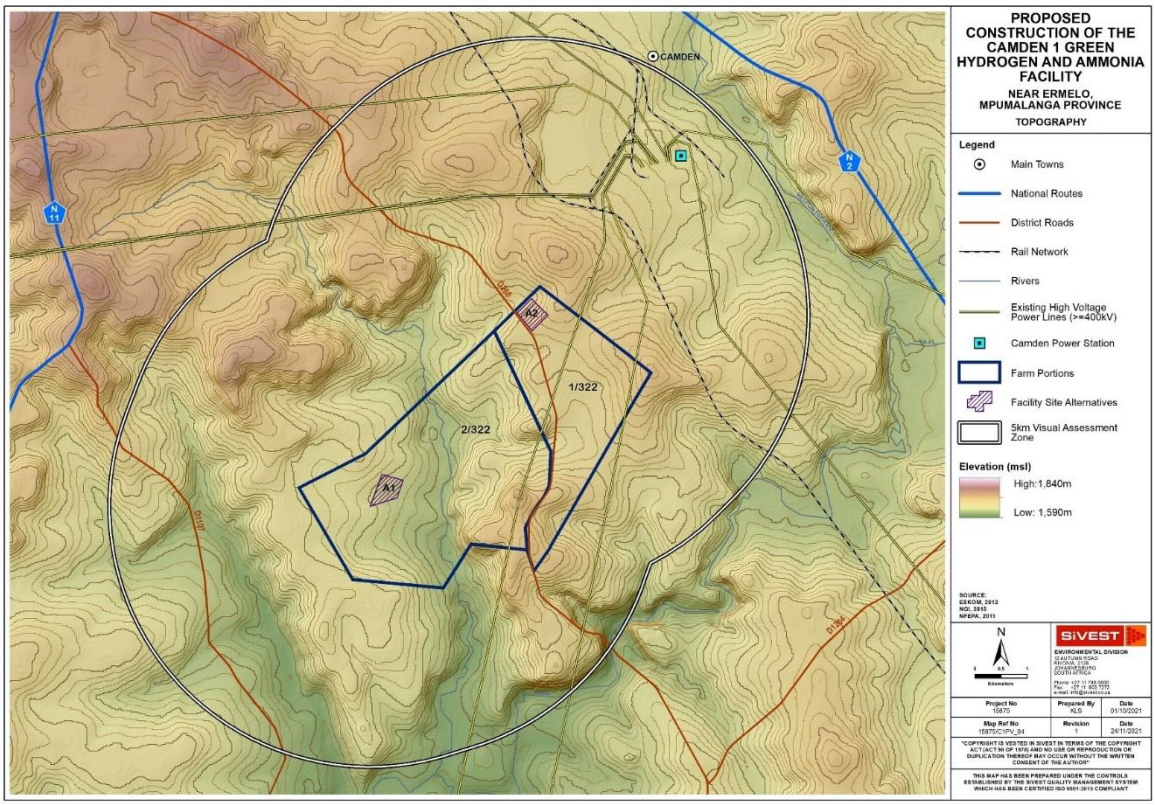


Figure 5-5: Topographical Map of Project Area (SiVest, 2021)

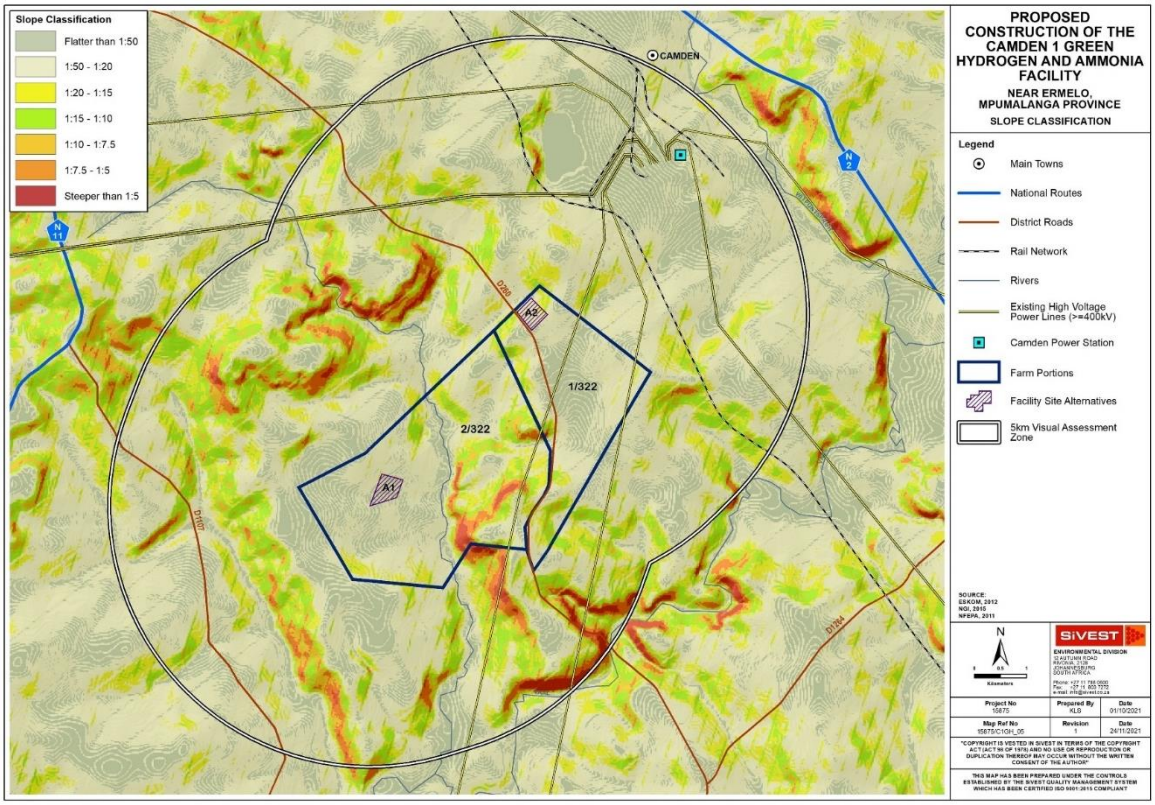


Figure 5-6: Slope classification of Project Area (SiVest, 2021)

5.1.4 GEOLOGY

A desktop review of the geology indicates the site is underlain predominantly by the Vryheid Formation of the Ecca Group (1:250 000, 2630). The Vryheid Formation consists of sandstone, shale, siltstone and coal seam that underlie the project area. The Vryheid Formation is intruded by late Triassic to Middle Jurassic Karoo dolerite dykes and sills which influence the regional hydrogeology.

5.1.5 SOILS AND AGRICULTURAL POTENTIAL

Based on the Land Type information, the site is located in Land Types Ca3 and BA51. Soils within the area are characterised by a Plinthic catena: undifferentiated, upland duplex and/or margalitic soils common, as well as dystrophic and/or mesotrophic; red soils widespread, upland duplex and margalitic soils rare.

Parts of the site are used for cultivation and parts are used for the grazing of both cattle and sheep. Cultivated crops include maize, soya beans and the fodder crop, weeping love grass, *Eragrostis curvula*. The area is far above the national average in terms of agricultural productivity. The site contains cultivation lands that make an important contribution to national food security, within the South African context of a considerable scarcity of arable land. Mpumalanga is the province that produces the second highest amount of maize after the Free State. The area produces long term average maize and soya bean yields that, according to verbal information supplied by farmers in the area, are above average for commercial farmers in South Africa. The long-term grazing capacity across the site is 4 - 5 hectares per large stock unit (Department of Agriculture, Forestry and Fisheries, 2018), which is also high in a South African context.

5.1.6 SURFACE WATER

HYDROLOGICAL CACHMENT

In terms of surface water, the study area is located within the western portion of C11B Quaternary Catchment (Vaal River) of the Highveld Ecoregion in the Vaal Water Management Area (WMA), with the Vaal River generally flowing northeast to southwest to within 1km of the south of the study area at its closest point. Most of the aquatic features and unknown tributary of the Vaal River within the study area are located within the riverine valleys and upper catchment areas of this quaternary catchment (**Figure 5-7**).

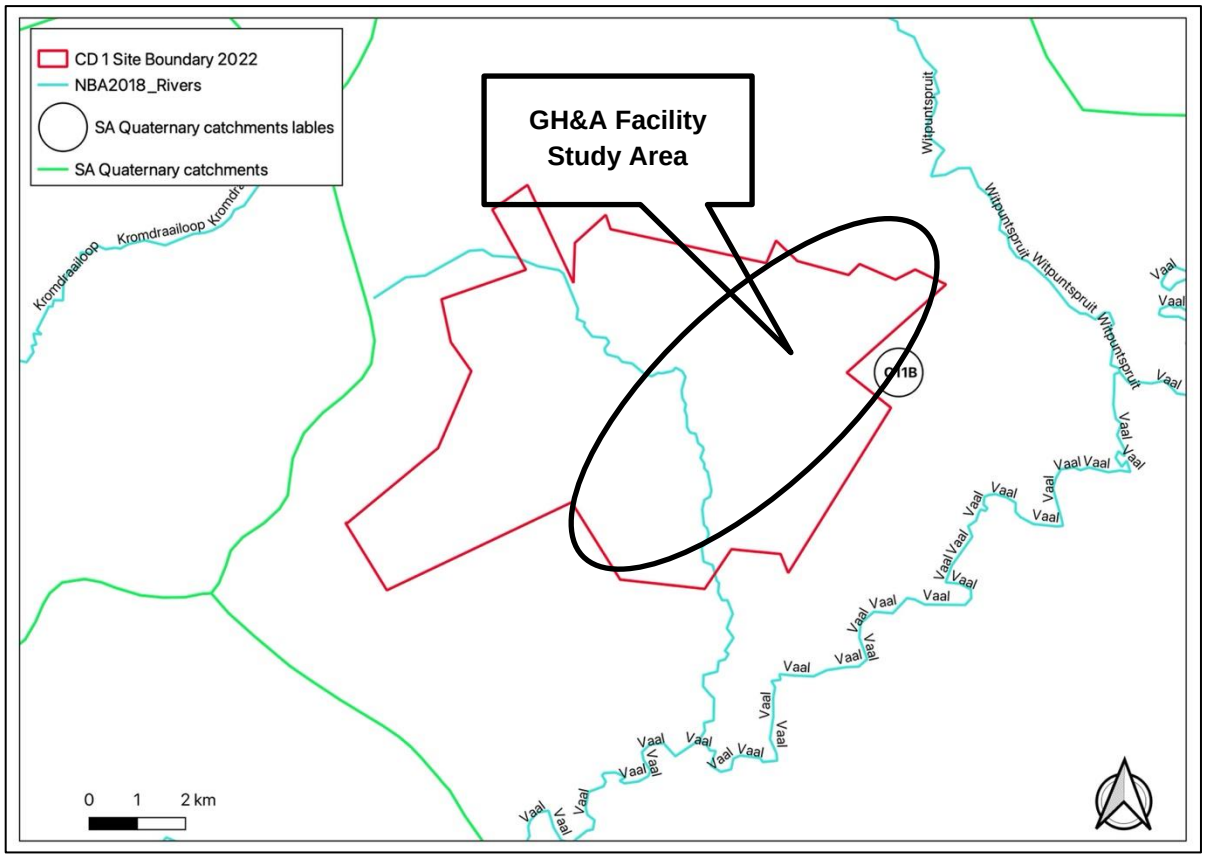


Figure 5-7: Mainstream rivers associated with the broader Camden I Wind Project Area, in which the proposed facility is located (EnviroSci, 2021)

LOCAL AQUATIC FEATURES

According to the Scoping Phase Aquatic Assessment Report (EnviroSci, 2021) (**Appendix H**), the study area is dominated by a variety of aquatic features, characterised as follows:

- Mainstem Rivers - Floodplain dominated systems with oxbow wetlands (**Figure 5-8**). A few reaches did contain very narrow riparian zones, consisting mostly of a single row of willow trees associated with the unknown tributary of the Vaal River
- Seep wetlands (**Figure 5-9**)

Figure 5-8: Wetlands associated with the unknown tributary that bisects the study area

Figure 5-9: A medium sized seep wetland

The DFFE identified the broader aquatic environment for the study area as having a Very High Sensitivity, based on the fact the following criteria are present within the site or the associated catchment, namely:

- Presence of Wetlands
- Aquatic Critical Biodiversity Areas (CBA)
- Freshwater Ecosystem Priority Area quinary catchments (NFEPA)

- Wetland clusters
- Eastern Highveld Grassland a listed Threatened Ecosystem under NEMA.

The presence of these Very High Sensitivity features within the broader study area, although to a finer mapping scale were confirmed during this assessment. The study area is however not located within an International Bird Area (IBA) or a Strategic Water Resource Area.

This ground-truthed delineations were then compared to current wetland inventories (van Deventer *et al*., 2020), 1: 50 000 topocadastral surveys mapping and the site. These inventories include wetland spatial data based on landcover 2007 data, previous assessments and wetland information retained by the Provincial authorities, combined into one database that formed part of the updated National Spatial Biodiversity Assessment, 2018.

A baseline map was then developed and refined using the August 2020 survey data, noting that due to the complex nature of the topography and geology, the features were digitised at a scale of 1:4000 **(Figure 5-10**).

Coupled to the aquatic delineations, information was collected on potential species that could occur within the wetlands and water courses, especially any areas that would contain open water for long periods and or conservation worthy species (Listed or Protected).

Figure 5-10: Delineated Wetlands within the proposed Project footprint based on ground-truthing information collected

PRESENT ECOLOGICAL STATE AND CONSERVATION IMPORTANCE

The Present Ecological State (PES) of a river, watercourse or wetland represents the extent to which it has changed from the reference or near pristine condition (Category A) towards a highly impacted system where there has been an extensive loss of natural habit and biota, as well as ecosystem functioning (Category E).

The PES scores have been revised for the country and based on the new models, aspects of functional importance as well as direct and indirect impacts have been included (DWS, 2014). The new PES system

incorporates Ecological Importance (EI) and Ecological Sensitivity (ES) separately as opposed to Ecological Importance and Sensitivity (EIS) in the old model, although the new model is still heavily centred on rating rivers using broad fish, invertebrate, riparian vegetation and water quality indicators. The Recommended Ecological Category (REC) is still contained within the new models, with the default REC being B, when little or no information is available to assess the system or when only one of the above-mentioned parameters are assessed or the overall PES is rated between a C or D.

All of the systems assessed by DWS (2014) on a Subquaternary level within the study area were rated as PES = C or Moderately Modified and PES = D or Largely Modified. While these were also rated as High in terms of Ecological Sensitivity and Ecological Importance respectively.

Based on the information collected during the field investigations of the broader study area, these ratings are verified and upheld for the riverine / wetland systems within the broader study area. The natural wetlands were however rated independently and achieved PES scores of C and D, while the EIS was rated as HIGH. The High EIS rating for both natural water courses and wetlands, is further substantiated by the fact that the affected catchments are included in both the National Freshwater Priority Atlas and the provincial Biodiversity Spatial Plan Critical Biodiversity Area spatial layers (**Figure 5-11** and **Figure 5-12**). These areas are also highlighted as important ecological support areas along the Vaal River.

Overall, these catchment areas and subsequent rivers / watercourses are largely in a natural state with localised impacts in some areas, which include the following:

- Erosion and sedimentation associated with road crossings;
- Impeded water flow due to several in channel farm dams; and
- Sedimentation and scour of channels due to undersized culverts within present day road crossings.

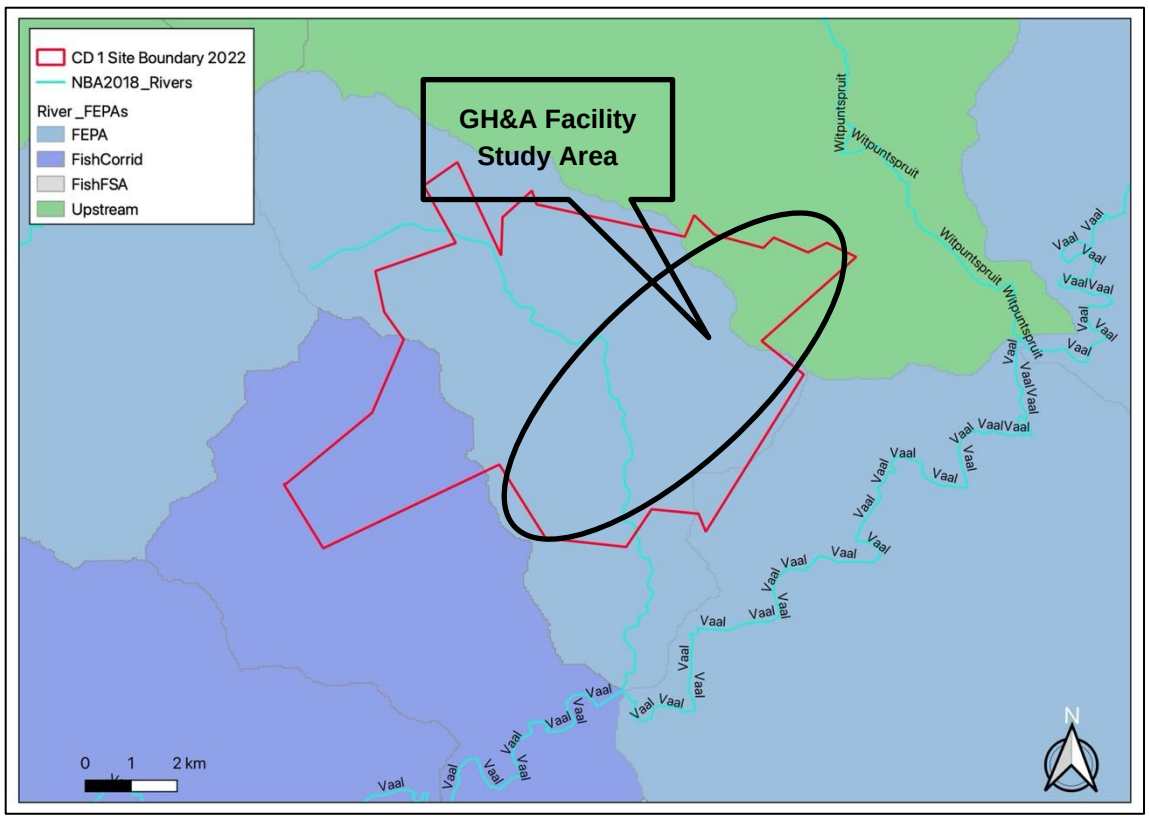


Figure 5-11: The Freshwater Ecosystem Priority Areas for the study site (Nel et al, 2011)

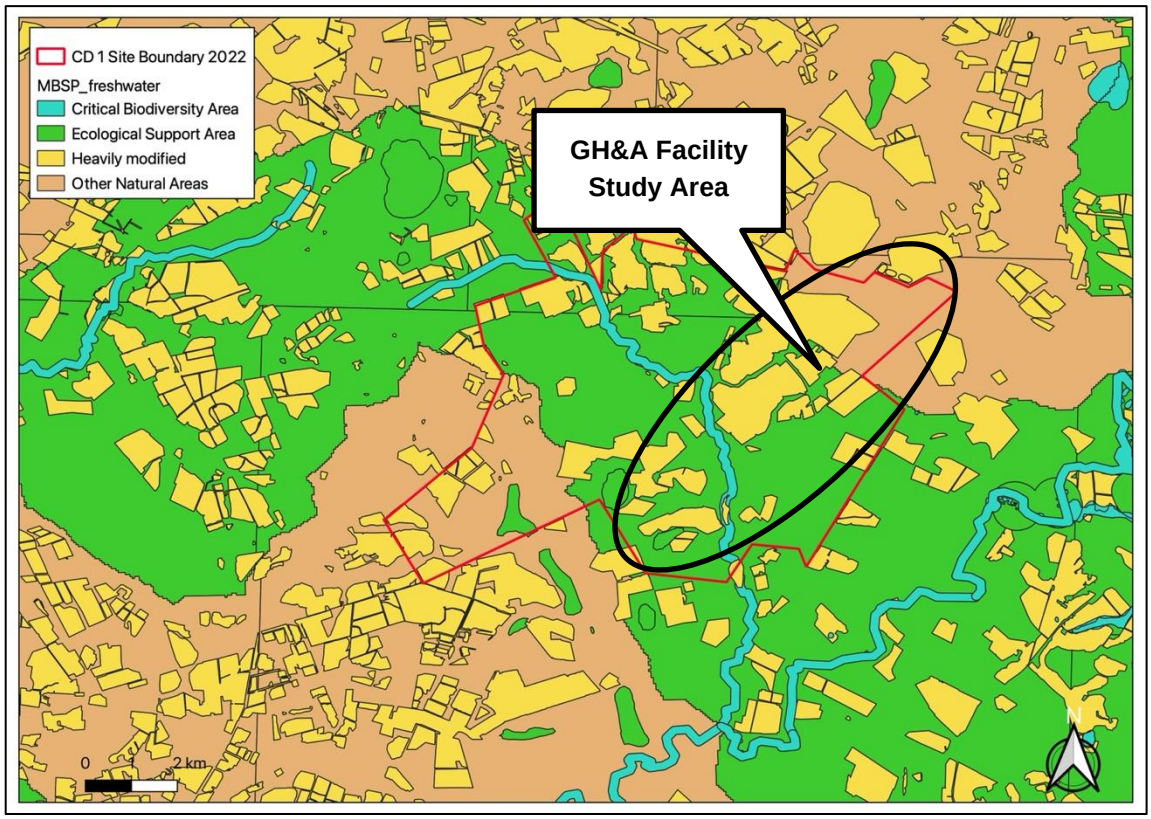


Figure 5-12: The Critical Biodiversity Areas as per the Mpumalanga Biodiversity Spatial Plan (Nel et al, 2011) issued 2014

SITE SENSITIVITY

Using the baseline description and field data while considering the current disturbances and site characteristics, the following features were identified, then categorised into one of number pre-determined sensitivity categories to provide protect and/or guide the layout planning and design processes of the corridor and a suitable alignment for the grid within. **Table 5-2** outlines the Aquatic sensitivity mapping categories used to categorise features or areas (with their buffers).

Table 5-2: Sensitivity Categories

No Go	Legislated "no go" areas or setbacks and areas or features that are considered of such significance that impacting them may be regarded as fatal flaw or strongly influence the project impact significance profile Therefore areas or features that are considered to have a high sensitivity or where project infrastructure would be highly constrained and should be avoided as far as possible. Infrastructure located in these areas are likely to drive up impact significance ratings and mitigations
Medium	Buffer areas and or areas that are deemed to be of medium sensitivity but should still be avoid as this would minimise impacts and or the need for additional Water Use Authorisation
Low	Areas of low sensitivity or constraints, such as artificial systems
Neutral	Unconstrained areas (left blank in mapping)

Table 5-3 below provides an overview of the sensitivity of various aquatic features (with buffers distances included) as it relates to the main project component types for the project. The features are shown spatially in **Figure 5-13**. The sensitivity ratings of No go, Medium and Low were determined through an assessment of the aquatic habitat sensitivity and related constraints. However, these No-Go areas (with buffers) relate in general

terms to the project and there are areas where encroachment on these areas would occur (i.e. existing road crossings within wetlands) but this is considered acceptable since these areas have already been impacted.

These proposed constraints / buffers do not include bird and or bat specialist buffers / constraints as theirs buffers along aquatic features are at times far larger around aquatic features, than those required for the known aquatic species within this region.

Table 5-3: Results of the sensitivity rating / constraints assessment

DEVELOPMENT COMPONENT	WATERBODY TYPE	SENSITIVITY RATING OF THE RESPECTIVE WATERBODY TYPE AGAINST THE DEVELOPMENT TYPE AND THE REQUIRED BUFFER	SENSITIVITY RATING OVERRIDE, IF AN IMPACT SUCH AS A ROAD ALREADY OCCURS WITHIN THE PROPOSED FOOTPRINT
WTG	Riverine Floodplains with Riparian Vegetation or wetland areas	No-Go with 95m buffer	
	Seepage Wetlands	No-Go with 62m buffer	
	Artificial dams or mine works		
Buildings / Substations & BESS	Riverine Floodplains with Riparian Vegetation or wetland areas	No-Go with 95m buffer	
	Seepage Wetlands	No-Go with 62m buffer	
	Artificial dams or mine works		
Roads and Pipelines	Riverine Floodplains with Riparian Vegetation or wetland areas	No-Go with 95m buffer	Moderate if an existing crossing / road or impact is already present, that must then be included in the potential road or crossing network. However if the road or pipeline network can't be aligned with existing impacted areas, then any such crossings must be evaluated on a case by case basis, by the aquatic specialist, preferably with the engineers and a site visit.
	Seepage Wetlands	No-Go with 62m buffer	
	Artificial dams or mine works		
Overhead Lines	Riverine Floodplains with Riparian Vegetation or wetland areas	Assumption is that the overhead lines could span these areas, but the towers/pylons should adhere to the buffer distances as indicated as far as possible but where areas areas are too large to span (buffers) then these tower positions must be evaluated on a case by case basis.	
	Seepage Wetlands		
	Artificial dams or mine works		

Figure 5-13: The delineated waterbodies inclusive of the respective buffer distances

5.1.7 GROUNDWATER

According to Aquifer Classification of South Africa (DWAF, 2012), the area is underlain by a Minor Aquifer with groundwater occurrence controlled by presence of fractures, faults and weathered zones within Karoo sediments, and dominated within the upper and lower contacts of the dolerite dykes and sills. Groundwater in the area is moderately vulnerable to contaminants when continuously discharged or leached (DWAF, 2013). The regional groundwater is of good quality with electrical conductivity typically <70mS/m (DWAF, 2012). With reference to GHT Consulting Scientists (GHT) Geohydrological Impact Assessment: Proposed Ash Dam Extension at Eskom Camden Power Station (2012) three aquifer types may be anticipated, as follows:

- **Shallow**: unconfined within the highly weathered Karoo sediments and/or alluvial deposits, and when underlain by less permeable material. Within the vicinity of the ash dam this reportedly ranges from approximately 0.2–1.3m below ground level (bgl)
- **Intermediate**: semi-confined within horizontal bedding interfaces between different lithologies or when connected through geological structures (joints, fractures, or dolerite dyke contacts)
- **Deep**: confined within basement lithologies

Groundwater flow directions are expected to somewhat mimic topography and regional drainage and largely be towards the south, in the direction of the Vaal River. This will, however, be complicated around the natural drainage lines where the topography will be expected to induce localised flows, particularly within the shallow aquifer, that will deviate from this general direction, with flow from elevated areas towards to lower lying drainage channels.

5.2 BIOLOGICAL ENVIRONMENT

5.2.1 REGIONAL VEGETATION

Based on the preliminary desktop and site specific field study Terrestrial Ecology Scoping Report (David Hoare Consulting, November 2021) (**Appendix I**), three regional vegetation type occurring in the broader study area, namely Eastern Highveld Grassland, Amersfoort Highveld Clay Grassland and Eastern Temperate Freshwater Wetlands (**Figure 5-14**). The Wakkerstroom Montyane Grassland vegetation type occurs nearby to the south-east of the site. The vegetation type that occur in the GH&A Facility study area and nearby areas are briefly described below.

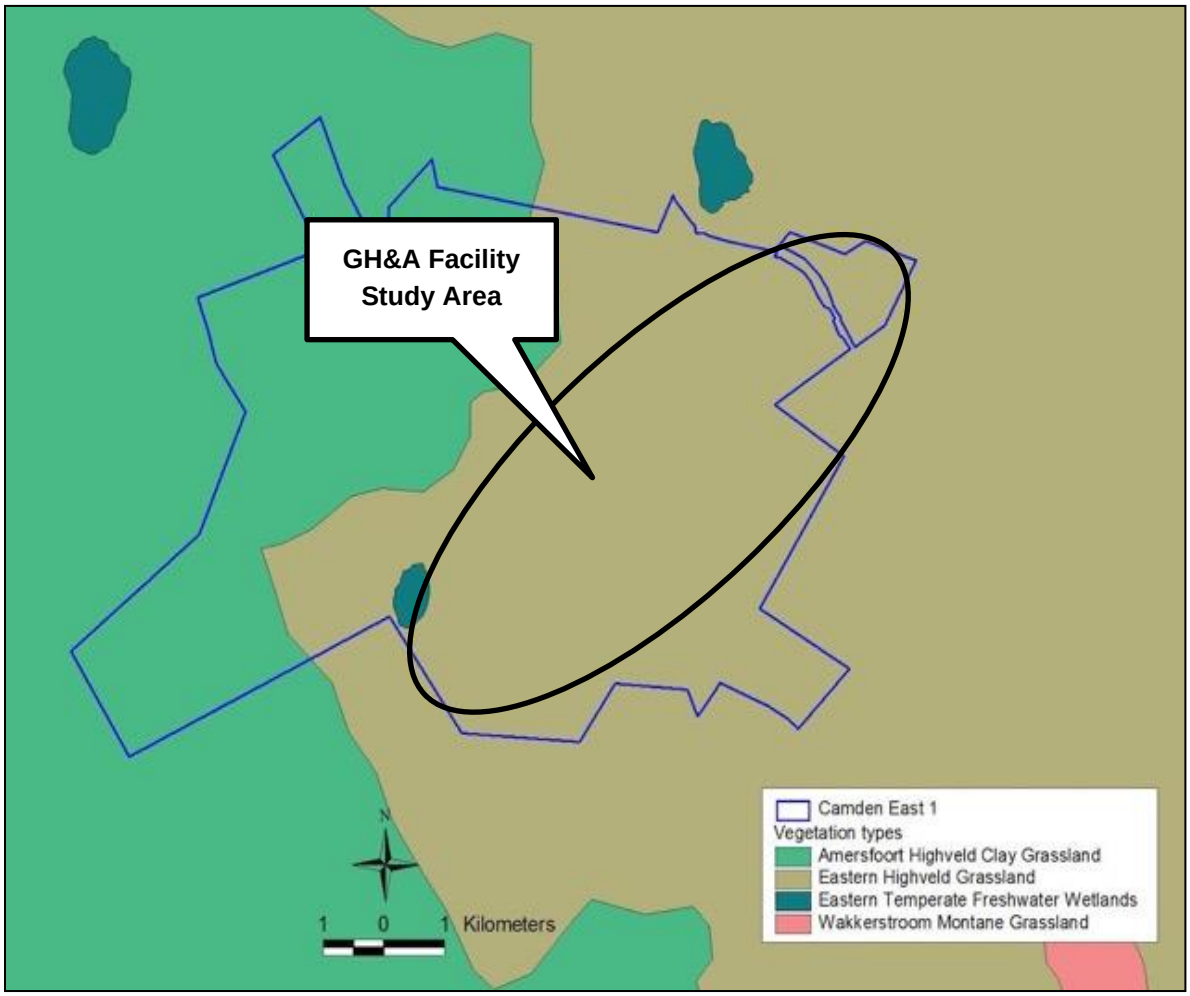


Figure 5-14: Regional Vegetation Types of the Study Area

EASTERN HIGHVELD GRASSLAND

DISTRIBUTION

Found in Mpumalanga and Gauteng Provinces, on the plains between Belfast in the east and the eastern side of Johannesburg in the west and extending southwards to Bethal, Ermelo and west of Piet Retief. The vegetation type occurs at an altitude of between 1 520–1 780 m.

VEGETATION & LANDSCAPE FEATURES

The vegetation occurs on slightly to moderately undulating plains, including some low hills and pan depressions. The vegetation is short dense grassland dominated by the usual highveld grass composition

(*Aristida*, *Digitaria*, *Eragrostis*, *Themeda*, *Tristachya*, etc.) with small, scattered rocky outcrops with wiry, sour grasses and some woody species (*Acacia caffra*, *Celtis africana*, *Diospyros lycioides* subsp *lycioides*, *Parinari capensis*, *Protea caffra*, *P. welwitschii* and *Searsia magalismontanum*).

GEOLOGY & SOILS

Red to yellow sandy soils of the Ba and Bb land types found on shales and sandstones of the Madzaringwe Formation (Karoo Supergroup). Land types Bb (65%) and Ba (30%).

CLIMATE

Strongly seasonal summer rainfall, with very dry winters. MAP 650–900 mm (overall average: 726 mm), MAP relatively uniform across most of this unit, but increases significantly in the extreme southeast. The coefficient of variation in MAP is 25% across most of the unit, but drops to 21% in the east and southeast. Incidence of frost from 13–42 days, but higher at higher elevations.

IMPORTANT TAXA

Low Shrubs	*Anthospermum rigidum* subsp. *pumilum*, *Stoebe plumosa*..
Herbs	*Berkheya setifera* (d), *Haplocarpha scaposa* (d), *Justicia anagalloides* (d), *Pelargonium luridum* (d), *Acalypha angustata*, *Chamaecrista mimosoides*, *Dicoma anomala*, *Euryops gilfillanii, E. transvaalensis* subsp. *setilobus, Helichrysum aureonitens*, *H. caespititium*, *H. callicomum*, *H. oreophilum*, *H. rugulosum*, *Ipomoea crassipes*, *Pentanisia prunelloides* subsp. *latifolia*, *Selago densiflora*, *Senecio coronatus*, *Vernonia oligocephala*, *Wahlenbergia undulata*.
Geophytic Herbs	*Gladiolus crassifolius*, *Haemanthus humilis* subsp. *hirsutus*, *Hypoxis rigidula* var. *pilosissima*, *Ledebouria ovatifolia*.
Succulent Herbs	*Aloe ecklonis*
Graminoids	*Aristida aequiglumis* (d), *A. congesta* (d), *A. junciformis* subsp. *galpinii* (d), *Brachiaria serrata* (d), *Cynodon dactylon* (d), *Digitaria monodactyla* (d), *D. tricholaenoides* (d), *Elionurus muticus* (d), *Eragrostis chloromelas* (d), *E. curvula* (d), *E. plana* (d), *E. racemosa* (d), *E. sclerantha* (d), *Heteropogon contortus* (d), *Loudetia simplex* (d), *Microchloa caffra* (d), *Monocymbium ceresiiforme* (d), *Setaria sphacelata* (d), *Sporobolus africanus* (d), *S. pectinatus* (d), *Themeda triandra* (d), *Trachypogon spicatus* (d), *Tristachya leucothrix* (d), *T. rehmannii* (d), *Alloteropsis semialata* subsp. *eckloniana*, *Andropogon appendiculatus*, *A. schirensis*, *Bewsia biflora*, *Ctenium concinnum*, *Diheteropogon amplectens*, *Eragrostis capensis*, *E. gummiflua*, *E. patentissima*, *Harpochloa falx*, *Panicum natalense*, *Rendlia altera*, *Schizachyrium sanguineum*, *Setaria nigrirostris*, *Urelytrum agropyroides*.

CONSERVATION STATUS OF THE REGIONAL VEGETATION TYPES

On the basis of a scientific approach used at national level by SANBI (Driver *et al*., 2005), vegetation types can be categorised according to their conservation status which is, in turn, assessed according to the degree of transformation relative to the expected extent of each vegetation type. The status of a habitat or vegetation type is based on how much of its original area still remains intact relative to various thresholds. The original extent of a vegetation type is as presented in the most recent national vegetation map (Mucina, Rutherford & Powrie 2005) and is the extent of the vegetation type in the absence of any historical human impact. On a national scale the thresholds are as depicted in **Figure 5-15**, as determined by best available scientific approaches (Driver *et al*., 2005). The level at which an ecosystem becomes Critically Endangered differs from one ecosystem to another and varies from 16% to 36% (Driver *et al*., 2005).

According to scientific literature (Driver *et al*., 2005; Mucina *et al*., 2006), as shown in **Table 5-4**, Eastern Highvbeld Grassland is listed as Endangered, Amersfoort Highveld Clay Grassland as Vulnerable and Eastern Temperate Freshwater Wetlands as Least Threatened.

Determining ecosystem status (Driver *et al.*, 2005). *BT = biodiversity target (the minimum conservation requirement).

Habitat remaining (%)			
80–100	least threatened	LT
60–80	vulnerable	VU
*BT–60	endangered	EN
0–*BT	critically endangered	CR

Figure 5-15: Ecosystem Status (Driver et al. 2005)

Table 5-4: Conservation status of different vegetation types occurring in the study area

VEGETATION TYPE	TARGET (%)	CONSERVED (%)	TRANSFORMED (%)	CONSERVATION STATUS	
				DRIVER *ET AL.* 2005; MUCINA *ET AL.*, 2006	NATIONAL ECOSYSTEM LIST (NEM:BA)
Eastern Highveld Grassland	24	0.3	44	Endangered	Vulnerable
Eastern Temperate Freshwater Wetlands	24	5	15	Least threatened	Vulnerable
Chrissiesmeer Panveld					Endangered

The National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011), published under the National Environmental Management: Biodiversity Act (Act No. 10, 2004), lists national vegetation types, and other ecosystems defined in the Act, that are afforded protection on the basis of rates of transformation. The thresholds for listing in this legislation are higher than in the scientific literature, which means there are fewer ecosystems listed in the National Ecosystem List versus in the scientific literature. Eastern Highveld Grassland and Eastern Temperate Freshwater Wetlands are both listed as Vulnerable in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011). Eastern Highveld Grassland covers the eastern two-thirds of the site (**Figure 5-14**). Eastern Temperate Freshwater Wetlands are not mapped as occurring on site, but the mapping is at a poor (regional) resolution and all pans and wetlands on site fall within this ecosystem type.

There is an additional listed ecosystem defined under the National Ecosystem List, called Chrissiesmeer Panveld, which is listed as Endangered. This covers more than two-thirds of the site (**Figure 5-16**). It spatially co-incides partially with Eastern Highveld Grassland, but is defined on different criteria.

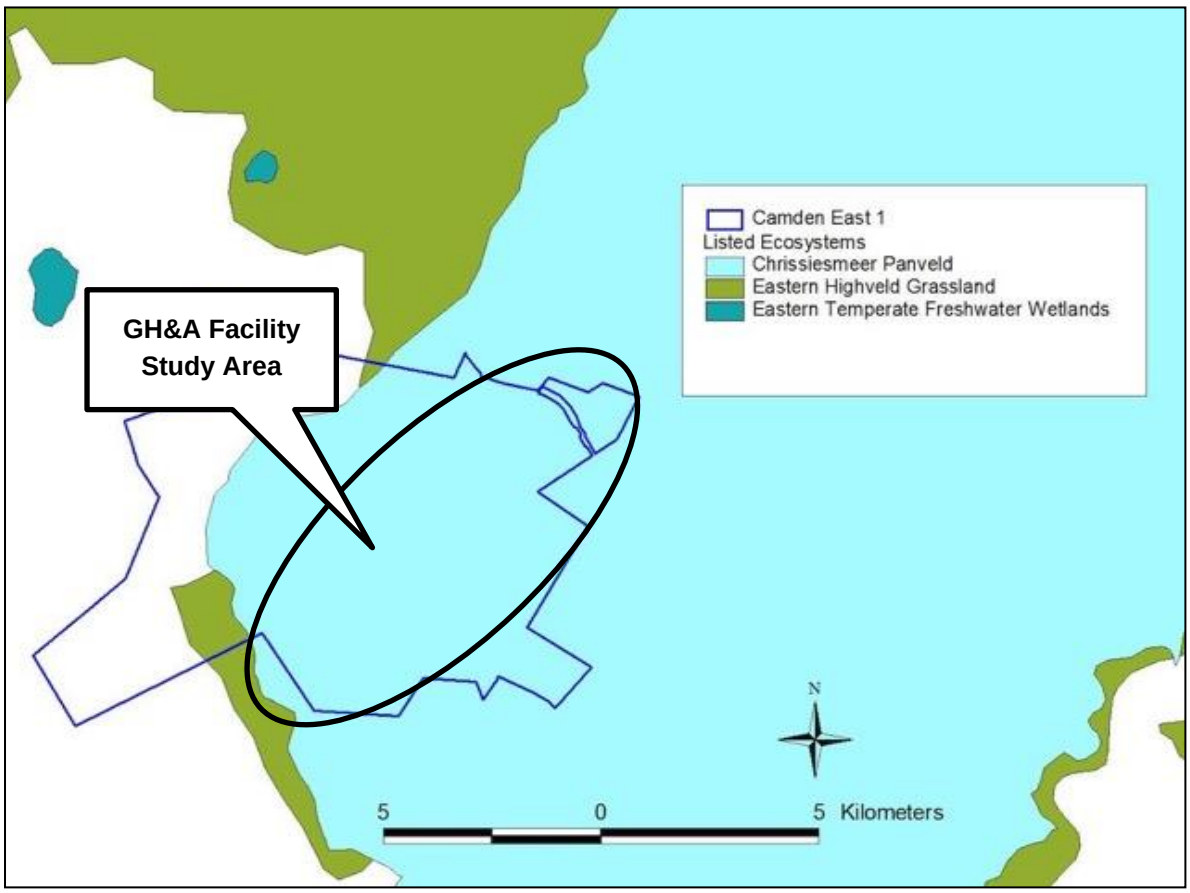


Figure 5-16: Distribution of listed ecosystems relative to the site

5.2.2 BIODIVERSITY CONSERVATION PLANS

The Mpumalanga Biodiversity Sector Plan (MBSP) (Mpumalanga Parks and Tourism Agency 2014) classifies the natural vegetation of the Province according to the following categories:

- Protected Areas (sub-divided into three categories);
- Critical Biodiversity Areas (sub-divided into "Irreplaceable" and "Optimal");
- Other natural areas;
- Ecological Support Area (sub-divided into four categories); and
- Modified (sub-divided into Heavily or Moderately modified

Figure 5-17 shows the features in the study area within five of the classes listed above:

- Protected Areas: (National Parks and Nature Reserves):
  - Approximately a third of the site on the south-eastern side is shown as a protected area. This is, however, incorrect. The part of the site shown as a Protected Area occupies the parts of the site on the Farm Welgelegen 322 IT. According to the land owner (Mr L. Reyneke), the farm is NOT a protected area and he is not aware of it ever being so. The 1:50 000 topocadastral maps do not indicate the farm as a protected area. A map of National (formal and informal) protected areas obtained from the SANBI BGIS website does not indicate the area to be a protected area. A GIS spatial layer indicating proposed protected area expansion areas (the National Parks Area Expansion Strategy layer) does not indicate the area as protected and nor does it indicate proposed expansion of the protected area network into this area. On the basis of these various data sources, it is assumed that the designation of the area as protected in the Mpumalanga Biodiversity Sector Plan (MBSP) is an error.
- Critical Biodiversity Areas (CBA):

- Irreplaceable: A significant area in the south-eastern part of the study area is within a “CBA: Irreplaceable” area. These categorized areas are associated with the Vaal River and all natural areas linked to it.
- Optimal: A significant area in the southern part of the study area is within a “CBA: Optimal” area. These categorized areas are associated with the Vaal River and all natural areas adjacent to it.

- Ecological Support Area (ESA):
  - The pipelines will traverse ESAs along their alignment.
  - Protected Area Buffer: There is a 1 km buffer around the designated protected areaThe pipelines will traverse this buffer area.
- Other Natural Areas (ONA):
  - There are patches throughout the site mapped as ONA.
- Heavily or moderately modified:
  - Remaining areas on site, associated primarily with cultivation

According to the National Parks Area Expansion Strategy (NPAES), there are no areas within the study area that have been identified as priority areas for inclusion in future protected areas. The study area is therefore **outside the NPAES focus area**.

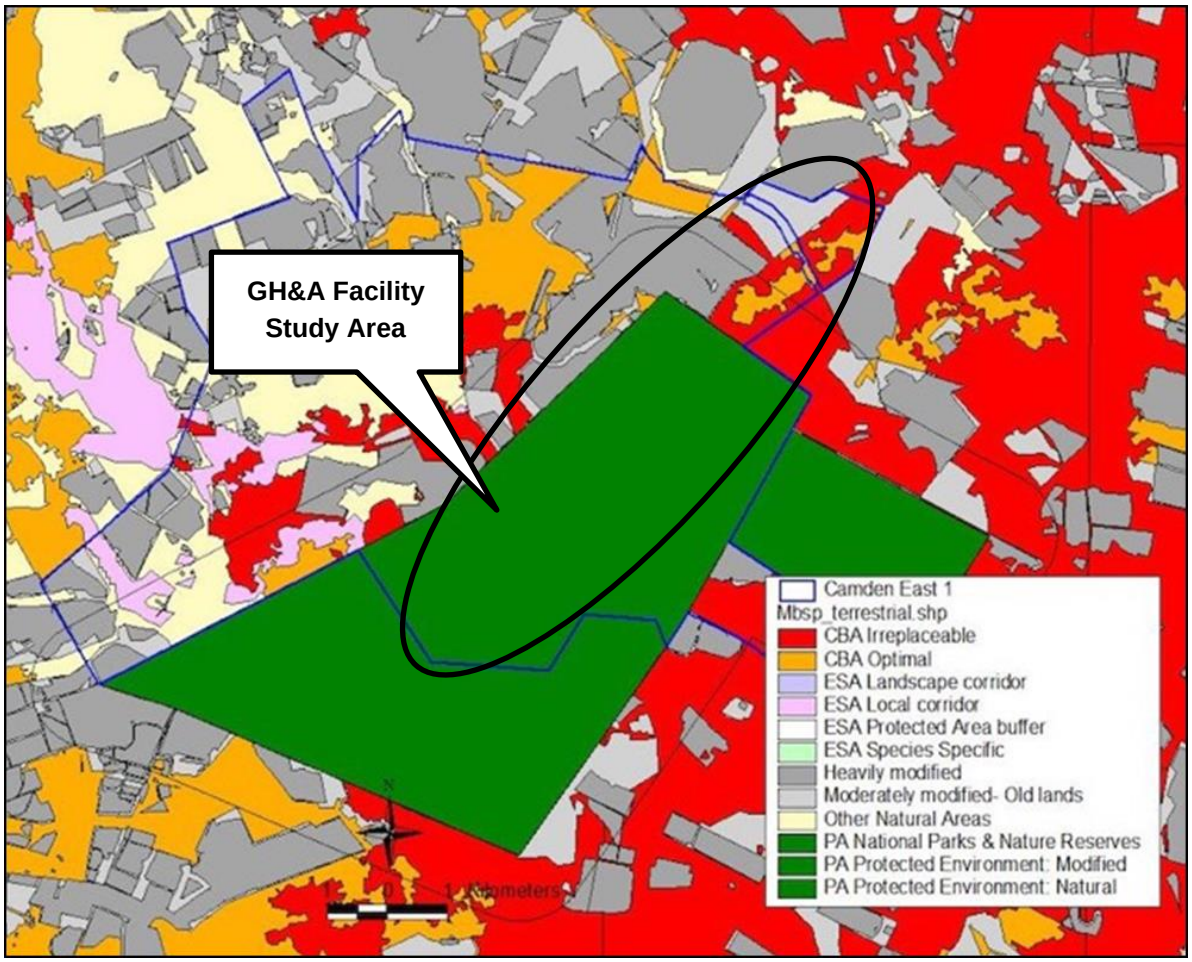


Figure 5-17: Biodiversity Map of the Project Area according to the MBSP (David Hoare Consulting, 2021)

5.2.3 PLANT SPECIES

Lists of plant species previously recorded in the study area were obtained from the South African National Biodiversity Institute (SANBI) website (http://newposa.sanbi.org/). These are listed in Appendix 3 of the

Ecological Scoping Report (**Appendix I**). In order to ensure that all possible species were considered for the area, a much larger area was searched for potential species of concern and the total Red and Orange list flora of Mpumalanga was considered here. Despite this broader search, there are a relatively small number of species that were identified of conservation concern that could potentially occur in the broad area that includes the project area.

The list contains 18 species listed in an IUCN threat category (Critically Endangered, Endangered or Vulnerable) or Near Threatened category of which 10 have a high possibility of occurring in the general area and in the type of habitats available in the study area. A further five could possibly occur there. This does not mean that they will occur there, only that the review has identified that these are species that should be assessed as possibly occurring in the area. None of these species were encountered on site, but a more detailed survey of specific habitats would be required to detect them, if they occurred there.

Plant species protected under the National Environmental Management: Biodiversity Act, 2004 (Act 10 of 2004) are listed in Appendix 6 of the Ecological Scoping Report (**Appendix I**). None of the species on this list were encountered on site and none are considered likely to occur there, although some have a geographical distribution that includes the study area.

All plant species protected under the Northern Cape Nature Conservation Act, 2009 (Act 9 of 2009) are listed in Appendix 5 of the Ecological Scoping Report (**Appendix I**). A number of species were found on site that are protected according to the Mpumalanga Nature Conservation Act, 2009 (Act 9 of 2009). From the field survey, this includes the following: *Aloe ecklonis, Boophone disticha, Brunsvigia radulosa*, and *Gladiolus papilio*. Note that these plants were recorded during a general reconnaissance survey. It is likely that other individuals of these species, as well as individuals potentially from other protected species could potentially occur on site. Despite not being threatened, any impacts on these species will require a permit from the relevant authorities.

Tree species protected under the National Forest Act are listed in Appendix 2 of the Ecological Scoping Report (**Appendix I**). There are none with a geographical distribution that includes the region in which the proposed project is located. There are five species that have a geographical distribution that ends south of the study area, namely *Boscia albitrunca, Curtisia dentata, Elaeodendron croceum, Prunus africana* and *Pittosporum viridiflorum*.

No trees or woody plants of significant size were found on site, with the exception of the exotic Eucalyptus trees in two groves on site, and scattered *Salix babylonica* along the banks of the Vaal River. For all five species listed here, there was a distribution gap associated with the southern Highveld part of Mpumalanga, even if the species occurred in all surrounding areas. This partially reflects an absence of indigenous forest patches in this area, the habitat in which many of these protected trees occur.

In summary, no species of protected trees were found or are likely to occur in the geographical area that includes the site.

5.2.4 TERRESTRIAL FAUNA SPECIES

Vertebrate species (mammals, reptiles, amphibians) with a geographical distribution that includes the broader study area are listed in Appendix 4 of the Ecological Scoping Report (**Appendix I**). All threatened (Critically Endangered, Endangered or Vulnerable) or near threatened vertebrate animals that could occur in the study area and have habitat preference that includes habitats available in the study area, are discussed further below.

MAMMALS

There are 81 mammal species that have a geographical distribution that includes the study area, of which fourteen are listed in a conservation category of some level (see Appendix 3 of the Ecological Scoping Report - **Appendix I**). This is a relatively moderate diversity of mammals compared to other parts of South Africa. Based on the natural state of the study area and surrounding areas, it is considered likely that some of these species could occur on site.

Of the species currently listed as threatened or protected (see Appendix 5 of the Ecological Scoping Report - **Appendix I** for list of protected species), eight of those listed in **Table 5-5** are considered to have a medium to high probability of occurring on site and being potentially negatively affected by proposed activities associated with the proposed projects.

Table 5-5: Mammal species of conservation concern with a likelihood of occurring on site

SCIENTIFIC NAME	COMMON NAME	STATUS	LIKELIHOOD OF OCCURRENCE
Ourebia ourebi	Oribi	Endangered	Low
Pelea capreolus	Grey Rhebok	Near Threatened, protected	Medium
Felis nigripes	Black-footed Cat	Vulnerable, protected	High
Panthera pardus	Leopard	Vulnerable, protected	Low
Aonyx capensis	Cape Clawless Otter	Near Threatened, protected	Medium
Hydrictus maculicollis	Spotted-necked Otter	Vulnerable, protected	Medium
Poecilogale albinucha	African Striped Weasel	Near Threatened	Medium
Parahyaena brunnea	Brown hyaena	Near Threatened	Low
Atelerix frontalis	South African Hedgehog	Near Threatened, protected	High
Crocidura maquassiensis	Maquassie Musk Shrew	Vulnerable	Low
Crocidura mariquensis	Swamp Musk Shrew	Near Threatened	High
Amblysomus septentrionalis	Highveld Golden Mole	Near Threatened	Medium
Mystromys albicaudatus	White-tailed Rat	Vulnerable	Low
Otomys auratus	Vlei Rat	Near Threatened	High

REPTILES

A total of 60 reptile species have a geographical distribution that includes the broader study area in which the project site is found (Alexander & Marais 2007, Bates *et al*. 2014, Branch 1988, Marais 2004, Tolley & Burger 2007). This is a moderate diversity compared to average diversity in other parts of the country. Of the reptile species that could potentially occur in the study area, four have been listed in a threat category (**Table 5-6**). There are three reptile species of conservation concern that could potentially occur in the study area and that may therefore be affected by the proposed projects.

Table 5-6: Reptile species of conservation concern with a likelihood of occurring on site.

SCIENTIFIC NAME	COMMON NAME	STATUS	LIKELIHOOD OF OCCURRENCE
Chamaesaura aenea	Coppery grass lizard	Near Threatened	Medium to High
Chamaesaura macrolepis	Large-scaled Grass Lizard	Near Threatened	Low
Tetradactylus breyeri	Breyer's Long-tailed Seps	Vulnerable	Low

SCIENTIFIC NAME	COMMON NAME	STATUS	LIKELIHOOD OF OCCURRENCE
Homoroselaps dorsalis	Striped Harlequin Snake	Near Threatened	Medium to High

AMPHIBIANS

A total of 24 frog species have a geographical distribution that includes the general study area in which the project site is found (Du Preez & Carruthers 2009). Some of these species are only marginally present in the study area due to the fact that their distribution range ends close to the study area. Of the frog species that could potentially occur in the study area, none are listed in a threat category, but one species is listed as protected, according to National legislation, the Giant Bullfrog.

It is concluded that the site contains habitat that is suitable for various frog species, although only one species of conservation concern is likely to occur in the study area. One frog species of concern is therefore potentially likely to be affected by development in the study area, as shown in **Table 5-7**.

Table 5-7: Amphibian species of conservation concern with a likelihood of occurring on site.

SCIENTIFIC NAME	COMMON NAME	STATUS	LIKELIHOOD OF OCCURRENCE
Pyxicephalus adspersus	Giant Bullfrog	Protected	Medium

PROTECTED ANIMALS

There are a number of animal species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) (see Appendix 6 of the Ecological Scoping Report - **Appendix I**). According to this Act, "*a person may not carry out a restricted activity involving a specimen of a listed threatened or protected species without a permit issued in terms of Chapter 7*". Such activities include any that are "*of a nature that may negatively impact on the survival of a listed threatened or protected species*". This implies that any negative impacts on habitats in which populations of protected species occur or are dependent upon would be restricted according to this Act.

Those species protected according to the National Environmental Management: Biodiversity Act (Act No. 10 of 2004) that have a geographical distribution that includes the site are listed in Appendix 4 of the Ecological Scoping Report (**Appendix I)**, marked with the letter "N". This includes the following species:

- Black Wildebeest (doesn't occur on site),
- Oribi (unlikely to occur on site),
- White Rhinoceros (doesn't occur on site),
- Black-footed Cat,
- Serval,
- Leopard (probably does not occur on site),
- Cape Clawless Otter,
- Spotted-necked Otter,
- Cape Fox,
- Honey Badger,
- South African Hedgehog,
- Brown Hyena,and
- Giant Bullfrog.

There are additional species protected under the Mpumalanga Nature Conservation Act (Act No. 10 of 1998) (see Appendix 5 of the Ecological Scoping Report - **Appendix I**). These include the following that have a geographical distribution that includes the site:

- Giant Bullfrog,

- South African Hedgehog,
- Honey Badger,
- Aardwolf,
- Brown Hyaena,
- Mountain Reedbuck,
- Black Wildebeest,
- Klipspringer,
- Orbi,
- Steenbok,
- Eland,
- Cape Clawless Otter
- Spotted-necked Otter,
- All species of reptiles, except the water leguaan, rock leguaan and all species of snakes, of which the following have a geographical distribution that includes the site:
  - Marsh terrapin
  - Leopard tortoise
  - Common dwarf gecko
  - Spotted dwarf gecko
  - Van Son's gecko
  - Delalande's sandveld lizard
  - Burchell's sand lizard
  - (Spotted sand lizard)
  - Coppery grass lizard
  - Cape grass lizard
  - Large-scaled grass lizard
  - Common girdled lizard
  - Common crag lizard
  - Yellow-throated plated lizard
  - Breyer's long-tailed seps
  - Short-headed legless skink
  - Thin-tailed legless skink
  - Wahlberg's snake-eyed skink
  - Cape skink
  - Red-sided skink
  - Speckled rock skink
  - Variable skink
  - Montane dwarf burrowing skink
  - Common flap-necked chameleon
  - Eastern ground agama
  - Southern rock agama.

5.2.5 HABITATS

The site is within an area of natural grassland. The grassland contains variation due to changes in topography, slope inclination, surface rockiness and the influence of water-flow and water retention in the landscape. A broad classification of the natural habitat units on site, which also reflects relatively uniform plant species compositional units, is as follows:

- Grassland (open grassland on undulating plains);
- Wetlands (seasonal wetlands in drainage valleys);
- Floodplain grasslands (flat areas of grassland on the river floodplain);
- Pans (seasonally inundated areas on the river floodplain);
- Secondary wetlands (cultivated or previously cultivated wetland areas);
- Secondary grassland ((secondary grasslands on old lands);
- Cultivation (areas currently cultivated and fallow lands);
- Degraded areas (disturbed areas with weeds or waste ground).

A preliminary map of habitats within the study area and adjacent areas is provided in **Figure 5-18**.

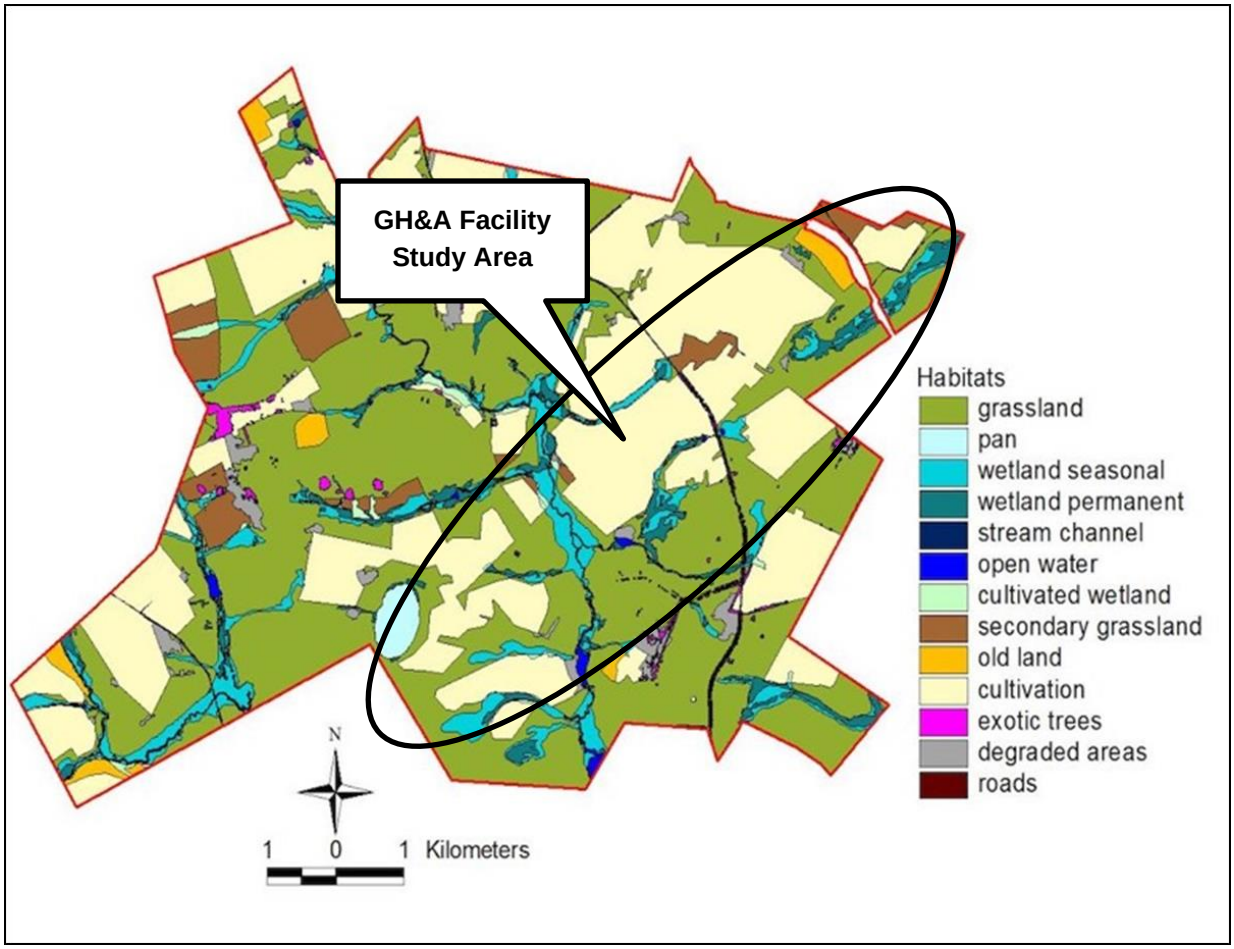


Figure 5-18: Main habitats of the study area (David Hoare Consulting, 2021)

To determine ecological sensitivity in the study area, local and regional factors were taken into account. There are some habitats in the study area that have been described as sensitive in their own right, irrespective of regional assessments. This includes primarily the stream beds and associated riparian zones and adjacent floodplains.

At a regional level, the CBA map for Mpumalanga indicates various parts of the study area as being important for conservation. There are large parts of the study area that fall within CBAs. Much of the remainder of the study area is heavily modified. The CBA map therefore corresponds with the distribution of remaining natural habitat on site.

In terms of other species of concern, including both plants and animals, the preferred habitat of each of these can be determined or has been described. They are, however, distributed amongst different habitats on site, which means that no single habitat is primarily important as habitat for species of concern.

A summary of sensitivities that occur on site and that may be vulnerable to damage from the proposed project are as follows:

- **CBA "Irreplaceable" areas**: The Mpumalanga Biodiversity Sector Plan (MBSP) (Mpumalanga Parks and Tourism Agency 2014) shows areas on site within various conservation planning categories, including areas designated as "CBA: Irreplaceable". These are areas that are required to meet biodiversity targets (for biodiversity pattern and ecological process features), the implication being that there are no other areas that meet the biodiversity criteria for meeting these conservation planning objectives. The Provincial policy is that they should remain in a natural state. Where possible, impacts on these areas should be minimised.
- **Wetlands**: These are described here only in terms of being a unique botanical habitat and not in the sense of a formal wetland delineation, which is normally assessed in a separate specialist study. The wetlands must be delineated according to "DWAF, 2003: A Practical Guideline Procedure for the Identification and Delineation of Wetlands and Riparian Zones". Restrictions in terms of infrastructure within these areas should be according to the National Water Act (Act 36 of 1998), except where the wetlands fall within a CBA "Irreplaceable" area, in which case they should be considered to be "No-Go" areas.
- **Listed ecosystems**: Chrissiesmeer Panveld is listed as Endangered, and Eastern Highveld Grassland and Eastern Temperate Freshwater Wetlands are both listed as Vulnerable in the National List of Ecosystems that are Threatened and need of protection (GN1002 of 2011). However, the first two are included almost entirely within a CBA: Irreplaceable area on site, so is already discussed in point 1 above. The second is a wetland vegetation type and is covered in point 2 above.
- **Grasslands**: Grassland vegetation, in a general sense has been identified as threatened nationally as a habitat type. Indications are that loss of any grassland habitat is permanent in an ecological and biodiversity sense, and it is not possible to restore grassland to a natural state after they have been disturbed. They should therefore be treated as sensitive and all efforts made to minimize impacts on any area of grassland. If possible, the footprint of any proposed infrastructure should be kept to a minimum within any natural grasslands, especially those in a moderate to good condition.
- **Plant species of concern**: There are a number of listed plant species that could potentially occur on site. The key habitats are grasslands and wetlands. There are also various protected species that could potentially occur on site

Based on this information, a map of habitat sensitivity on site is provided in **Figure 5-19**. This shows main habitat sensitivity classes on site, as follows:

- LOW for all transformed areas.
- MEDIUM-LOW for secondary grasslands in previously cultivated areas.
- MEDIUM for cultivated wetlands.
- MEDIUM-HIGH for all remaining natural habitat on site.
- HIGH for remaining natural habitat within "CBA: Irreplaceable" and "CBA: Optimal" areas.
- VERY HIGH for intact natural wetlands

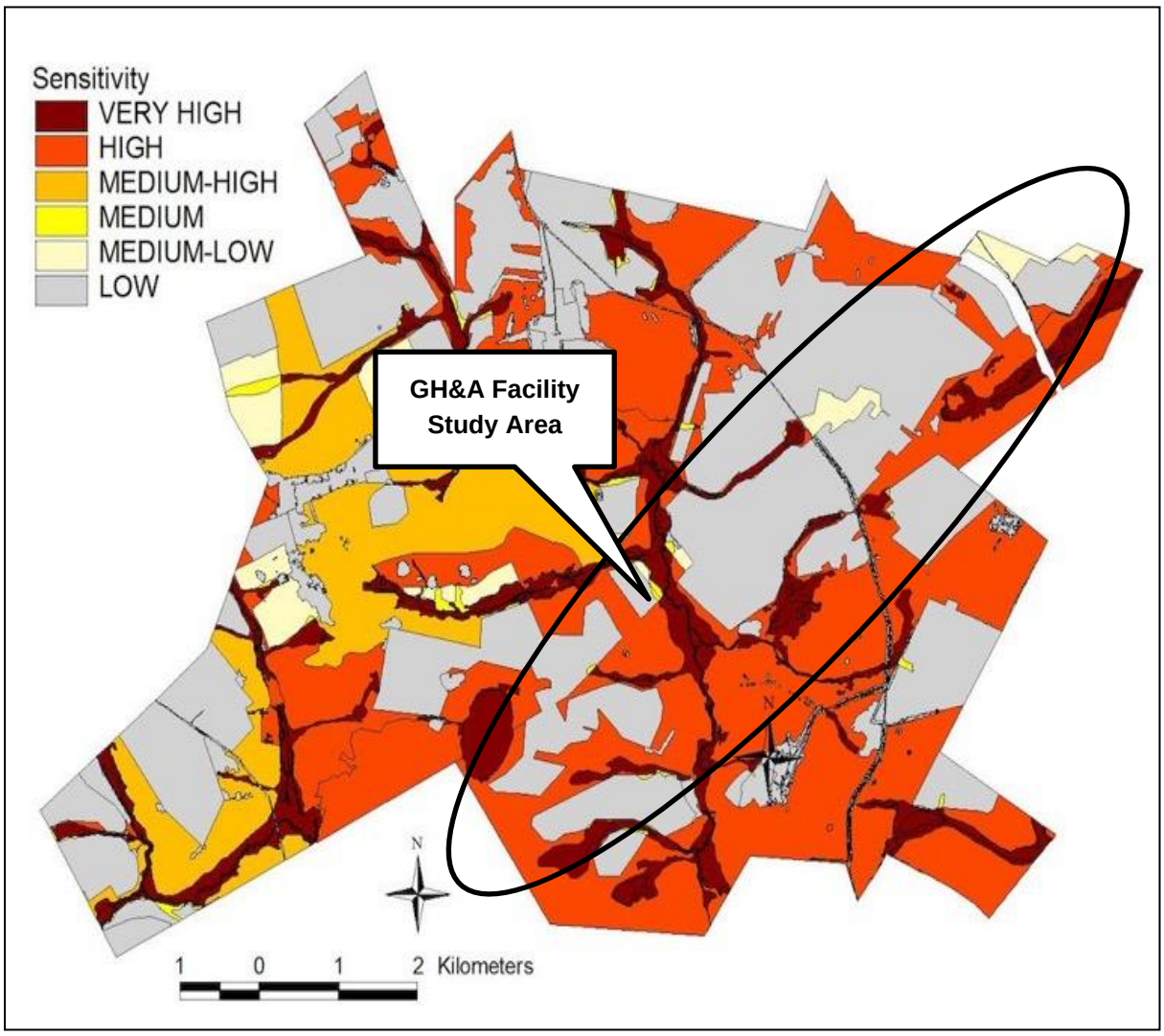


Figure 5-19: Habitat Sensitivity of the Study Area, including CBAs

5.2.6 AVIFAUNA

IMPORTANT BIRD AREAS

The project site is not located in an Important Bird Area (IBA), but it is located between three IBAs. The closest IBA to the project site is the Amersfoort-Bethal-Carolina IBA SA018, which is located within 1.5km from the site to the west. The Grasslands IBA SA020 is located 6-7km to the east of the site. The Chrissies Pans IBA SA019 is located 16-17km to the north-east of the site. Due to the close proximity of the site to the IBAs, it is possible that some highly mobile priority species which are also IBA trigger species, and which occur either permanently or sporadically in the IBAs, might be impacted by the project when they leave to forage or breed beyond the borders of the IBA. Species that were recorded in the broader areas and fall within this category are the following:

- Secretarybird
- Denham's Bustard
- Blue Crane
- Grey Crowned Crane
- Wattled Crane
- Martial Eagle

- Lanner Falcon
- Greater Flamingo
- Lesser Flamingo
- African Marsh Harrier
- Black Harrier
- Southern Bald Ibis
- African Grass Owl

BIRD HABITAT

Whilst much of the distribution and abundance of the bird species in the project site can be explained by the dominant biomes and vegetation types, it is also important to examine the modifications which have changed the natural landscape, and which may have an effect on the distribution of avifauna. These are sometimes evident at a much smaller spatial scale than the biome or vegetation types, and are determined by a host of factors such as topography, land use and man-made infrastructure.

The following bird habitat classes were identified in the project site:

GRASSLAND

The majority of the habitat in the project site comprises natural grassland. The grassland varies from dense stands of relatively high grass to areas of heavily grazed short grass. The priority species which could potentially use the natural grassland in the project site on a regular basis are the following:

- Secretarybird
- White-bellied Bustard
- Blue Crane
- Grey Crowned Crane
- Lanner Falcon
- Southern Bald Ibis
- Blue Korhaan
- African Grass Owl

The priority species which could occasionally use the natural grassland in the project site are the following:

- Denham's Bustard
- Martial Eagle
- African Marsh Harrier
- Black Harrier
- Montagu's Harrier
- Cape Vulture

AGRICULTURAL LANDS

The project site contains a patchwork of agricultural fields, where maize, soya beans and pastures are cultivated. Some fields are lying fallow or are in the process of being re-vegetated by grass. The priority species which could potentially use the agricultural fields in the project site on a regular basis are the following:

- Blue Crane
- Grey Crowned Crane
- Lanner Falcon
- Southern Bald Ibis

The priority species which could occasionally use the agricultural lands in the project site are the following:

- Denham's Bustard
- Brown Snake Eagle
- Martial Eagle

— Cape Vulture

PRIORITY SPECIES

The South African Bird Atlas Project 2 (SABAP2) data indicates that a total of 234 bird species could potentially occur within the broader area. Appendix 1 of the Avifauna Scoping Report (**Appendix J**) provides a comprehensive list of all the species. Of these, 37 species are classified as priority species (see definition of priority species in section 4) and 16 of these are South African Red List species. Of the priority species, 25 are likely to occur regularly in the development area.

Table 5-8 lists all the priority species that are likely to occur regularly and the possible impact on the respective species by the proposed wind farm. The following abbreviations and acronyms are used:

— NT = Near threatened
— VU = Vulnerable
— EN = Endangered

Table 5-8: Priority species potentially occurring at the development area

SPECIES NAME	SCIENTIFIC NAME	SABAP2 FULL PROTOCOL REPORTING RATE	SABAP2 AD HOC PROTOCOL REPORTING RATE	GLOBAL STATUS	REGIONAL STATUS	RECORDED DURING SURVEYS	LIKELIHOOD OF REGULAR OCCURRENCE	GRASSLAND	AGRICULTURE	POWERLINE - COLLISION	DISPLACEMENT: DISTURBANCE	DISPLACEMENT: HABITAT TRANSFORMATION	ELECTROCUTIONS: 132KV GRID
African Grass Owl	*Tyto capensis*	2.4	0	-	VU	x	M	x		x	x	x	
Denham's Bustard	*Neotis denhami*	1.8	0	NT	VU		L	x		x	x	x	
Lanner Falcon	*Falco biarmicus*	7.3	0	-	VU	x	M	x	x				
Secretarybird	*Sagittarius serpentarius*	13	0	EN	VU	x	H	x		x	x	x	
Southern Bald Ibis	*Geronticus calvus*	23	3.1	VU	VU	x	H	x	x	x			
White-bellied Bustard	*Eupodotis senegalensis*	7.9	0	-	VU	x	M	x		x	x	x	
Blue Crane	*Grus paradisea*	12	0.4	VU	NT	x	H	x	x	x	x	x	
Greater Flamingo	*Phoenicopterus roseus*	3.6	4.4	-	NT	x	M			x			
Lesser Flamingo	*Phoeniconaias minor*	3.6	1.3	NT	NT	x	M			x			

SPECIES NAME	SCIENTIFIC NAME	SABAP2 FULL PROTOCOL REPORTING RATE	SABAP2 AD HOC PROTOCOL REPORTING RATE	GLOBAL STATUS	REGIONAL STATUS	RECORDED DURING SURVEYS	LIKELIHOOD OF REGULAR OCCURRENCE	GRASSLAND	AGRICULTURE	POWERLINE - COLLISION	DISPLACEMENT: DISTURBANCE	DISPLACEMENT: HABITAT TRANSFORMATION	ELECTROCUTIONS: 132KV GRID
African Marsh Harrier	*Circus ranivorus*	0.6	0	-	EN		L						
Black Harrier	*Circus maurus*	0	0.9	EN	EN		L	x					
Cape Vulture	*Gyps coprotheres*	0	0	EN	EN	x	L	x		x			x
Grey Crowned Crane	*Balearica regulorum*	5.5	0	EN	EN	x	M	x	x	x	x	x	
Martial Eagle	*Polemaetus bellicosus*	2.4	0	EN	EN	x	L	x					
Wattled Crane	*Grus carunculata*	0.6	0	VU	CR		L			x			

AVIFAUNA SENSITIVITY

The following specific environmental sensitivities have been identified from an avifaunal perspective:

- **100m all infrastructure exclusion zone (barring essential roads and grid line crossings) around drainage lines and associated wetlands.** Wetlands are important breeding, roosting and foraging habitat for a variety of Red List priority species, most notably for African Grass Owl (SA status Vulnerable), Grey Crowned Crane (SA status Endangered) and African Marsh Harrier (SA status Endangered).
- **High sensitivity grassland - Limited infrastructure zone.** Development in the remaining high sensitivity grassland in the project site must be limited as far as possible. The grassland is vital breeding, roosting and foraging habitat for a variety of Red List priority species. These include Blue Crane (SA status near-threatened), Blue Korhaan (Global status near -threatened), White-bellied Bustard (SA Status Vulnerable), Denham's Bustard (SA Status Vulnerable) and Secretarybird (Global and SA status Endangered).

The avifaunal sensitivities for the Camden I GH&A Facility are shown in **Figure 5-20.**

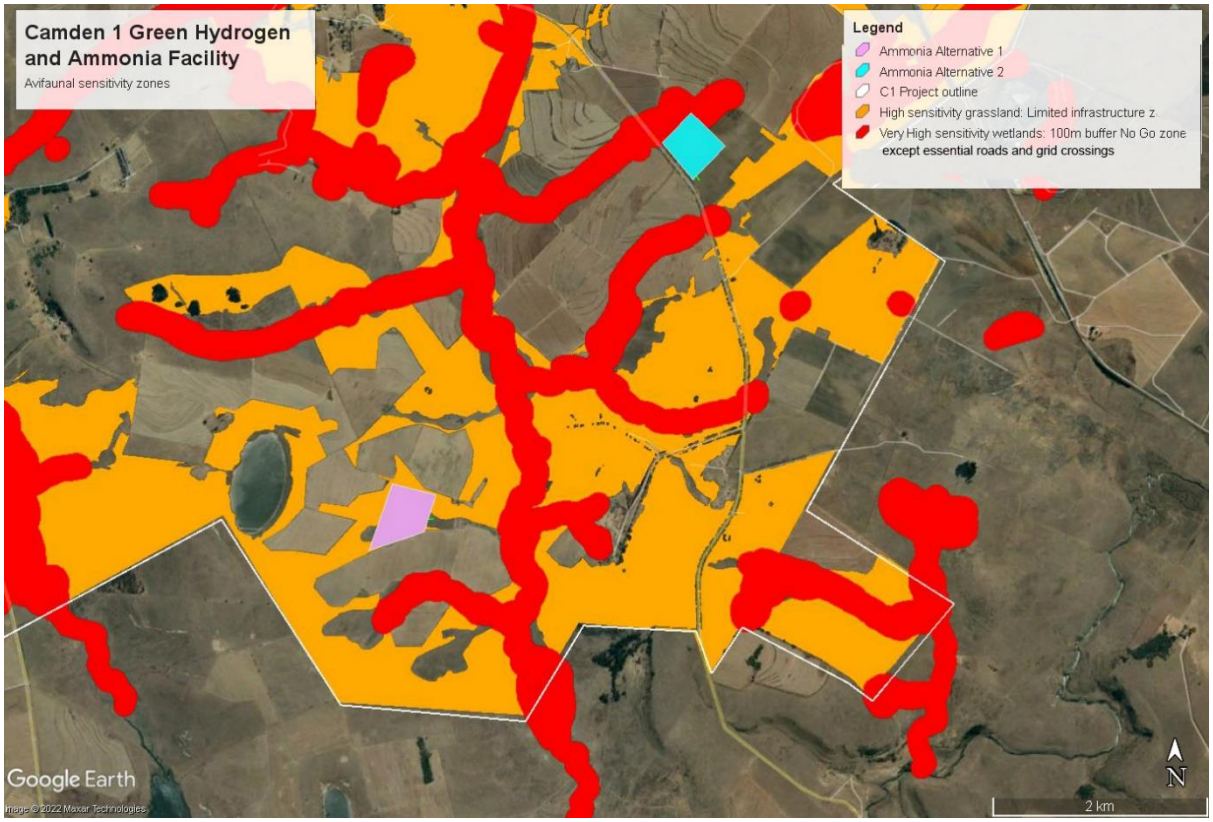


Figure 5-20: Proposed avifaunal sensitivities at the Camden I GH&A Facility (Chris van Rooyen Consulting, 2021).

5.3 SOCIAL ENVIRONMENT

5.3.1 LAND USE

DEVELOPMENT SITE

The site is used for cultivation and for the grazing of both cattle and sheep. Cultivated crops include maize, soya beans and the fodder crop, weeping love grass, *Eragrostis curvula*.

In terms of the South African National Land Cover dataset, the site is classified as Grassland interspersed with cultivation areas, Small tracts of forested land and numerous water bodies are scattered throughout the study area (**Figure 5-21**).

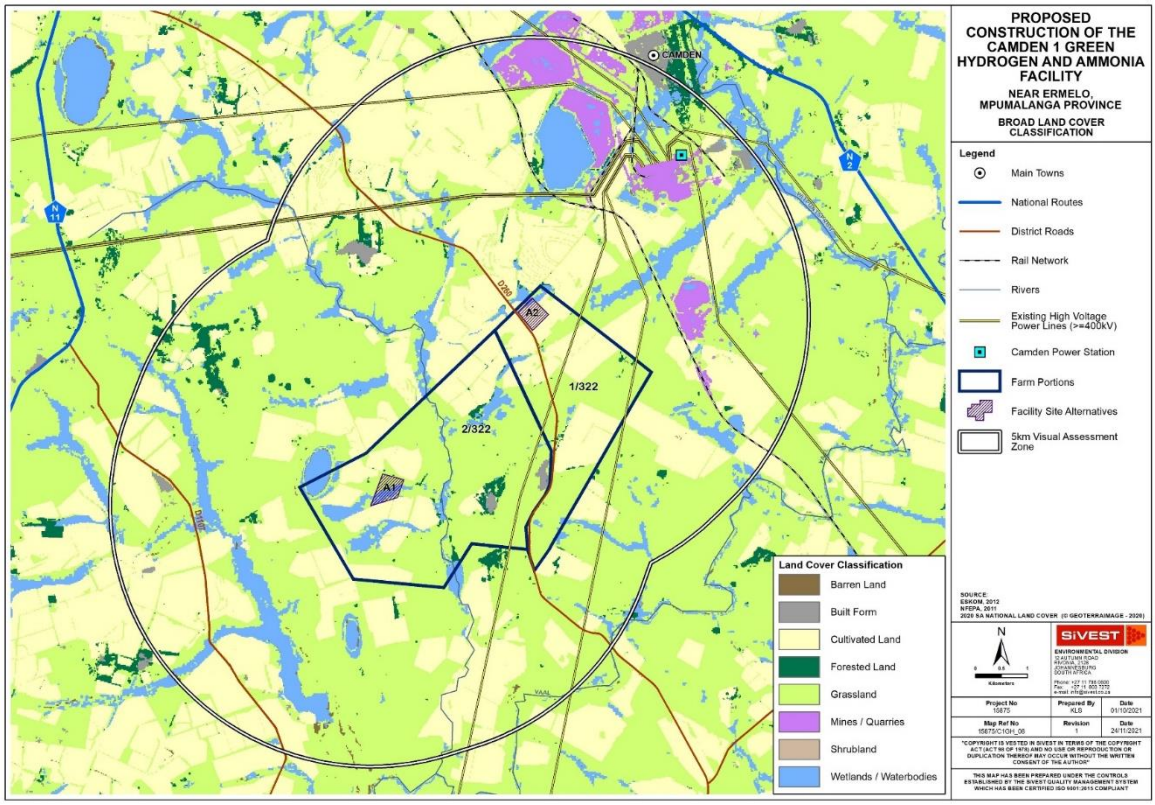


Figure 5-21: Broad land cover classification (SiVest 2021)

SURROUNDING AREAS

The broader study area is located approximately 10km south east of the town of Ermelo. The only other settlement in the area is the rural settlement of Sheepmore located approximately 20 km to the east of the proposed project site.

Commercial agriculture is the dominant activity in the study area, with the main focus being maize cultivation and livestock grazing. There are multiple farm portions in the broader study area, resulting in a relatively moderate density of rural settlement with many scattered farmsteads in evidence. Built form in much of the study area comprises farmsteads, ancillary farm buildings and workers' dwellings, gravel access roads, telephone lines, fences and windmills.

High levels of human influence are however visible in the northern / north-eastern sector of the broader study area. Much of the town of Ermelo encroaches into the study area and peri-urban areas stretching southwards from Ermelo along the N2 national route are dominated by mining activity and associated infrastructure, including Mooiplaats and Vunene Collieries. Also located in this area is the Camden Power Station with associated high voltage power lines, and the adjacent Camden residential area.

Other evidence of significant human influence includes a sizeable quarry (Rietspruit Crushers) located to the west of the N11 national route, as well as road, rail, telecommunications and high voltage electricity infrastructure.

5.3.2 NOISE CLIMATE

The existing noise climate surrounding the Camden I GH&A Facility is predominantly rural with very low baseline noise levels anticipated. Noise sources may include birds, insects, livestock and activities of resident farmers. Anthropogenic influences may include traffic on local roads and on the nearby N2 and N11 National roads as well as train activity along the railway line located just northeast of the study area. A distinctive hum from the nearby Camden power station may also be evident at receptors in close proximity to the power station.

Sensitive receptors are identified as areas that may be impacted negatively due to noise associated with the proposed GH&A Facility. Examples of receptors include, but are not limited to, schools, shopping centres, hospitals, office blocks and residential areas. Being such a remotely located site, dominant receptors in the area surrounding the site include small farmsteads and farmhouses. The specific sensitive receptors (farmhouses) considered in this study are presented in **Figure 5-22**.

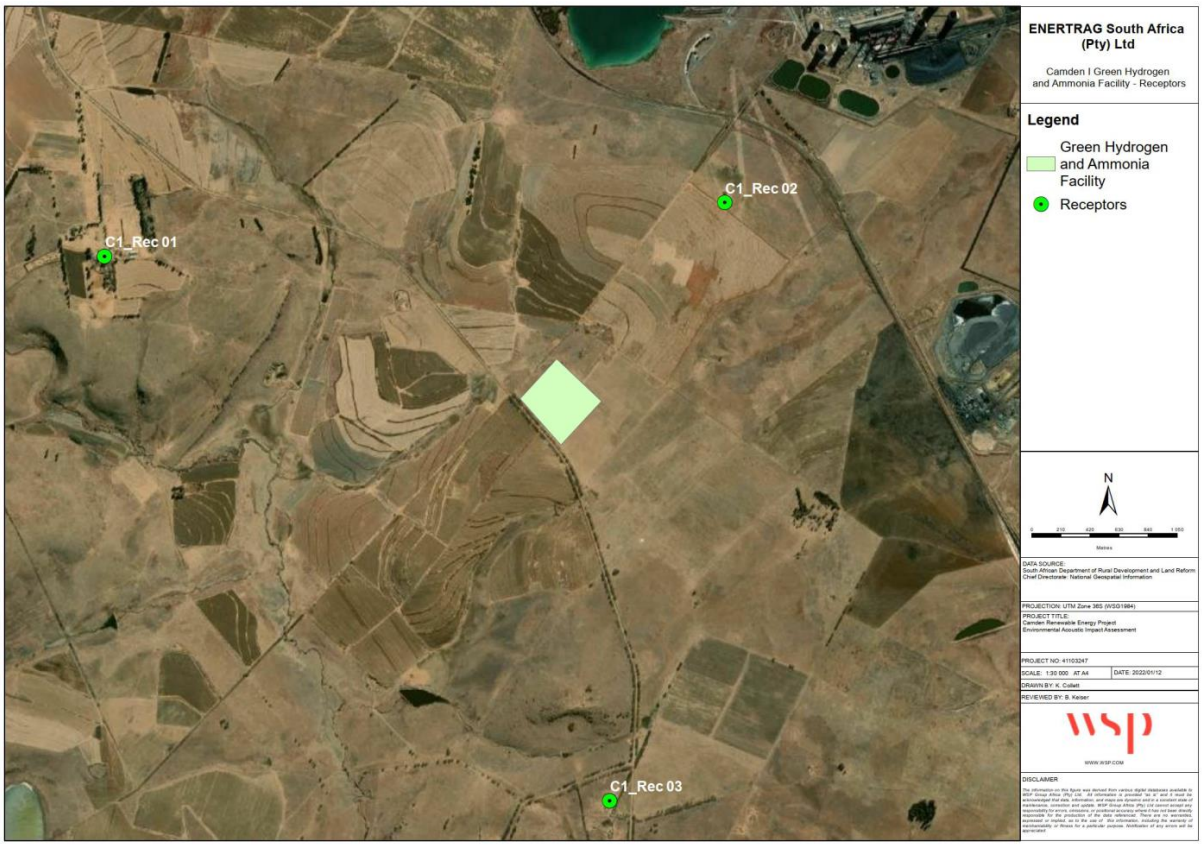


Figure 5-22: Sensitive receptors surrounding the Camden I GH&A Facility Preferred Alternative

5.3.3 TRANSPORT NETWORK

The local road network consists of the N2 to the north and north east of the project site, and the N11 to the west and south of the site. The Richards Bay railway line traverse the site to the south of the Camden Power station site. There are 3 landing strips within Msukaligwa municipality one municipal landing strip in Ermelo with tarred runaway for various activities, one at Warburton and Woodstock farms respectively used for fire-fighting purposes by forestry companies.

5.3.4 HERITAGE AND CULTURAL RESOURCES

The Camden power station and associated small town is situated 16km south from Ermelo in Mpumalanga. The archaeological record for the greater study area consists of the Stone Age and Iron Age.

STONE AGE

The Stone Age of southern Africa starts when hominins (ancestral to modern-day humans) first started to produce crude tools made with stone. The Earlier Stone Age (2 million - 200 000 years ago) is associated with hominins such as Homo habilis and Homo erectus (Dusseldorp et al. 2013). Mpumalanga currently does not have an extensive ESA archaeological record, at Maleoskop on the farm Rietkloof, only a few ESA artefacts have been found and stone tools consisted of choppers (Oldowan), hand axes, and cleavers (Acheulean) (Esterhuysen & Smith 2007) and some surface scatters have been recorded near Piet Retief (Nel & Karodia 2013).

Middle Stone Age artefacts represents archaic and modern humans that occupied the landscape between 300 000 to 40 000 before present. Later Stone Age occupational sequences reflect San and Khoisan communities from 40 000 years ago until recently (Dusseldorp et al. 2013). Although the MSA and LSA has not been extensively studied in Mpumalanga, evidence for these periods has been excavated from Bushman Rock Shelter in the Ohrigstad District (Esterhuysen & Smith 2007; Lombard et al. 2012) and it is known that San communities lived near Lake Chrissie as recently as the 1950s (e.g., Schlebusch et al. 2016). MSA and LSA surface scatters have also been investigated in the vicinity of Piet Retief, and De Wittekrans nearby Camden is a Later Stone Age archaeological rock art site complex (Nel & Karodia 2013).

IRON AGE

The archaeology of farming communities of southern Africa encompasses three phases. The Early Iron Age (200-900 CE) represents the arrival of Bantu-speaking farmers in southern Africa. Living in sedentary settlements often located next to rivers, these farmers cultivated sorghum, beans, cowpeas, and kept livestock. The Middle Iron Age (900-1300 CE) is mostly confined to the Limpopo Valley in southern Africa with Mapungubwe Hill probably representing the earliest 'state' in this region (Huffman 2007).

The Late Iron Age (1300-1840s CE) marks the arrival and spread of ancestral Eastern Bantu-speaking Nguni and Sotho-Tswana communities into southern Africa. The location of Late Iron Age settlements is usually on or near hilltops for defensive purposes. The Late Iron Age as an archaeological period ended by 1840 CE, when the Mfecane caused major socio-political disruptions in southern Africa (Huffman 2007).

Dates from Early Iron Age sites indicated that by the beginning of the 5th century CE Bantu-speaking farmers had settled in the Mpumalanga lowveld. Subsequently, farmers continued to move into and between the lowveld and highveld of Mpumalanga. Iron Age sites such as Welgelegen Shelter, Robertsdrift and Tafelkop situated 50-100 km west of Camden dates from the 12th to the 18th century (Derricourt & Evers 1973; Esterhuysen & Smith 2007).

During the mid-17th century Europeans started to settle in modern-day Cape Town. During and after the conflict caused by the Mfecane (1820-1840), during the reign of king kaSenzangakhona Zulu, known as Shaka, Dutch-speaking farmers started to migrate to the interior regions of South Africa. A period that is marked by various skirmishes and battles between the local inhabitants, Dutch settlers and the British (Giliomee & Mbenga 2007).

HISTORICAL CONTEXT OF CAMDEN

Camden power station was commissioned in 1967 (Gaigher 2011; Matenga 2020). However, the nearby town of Ermelo has a rich history. The earliest record for settlers in Ermelo is from 1860, when the area was under the jurisdiction of Zulu-speaking Nhlapo communities (Nhlapo 1945). The construction of the town of Ermelo was initiated by the Dutch Reform Church, which purchased the eastern part of the farm Nooitgedacht on 26 May 1879. The town was officially proclaimed on 12 February 1880 by William Owen Lanyon, the Administrator of the Transvaal (Greyling 2017).

BATTLEFIELDS AND WAR HISTORY

Due to the proximity of Ermelo to the Nederlandsche Zuid-Afrikaansche Spoorweg-Maatskappij railway line linking Pretoria with Lourenço Marques (Maputo), the area was subject to various skirmishes during the Anglo-Boer War of 1899-1902. At the time there were about 100 families residing in the town and many women and children were sent to British concentration camps. In 1901, British troops burnt the town down due to their scorched earth policy, and Ermelo was rebuilt in 1903 (Moody 1977; Pretorius 2000; Van Schalkwyk 2012; Greyling 2017).

GRAVES AND BURIAL SITES

No graves are indicated by the Genealogical Society of the South Africa for the study area. The Klipbank cemetery with 21 graves is indicated 3,6 km to the south of the Project.

CULTURAL LANDSCAPE

The greater area is mostly cultivated, and forms part of a landscape characterised by wide scale cultivation and mining activities. Development in the study area is limited to farming infrastructure such as access roads, fences, and agricultural developments.

5.3.5 VISUAL CHARATER AND SENSITIVITY

VISUAL CHARACTER AND CULTURAL VALUE

The physical and land use-related characteristics of the study area as described above contribute to its overall visual character. Visual character largely depends on the level of change or transformation from a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural, undisturbed landscape. Visual character is also influenced by the presence of built infrastructure including buildings, roads and other objects such as telephone or electrical infrastructure. The visual character of an area largely determines the sense of place relevant to the area. This is the unique quality or character of a place, whether natural, rural or urban which results in a uniqueness, distinctiveness or strong identity.

The predominant land use in the area (maize cultivation) has significantly transformed the natural landscape across much of the study area. In addition, the landscape becomes progressively more transformed towards the north-eastern boundary of the study area where Camden Power Station and mining activities have resulted in a high degree of visual degradation. The more industrial character of the landscape is an important factor in this context, as the introduction of the proposed Facility would result in less visual contrast where other anthropogenic elements are already present, especially where the scale of those elements is similar to that of the proposed development.

The scenic quality of the landscape is also an important factor that contributes to the visual character or inherent sense of place. Visual appeal is often associated with unique natural features or distinct variations in form. As such, the pastoral landscape and rolling hills in parts of the study area are important features that could increase the visual appeal and visual interest in the area.

Cultural landscapes are becoming increasingly important concepts in terms of the preservation and management of rural and urban settings across the world. The concept of ‘cultural landscape’ is a way of looking at a place that focuses on the relationship between human activity and the biophysical environment (Breedlove, 2002). In this instance, the rural / pastoral landscape represents how the environment has shaped the predominant land use and economic activity practiced in the area, as well as the patterns of human habitation and interaction. The presence of small towns, such as Ermelo, engulfed by an otherwise rural / pastoral environment, form an integral part of the wider landscape.

In light of this, it is important to assess whether the introduction of the Facility as proposed would be a degrading factor in the context of the prevailing character of the cultural landscape. Broadly speaking, visual impacts on the cultural landscape in the area around the proposed development would be reduced by the fact that the visual character in much of the area has been significantly transformed and degraded by mining and infrastructural development.

VISUAL CONTRAST

The visual contrast of a development refers to the degree to which the development would be congruent with the surrounding environment. This is based on whether or not the development would conform to the land use, settlement density, structural scale, form and pattern of natural elements that define the structure of the surrounding landscape. Visual compatibility is an important factor to be considered when assessing the impact of the development on receptors within a specific context. A development that is incongruent with the surrounding area could change the visual character of the landscape and have a significant visual impact on sensitive receptors.

In order to determine the likely visual compatibility of the proposed development, the study area was classified into the following zones of visual contrast:

- High – undeveloped / natural / rural areas.
- Moderate –
  - areas within 500m of existing power lines (>=88kV);
  - areas within 500m of railway infrastructure;
  - cultivated areas and smallholdings.

- Low –
  - areas within 500m of urban / built-up areas;
  - areas within 500m of quarries / mines etc;
  - areas within 500m of Camden Power Station;

These zones are depicted in **Figure 5-23**.

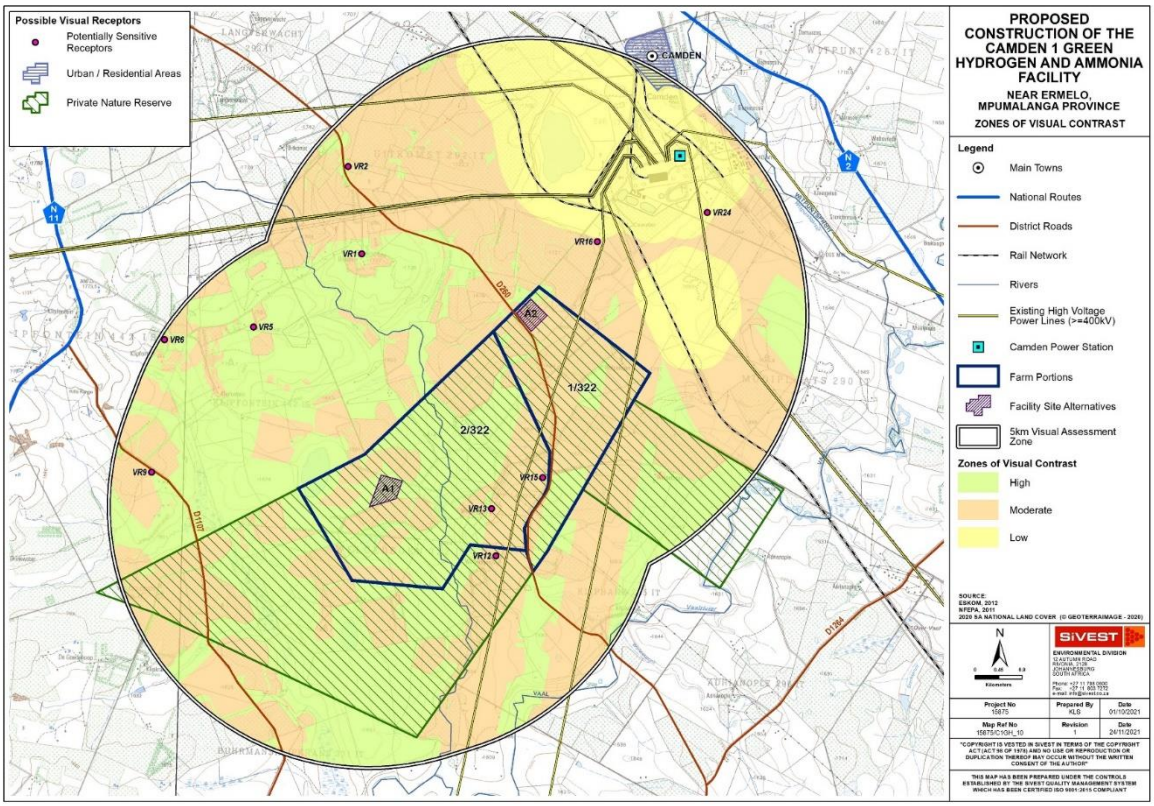


Figure 5-23: Zones of Visual Contrast for the Camden I GH&A Facility

5.3.6 SOCIO-ECONOMIC

SOCIAL OVERVIEW OF THE STUDY AREA

The study area is located ~ 10 km to the south-east of the town of Ermelo, which is the administrative centre of the Msukaligwa Local Municipality. Ermelo is also known as the garden city of Mpumalanga and the gateway to the province. The only other settlement in the area is the rural settlement of Sheepmore located ~ 20 km to the east of the site.

Three national highways, namely the N2, N11 and the N17 intersect at Ermelo. The N2 freeway connects Ermelo with Richards Bay on the KwaZulu Natal coastline. The N11 South connects the town to Newcastle to the south and then onto the Ladysmith before linking up with the N3 to Durban. The N11 north connects to Middelburg and the N4 freeway west to Pretoria. The N17 West connects the town to the southern suburbs of Johannesburg and N17 East to eSwatini.

Ermelo is also a major railway junction between Mpumalanga and KwaZulu-Natal. The rail junction connects to Machadodorp which is on the Pretoria and Maputo railway line. The town also lies on the railway line that connects the Mpumalanga coalfields with the export Port of Richards Bay on the Indian Ocean.

The study area is flanked by the N2 to the north and north-east of the site, and the N11 to the west and south west of the site. The Richards Bay railway line traverse the site to the south of the Camden Power station site (**Figure 5-24**). The Eskom Camden Coal Power station is located immediately to the north and north east of the

site. Construction of the 1600 MW power station commenced in November/December 1962 and the first turbo-generator was commissioned in April 1967. The last of the eight units was commissioned in 1969. The Camden Power station became the starting point of the national power grid, consisting of a series of 400 kV lines which today interconnect the entire country. The power station has six 111.86m high cooling towers and four 154m high chimney (smoke stacks) that serve 8 boilers.

Between 1990 and 2006 the station was mothballed, but South Africa's energy crisis in the early 21st century prompted Eskom to recommission the station, starting with unit 6 in July 2005 and completing with unit 1 in July 2008.

The development of the Camden Power station also involved the construction of 356 permanent houses to the north of the power station to accommodate administration, operating and maintenance personnel. Community facilities including a community hall, sports facilities, included four tennis courts, a bowling green, swimming bath, shooting range, rugby, hockey, soccer, and cricket fields and jukskei, and the associated clubhouses and changerooms were also established. Several parks, situated throughout the residential property, provided playgrounds for some 500 children at Camden. Schooling was provided in Ermelo for these children, with a regular bus service operating between Camden and Ermelo[14].

The other land uses in the study area include coal mining and commercial agriculture. Commercial agriculture in the area between the N2 and N11 to the south and west of the Camden Power Station includes livestock and grain farming. There are a number of farmsteads associated with the farming operations in the area, some of which are no longer inhabited. The number of occupied farmsteads will be confirmed during the site visit undertaken during the assessment phase. A guest farm, the Drinkwater Guest Farm, is located adjacent to and east of the N11, ~ 14 km south west of the Camden Power Station.

The social environment can therefore be described is a working agricultural / industrial (power related) environment. With the exception of the Drinkwater Guest Farm there do not appear to be any other tourist related activities located in the study area. Therefore, from a social perspective there appear to be a limited number of sensitive social receptors.

Figure 5-24: Camden Power Station

[14] https://www.eskom.co.za/sites/heritage/Pages/Camden.aspx

ADMINISTRATIVE CONTEXT

The study area is located within the Msukaligwa Local Municipality within the Mpumalanga Province. The MM is one of the seven Local Municipalities that make up the Gert Sibande District Municipality (**Figure 5-25**). The town of Ermelo is the administrative seat of the Msukaligwa Local Municipality.

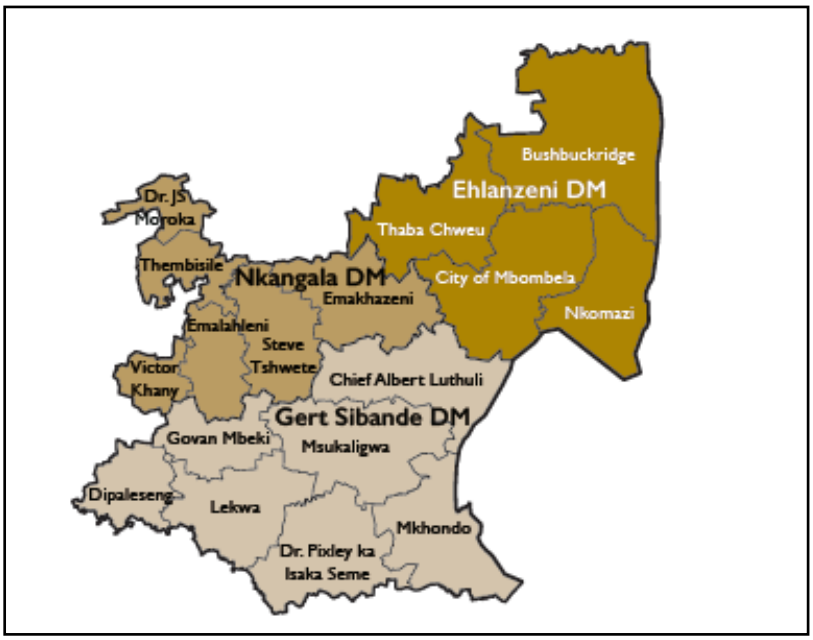


Figure 5-25: Location of Msukaligwa Municipality within the Gert Sibande District Municipality and Mpumalanga Province

DEMOGRAPHIC OVERVIEW

POPULATION

The population of the Msukaligwa Local Municipality in 2016 was 164 608 (Community Household Survey 2016). Of this total, 35.4% were under the age of 18, 60.4% were between 18 and 64, and the remaining 4.1% were 65 and older. The MM therefore had a high percentage of the population that fall within the economically active group of 18-65. The figures are higher than the figures for the GSDM and Mpumalanga (57.7% and 56.6% respectively). This is likely to be due to the employment opportunities associated with the mining and manufacturing activities in the Msukaligwa Local Municipality.

The dependency ratio is the ratio of non-economically active dependents (usually people younger than 15 or older than 64) to the working age population group (15-64). The higher the dependency ratio the larger the percentage of the population dependent on the economically active age group. This in turn translates to reduced revenue for local authorities to meet the growing demand for services. The traditional approach is based people younger than 15 or older than 64. The information provided provides information for the age group under 18. The total number of people falling within this age group will therefore be higher than the 0-15 age group. However, most people between the age of 15 and 17 are not economically active (i.e., they are likely to be at school).

Using information on people under the age of 18 is therefore likely to represent a more accurate reflection of the dependency ratio. Based on these figures, the dependency ratios for the Msukaligwa Local Municipality, the GSDM and Mpumalanga in 2016 were 65.4%, 73.5% and 77% respectively. The high dependency ratios reflect the limited employment and economic opportunities in the area and the province as a whole. As indicated above, a high dependency ratio also places pressure on local authorities in terms of service delivery.

In terms of race groups, Black Africans made up 91.6% of the population on the MM, followed by Whites, 6.9% and Asian or Indians, 0.9%, and Coloureds, 0.6%. This figures for the GSDM are similar. The main first language spoken in the Msukaligwa Local Municipality was isizulu, 79.1%, followed by Siswati, 7.3% and Afrikaans, 6.2%.

HOUSEHOLDS AND HOUSE TYPES

The total number of households in the Msukaligwa Local Municipality in 2016 was 51 090, which constituted approximately 20% of the total number of households in the GSDM. Of these 66.2% were formal houses, 9.1% flats in backyards, 6.6% traditional dwellings, and 9.4% shacks or informal dwellings. The figures for the GSDM were 67.2%, 4.6%, 6.7% and 13.4% respectively. The majority of dwellings in the Msukaligwa Local Municipality are therefore formal structures. A relatively large percentage of the properties in the MM (43.3%), while 5.9% were owned and in the process of being paid off. 22.1% of the households rented their properties, while 10.6% occupied their properties rent free. The rent-free figure is likely to be associated with farm workers. The relatively high number of properties that are owned and or in the process of being paid off reflects a relatively stable and established community.

In terms of household heads, approximately 38.9% of the households in the Msukaligwa Local Municipality and 39.1% of the households in the GSDM were headed by women. These figures similar to the provincial figure of 39.71%. The high percentage of households headed by women reflects the likelihood that the men have left the area in search of employment opportunities in Gauteng. Women headed households tend to be more vulnerable.

HOUSEHOLD INCOME

Based on the data from the 2011 Census, 12.6% of the population of the Msukaligwa Local Municipality had no formal income, 4.1% earned less than R 4 800, 7.1% earned between R 5 000 and R 10 000 per annum, 17.7% between R 10 000 and R 20 000 per annum and 20.9% between R 20 000 and 40 000 per annum (2016). The poverty gap indicator produced by the World Bank Development Research Group measures poverty using information from household per capita income/consumption. This indicator illustrates the average shortfall of the total population from the poverty line. This measurement is used to reflect the intensity of poverty, which is based on living on less than R3 200 per month for an average sized household (~ 40 000 per annum). Based on this measure, in the region of 62.4% of the households in the Msukaligwa Local Municipality and 65.2% in the GSDM live close to or below the poverty line.

The low-income levels reflect the rural nature of the local economy and the limited formal employment opportunities outside in the urban areas. This is also reflected in the high unemployment rates. The low-income levels are a major concern given that an increasing number of individuals and households are likely to be dependent on social grants. The low-income levels also result in reduced spending in the local economy and less tax and rates revenue for the Msukaligwa Local Municipality. This in turn impacts on the ability of the Msukaligwa Local Municipality to maintain and provide services.

Household income levels are likely to have been impacted by the COVID-19 pandemic. The number of households in the Msukaligwa Local Municipality and GSDM that live close to or below the poverty line is likely to have increased over the last 18 months. This, coupled with the high dependency ratio, is a major cause of concern for the area.

EMPLOYMENT

The official unemployment rate in the Msukaligwa Local Municipality in 2016 was 15.6%, while 42.6% were employed, and 36.4% were regarded as not economically active. However, the COVID-19 pandemic is likely to have resulted in an increase in unemployment rates in both the ULM and Ward 3. Recent figures released by Stats South Africa also indicate that South Africa's unemployment rate is in the region of 36%, the highest formal unemployment rate in the world.

EDUCATION

In terms of education levels, the percentage of the population over 20 years of age in the Msukaligwa Local Municipality and GSDM with no schooling was 10.6% (2016), compared to 10.8% and 11.3% for the GSDM and Mpumalanga Cape Province. The percentage of the population over the age of 20 with matric was 34.12%, compared to 34.3% and 36.1% for the GSDM and Mpumalanga. The education levels for the Msukaligwa Local Municipality are therefore similar to the DM and Provincial figures.

MUNICIPAL SERVICES

ELECTRICITY

Based on 2016 survey, 87% of households in the Msukaligwa Local Municipality had access to electricity, compared to 90% for the GSDM and 93% for Mpumalanga.

ACCESS TO WATER

Based on the 2016 survey information, 81.7% of households in the Msukaligwa Local Municipality were supplied by a service provider, while 5.8% relied on their own service or natural sources (4%). The reliance on own services or natural sources reflects the rural nature of large parts the Msukaligwa Local Municipality.

SANITATION

72.3% of the households in the Msukaligwa Local Municipality had access to flush toilets (2016), while 18.8% relied on pit toilets and 3.2% had no access to formal sanitation. The high percentage of households that rely on pit toilets is linked to the relatively high percentage (9.4%) of households that live in shacks.

REFUSE COLLECTION

Only 59.4% of the households in the Msukaligwa Local Municipality had access to regular refuse removal service, while 16.5% disposed of their waste at their own dump and 7.1% had not access to facilities. The low percentage of households that have access to regular refuse removal services is linked to the relatively high percentage (9.4%) of households that live in shacks. The relatively higher percentage that dispose of their waste at their own dump reflects the rural nature of the area and the difficulty of providing municipal services to areas located at a distance from the main towns in the area.

HEALTH, EDUCATION AND COMMUNITY FACILITIES

HEALTH SERVICES

The Msukaligwa Local Municipality IDP indicates that there is 1 government and 1 private hospital in the Msukaligwa Local Municipality, 10 primary health care clinics, and 4 mobile clinics (**Table 5-9**).

Table 5-9: Health services in Msukaligwa Local Municipality

FACILITIES	NUMBER
Private Hospitals	1
Primary Health Care Clinics	10
Mobile Clinics	4
Government hospitals	1
Infectious Hospital (TB)	1
Dentists	4
Gynaecologist	1
Social Workers	12
Private Doctors	20

EDUCATIONAL FACILITIES

The Msukaligwa Local Municipality IDP indicates that there are 71 primary schools, 6 high schools, 12 combined schools and 11 secondary schools in the Msukaligwa Local Municipality . There is 1 FET College, but no tertiary facility (**Table 5-10**). The IDP notes that given the growth in the area there is a need for at least a tertiary institution within the GSDM. Development within Ermelo has also created a need for more primary and high schools.

Table 5-10: Educational Facilities in Msukaligwa Local Municipality

FACILITY	NUMBER
No. of Primary Schools	71
No. of High School	6
No. of Combined Schools	12

FACILITY	NUMBER
No. of Secondary Schools	11
No. of Tertiary Education Facilities	0
No. of FET Colleges	1
No. of Training Centres/Adult Education	9
No. of Private Schools	3
Day Care Centres	40

COMMUNITY FACILITIES

Table 5-11 lists the community facilities in the Msukaligwa Local Municipality. As indicated in the table, Ermelo as the administrative centre is relatively well catered for in terms of community facilities, including police stations, sports facilities, libraries, community halls and pension pay out points. However, Sheepmore, which is the closest rural settlement to the development area does not have a library and the sports facility is an informal soccer field.

Table 5-11: Community facilities

AREA / TOWN	POLICE STATION	PUBLIC SPORT FACILITIES	PUBLIC LIBRARIES	COMMUNITY HALLS	MPCC/TSC	POST OFFICE	PENSION PAY POINTS	COMMENTS
Breyton / KwaZanele	1	4	2	2	1	1	1	There is one informal soccer field at Breyton
Ermelo, Wesselton, Cassim Park and Thusiville	2	9	4	5	-	1	2	There are five informal soccer fields at Wesselton. The Thusiville library is completed but not yet operating
Chrissiesmeer / Kwachibikhulu	1	1	1	1	-	1	1	There is one informal soccer field as Chrissiesmeer
Davel / Kwadela	1	2	1	1	-	1	1	There is one informal soccer field at KwaDela. There is a complaint that the existing library at Davel is far from the majority of users who reside at KwaDela
Lothair / Silindile	1	1	1	1	1	1	1	The TSC is almost completed and postal services run by agency at Lothair
Sheepmoor	1	1	-	1	-	1	1	There is one informal soccer field at Sheepmoor. No library at Sheepmoor
Warburton / Nganga	-	1	-	-	-	1	-	Postal services run at agency at Warburton. The sport facility is an informal soccer field. No library at Warburton

ECONOMIC OVERVIEW

The economic growth rate for Msukaligwa Local Municipality was at 3.0% per annum on average over the period 1996 to 2017 and forecasted average annual GDP growth for 2017-2022 relatively low at 1.3%. The contribution of Msukaligwa Local Municipality to the Mpumalanga economy was around 4.3%, making it the fifth largest local economy in the province. It is the second largest economy in the District, contributing around 15.5%.21

The key economic sectors in the Msukaligwa Local Municipality in 2017 in terms of contribution to GDP were mining (20.3%), community services (18.5%), trade (including industries such as tourism) (18.2%) and finance (14.2%) (**Table 5-12**). Despite the importance of agriculture, it only contributed 6% to GDP in 2017. The IDP notes that the Msukaligwa Local Municipality has a comparative advantage in economic sectors such as agriculture, transport, and mining.

Table 5-12: Contribution of sectors to Msukaligwa Local Municipality GDP

ECONOMIC SECTOR	2014	2017	CHANGE
Agriculture	5,3%	6,0%	0,7%
Community Services	18,4%	18,5%	0,1%
Construction	2,7%	2,7%	0,0%
Finance	13,3%	14,2%	0,9%
Manufacturing	5,1%	5,1%	0,0%
Mining	20,8%	20,3%	-0,5%
Trade	18,5%	18,2%	-0,3%
Transport	11,3%	11,3%	0,0%
Utilities	4,5%	3,8%	-0,7%

Finance and Agriculture achieved the highest, although slight, growth in contribution from 2014 to 2017. The contribution of utilities, mining and trade declined slightly. In terms of employment, the trade sector (20.6%) was the most important sector in terms of employment, followed by community services (15.3%), mining (12.8%), finance (11.6%) and manufacturing (10.1%) (**Table 5-13**).

Table 5-13: Contribution to employment of sectors in Msukaligwa Local Municipality

EMPLOYMENT SECTOR	2014	2017	CHANGE
Agriculture	6%	6,3%	0,3%
Community Services	14,5%	15,3%	0,8%
Construction	7,9%	8,5%	0,6%
Finance	11,2%	11,6%	0,4%
Manufacturing	9,9%	10,1%	0,2%
Mining	14,7%	12,8%	-1,9%
Trade	21,1%	20,6%	-0,5%
Transport	4,5%	4,7%	0,2%
Utilities	2,5%	2,4%	-0,1%

In terms of unemployment, the Msukaligwa Local Municipality unemployment rate was the 6th lowest among all the municipal areas of Mpumalanga. The unemployment rate deteriorated slightly from 23.1% in 2014 to 24.1% in 2017. Unemployment rates are higher for females at 29.8% and for males at 24.1%. However, youth unemployment at 34.5% is a key concern.

The IDP notes that in terms of future economic development, coal mining can be expected to remain an important sector for the short to medium term. However, the role of this sector is expected to decline in the medium to long term due to limited coal resources, and a move away from a coal-based economy locally and globally due the impact on climate. The current transport and logistics sector is also likely to be impacted on by a decline in coal mining.

6 IDENTIFICATION OF POTENTIAL IMPACTS

The scoping phase of a S&EIR process is aimed to identify potential impacts that are most likely to be significant and which need to be assessed as part of the S&EIR process. The determination of anticipated impacts associated with the proposed development is a key component to the S&EIR process. This Chapter identifies the anticipated environmental and social impacts associated with the proposed project.

The issues identified stem from those aspects presented in **Section 5: Description of Baseline Environment** and the description of project components and phases as outlined in **Section 2: Project Description**. Each significant issue identified is to be investigated further during the S&EIR process. Non-significant issues will be scoped out of the study with reasonable consideration given within the Scoping Report.

6.1 AIR QUALITY

Construction Phase Impacts

Dust Emissions

Construction is a source of dust emissions that can have a temporary impact on the local air quality situation. Emissions during construction are associated with land clearing, drilling and blasting, ground excavation and cut and fill operations. Dust emissions vary substantially on a daily basis, depending on the level of activity, the specific operations and the prevailing meteorological conditions. A large portion of dust emissions results from movement of equipment and traffic over temporary roads at the construction site. The use of project-related vehicles and machinery can also result in an increase of gaseous emissions and potentially contributing to reduced ambient air quality.

Operational Phase Impacts

Bulk Storage Tank Emissions

The proposed facility will store synthesised NH_3 product in bulk, however in a liquid state. Since NH_3 has a very low boiling point, NH_3 requires either temperature or pressure control to maintain a liquid phase and prevent product loss through evaporation.

Storage of NH_3

An insulated, temperature-controlled (i.e. -33.34°C) storage tank solution is proposed for the storage of NH_3. The temperature of the liquid will be maintained below boiling point to prevent evaporation of the product. The liquid vapour pressure of NH_3 at a temperature of -33.34 °C is zero

Mitigation Considerations

- Implementation of standard construction phase mitigation measures (such as wet suppression) to be outlined in the EMPr will assist in controlling dust emissions and minimising impacts.
- Relevant emissions monitoring

Recommended EIA Phase Studies

A detailed Air Quality Impact Assessment will be undertaken during the EIA phase including findings of the preliminary modelling, associated impacts, as well as detailed recommendations, including mitigation measures if deemed necessary. Refer to **Section 7** of this Report for the Plan of Study for the Air Quality Impact Assessment.

6.2 NOISE AND VIBRATIONS

Construction Phase Impacts

Noise and Vibration Emissions

The following construction-related activities are likely to generate vibrations and additional noise into the environment:

- Presence of workforce
- Land clearing
- Drilling and blasting
- Cut and fill operations
- Vehicle activities associated with transport of equipment
- Use of equipment and machinery
- Concrete mixers and cranes

Vibrations and audible increase in noise can lead to the disturbance and nuisance to sensitive receptors. A receptor is defined by the WBG (April 2007) as "any point on the premises occupied by persons where extraneous noise and/or vibration are received". Being such a remotely located site, dominant receptors in the area surrounding the site include small farmsteads and farmhouses.

Operational Phase Impacts

Noise Emissions

Based on the great distance between the proposed site and the surrounding receptors, noise impacts are not anticipated to be strong. Potential sources of noise at the proposed site include:

- Water treatment pumps;
- The electrolyser units and associated transformers;
- Air compressors; and
- Intermittent vehicle activity.

Cumulative Impacts

Cumulative impacts might occur due to the presence of the Camden Renewable Energy Complex proposed in proximity to the study area. The footprint of these developments will likely be cumulative.

Mitigation Considerations

- Implementation of standard construction phase mitigation measures to be outlined in the EMPr will assist in controlling noise emissions and minimising impacts.

Recommended EIA Phase Studies

An Environmental Acoustic Impact Assessment will be undertaken during the EIA phase including findings of the preliminary modelling, associated impacts, any inputs into micro-siting, as well as detailed recommendations, including mitigation measures if deemed necessary. Refer to **Section 7** of this Report for the Plan of Study for the Environmental Acoustic Impact Assessment.

6.3 TOPOGRAPHY AND GEOLOGY

Construction Phase Impacts

Furthermore, excavation, drilling and blasting activities have the potential to result in slope instability. It is anticipated that minor impacts to the topography will occur during construction and the impact will be limited to localised areas that is within the turbine positions and associated infrastructure.

Operational Phase Impacts

No impacts anticipated.

Mitigation Considerations

- Implementation of erosion management measures in line with the Erosion Management Plan and Rehabilitation Plan to be included in the EMPr.
- All cleared areas must be revegetated with indigenous vegetation.
- Implement an effective stormwater runoff control system, including runoff control features to direct and dissipate water flow from roads and other hardened surfaces.
- Progressive rehabilitation will be essential to reduce the potential for soil erosion and sedimentation.

Recommended EIA Phase Studies

No further studies are recommended.

6.4 SOILS, LAND CAPABILITY AND AGRICULTURAL POTENTIAL

Construction Phase Impacts

Loss of agricultural potential by soil degradation

During the construction phase there is potential for soil degradation. Soil can be degraded by impacts of erosion; impeded drainage; topsoil loss; and contamination. Erosion can occur as a result of the alteration of the land surface run-off characteristics, which can be caused by construction related land surface disturbance, vegetation removal, and the establishment of hard surface areas including roads. Compacted roads and crane platforms can impede natural, lateral drainage through the soil and result in water logging. Loss of topsoil can result from poor topsoil management during construction related excavations. Hydrocarbon spillages from construction activities can contaminate soil. Soil degradation will reduce the ability of the soil to support agricultural production.

Loss of agricultural potential by occupation of land

Agricultural land directly occupied by the development infrastructure, which includes roads and crane platforms, will become unavailable for agricultural use.

Operational Phase Impacts

Enhanced agricultural potential through increased financial security for farming operations

Reliable income will be generated by the farming enterprises through the lease of the land to the energy facility. This is likely to increase their cash flow and financial security and thereby could improve farming operations.

Prevention of crop spraying by aircraft over land occupied by turbines.

Interference with farming operations

Construction (and decommissioning) activities have some nuisance impact for farming operations but are highly unlikely to have an impact on agricultural production

Cumulative Impacts

Cumulative impacts might occur due to the presence of the Camden Renewable Energy Complex proposed in proximity to the study area. The footprint of these developments will likely be cumulative.

Mitigation Considerations

- Implementation of erosion management measures in line with the Erosion Management Plan and Rehabilitation Plan to be included in the EMPr.
- All cleared areas must be revegetated with indigenous vegetation.

- Implement an effective stormwater runoff control system, including runoff control features to direct and dissipate water flow from roads and other hardened surfaces.
- Progressive rehabilitation will be essential to reduce the potential for soil erosion and sedimentation.
- Areas of construction should be (practically) limited in extent, and activities outside of the project area should be kept to a minimum.
- Vegetation removal should be kept to a minimum and limited to the area of development.
- Impacts that are expected to lead to long term degradation of soil quality (i.e. soil contamination) need to be limited through appropriate on-site management measures. This includes the proper handling and storage of hazardous materials, the use of hardstanding in areas where spillages are possible, the use of bunding around storage of hazardous materials and proper upkeep of machinery and vehicles.

Recommended EIA Phase Studies

A detailed Agricultural Agro-Ecosystem Specialist Assessment would need to be undertaken during the EIA phase of the assessment. Refer to **Section 7** of this Report for the Plan of Study for the Agricultural Agro-Ecosystem Specialist Assessment.

6.5 SURFACE WATER

Construction Phase Impacts

The construction of the project components will result in clearing of vegetation, levelling and excavation / trenching. The removal of vegetation can result in exposure of bare soil to wind and rainfall leading to an increase in erosion potential. Generation of excess excavation material will require spoiling / stockpiling which can also lead to an increased risk of soil erosion. Rainfall on unconsolidated sediment has the potential to cause an indirect impact as runoff with higher sediment load entering surrounding drainage lines leading to sedimentation of watercourses and reduced water quality (due to increased turbidity). This has the potential to result in negative secondary impacts on receiving environments and ecosystem functioning. Surface water impacts associated with the proposed WEF relate to:

- Loss of aquatic species of special concern
- Damage or loss of riparian and wetlands systems and disturbance of the waterbodies during construction
- Potential impact on localised surface water quality
- Impact on habitat change and fragmentation related to hydrological regime changes

Operational Phase Impacts

Impact on aquatic systems through the possible increase in surface water runoff on form and function - Increase in sedimentation and erosion.

Mitigation Considerations

Prevention of soil erosion and uncontrolled flow of water across the site is an essential design requirement. The project will include stormwater management infrastructure (drainage and containment) to protect project assets and control surface water flow. Additional measures to protect watercourses and aquatic ecology typically include:

- Presenting a layout that avoids all sensitive habitats that were rated as HIGH, with the exception of making use of areas that are already disturbed e.g. upgrade road crossings, or unavoidable road and power line crossings.
- Where these crossings are upgraded the following must be considered:
  - The final design should take cognisance of typical baseflows and should not create any impedance of flows
  - Natural river levels upstream and downstream of the site should be maintained, thus allowing for continuity within the riverbed, i.e. not create any obstruction limiting any fauna from moving up or downstream.

- Vehicle movement within the watercourse should be limited to the works area to prevent undue any compaction of soils
- Bed and bank erosion protection should be included in the designs to prevent bank instability and sedimentation.

- With regard the prevention of water quality changes to the aquatic environment the following must be monitored / implemented:
  - Chemicals used for construction must be stored safely on site and surrounded by bunds. Chemical storage containers must be regularly inspected so that any leaks are detected early.
  - Littering and contamination of water sources during construction must be prevented by effective construction camp management.
  - Emergency plans must be in place in case of spillages onto road surfaces and water courses.
  - No stockpiling should take place within a water course.
  - All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.
  - Stockpiles must be located away from river channels.
  - The construction camp and necessary ablution facilities meant for construction workers must be beyond the proposed buffers.
- A stormwater management plan (SWMP) must be developed in the preconstruction phase, detailing the stormwater structures and management interventions that must be installed to manage the increase of surface water flows directly into any natural systems. Effective stormwater management will include effective stabilisation (gabions and Reno mattresses) of exposed soil and the re-vegetation of any disturbed riverbanks. The effectiveness of the stormwater / energy dissipation structures will then be inspected on an annual basis and maintained / improved as required during this the operational phase, especially where any erosion or sedimentation has become evident in the operational phase.

Recommended EIA Phase Studies

A detailed Aquatic Impact study, including wetland assessment, would need to be undertaken during the EIA phase of the assessment. This will include the associated potential impacts and corresponding mitigation measures. Following comments from the relevant stakeholders, the final report will be updated and submitted with the final EIA report. Refer to **Section 7** of this Report for the Plan of Study for the Aquatic Impact study.

6.6 GROUNDWATER

Construction Phase Impacts

Ground contamination

During the construction phase there is potential for soil contamination associated with potential release of environmental contaminants and hazardous substances (typically sewage/ portable toilet chemicals, cement, oil grease and fuel).

Operational Phase Impacts

Ground contamination

During the operational phase there is potential for soil contamination associated with potential release of environmental contaminants and hazardous substances.

Product and raw material transport will be required and it has been assumed that vehicle maintenance and refuelling maybe undertaken onsite. Therefore, hydrocarbon contamination from fuel storage, fuel distribution and oil handling facilities is considered potential groundwater risk. The above contaminants have potential to be transported into the groundwater through a process of percolation.

Mitigation Considerations

- Chemicals, hydrocarbon materials and hazardous substances maintained onsite must be managed in accordance with the Hazardous Substances Act (No. 15 of 1973) and its relevant regulations.
- All machinery and equipment should be inspected regularly for faults and possible leaks; these should be serviced off-site or in appropriately bunded areas.
- Spill kits must be available at all locations where hazardous substances are stored, handled or used, and spills must be cleaned up immediately in accordance with an established protocol applicable to the material.

Recommended EIA Phase Studies

No further studies are recommended.

6.7 HAZARDOUS SUBSTANCES AND POLLUTANTS

Construction Phase Impacts

Soil, groundwater and surface water contamination

Potential exists for soil, groundwater and surface water contamination associated with potential releases of small quantities of environmental contaminants and hazardous substances. Sources of pollutants and release mechanisms include:

- Leakages of hydrocarbons (diesel and oil) from construction vehicles and heavy machinery (e.g. excavators and bulldozers).
- Loss of containment and accidental spillage associated with storage and handling of hydrocarbons, chemicals, and concrete.

Runoff creates a preferential pathway and exposure of the above contaminants into the subsurface and water resources leading to a deterioration in water quality and secondary health impacts on aquatic ecosystems and water users.

Operational Phase Impacts

Soil, groundwater and surface water contamination

Potential exists for soil, groundwater and surface water contamination associated with potential releases of small quantities of environmental contaminants and hazardous substances.

Major Hazardous Installation

The following hazards will be considered in the assessment:

- Water treatment:
  - suitable secondary spill containment.
- Electrolysers:
  - internal explosions,
  - leaks, fires.
- Hydrogen compression, liquefaction, storage and transport:
  - fire and explosions,
  - domino impacts on other facilities,
  - occupied building locations on site.
- Oxygen compression, liquefaction storage and transport:
  - enhanced flammability.
- LAES – air separation plant:
  - asphyxiation, enhance flammability and internal explosions.
- Nitrogen compression, liquefaction storage and transport:
  - asphyxiation.

- Ammonia production, liquefaction storage and transport:
  - toxic vapour clouds – proximity to occupied areas,
  - fire and explosions.

Mitigation Considerations

- Chemicals, hydrocarbon materials and hazardous substances maintained onsite must be managed in accordance with the Hazardous Substances Act (No. 15 of 1973) and its relevant regulations.
- All machinery and equipment should be inspected regularly for faults and possible leaks; these should be serviced off-site or in appropriately bunded areas.
- Spill kits must be available at all locations where hazardous substances are stored, handled or used, and spills must be cleaned up immediately in accordance with an established protocol applicable to the material.

Recommended EIA Phase Studies

A qualitative risk assessment has been recommended.

6.8 WASTE MANGAEMENT

Construction Phase Impacts

Generation of General Waste

The table below provides a summary of the typical general waste types that are likely to be generated on site during construction. The presence of construction workers has the potential to increase litter on site in the absence of adequate waste receptacles. This results in an unsightly working environment and possible entry into surrounding environment. Furthermore, waste materials may attract pest species / vectors into working areas leading to potential health implications for construction staff and community members.

Spoil material unsuitable for reuse as backfill and bedding material has the potential to disrupt land use and habitats if inappropriately manage or disposed illegally.

Waste generation (domestic waste, mixed industrial and metal waste) and a lack of appropriate separation, temporary storage and recycling (i.e. not aligned with the Waste Hierarchy) has the potential to result in unnecessary waste material to landfill.

Waste Category	*Waste Type*	*Typical Constituents*
General Waste	Domestic Waste	Paper and cardboard packaging, empty plastic and metal containers (non-hazardous original contents) etc.
	Organic Waste	Canteen, food and cooking waste
	Mixed Industrial	Wood, plastic, packaging etc.
	Metal Waste	Ferrous and non-ferrous scrap and stainless steel, metal cuttings, electrode stubs from welding.
	Spoil Material	Excavations, trenching and terracing will result in the generation of spoil material
	Building rubble	Wasted flooring material, paint containers, wall tiles, timber, piping etc.
	Biomass	Cleared vegetation

Generation of Hazardous Waste

The table below provides a summary of the typical hazardous waste types that are likely to be generated on site during construction. Hazardous waste generation and inappropriate

management and disposal has the potential to lead to contamination of soil, groundwater and surface water.

Waste Category	Waste Type	Typical Constituents
Hazardous Waste	Oily Waste	Used lubricant and hydraulic oils and hydrocarbon based solvents
	Oil Contaminated Waste	Solid material (rags etc.) that has come into contact with and contains traces of oil or grease
	Hazardous Chemical Containers	From temporary storage and use of chemicals on site
	Sanitary Waste	Sewerage / faecal matter generated at the contractor's camp

Sanitation Waste

Sanitation services are required to accommodate workers on site, contractor's yard and at site camps along the route. Temporary ablution facilities (chemical toilets) are proposed to appropriately contain and treat waste for offsite disposal. The incorrect siting of chemical toilets (i.e. within 100m of a watercourse or stream) and loss of containment could lead to pollution of the receiving environment (soil, groundwater and surface water), leading to secondary health impact to ecosystems and communities (ground and surface water users).

Sanitary waste, if not correctly contained, has the potential to enter surface water via runoff and increase organic matter loading in water systems.

Operational Phase Impacts

Generation of General Waste

The table below provides a summary of the typical general waste types that are likely to be generated on site during operation. Waste generation (domestic waste and mixed industrial) and a lack of appropriate separation, temporary storage and recycling (i.e. not aligned with the Waste Hierarchy) has the potential to result in unnecessary waste material to landfill. However, it is noted that only small volumes of waste are anticipated to be generated by the facility during operations.

Waste Category	Waste Type	Typical Constituents
General Waste	Domestic Waste	Paper and cardboard packaging, empty plastic and metal containers (non-hazardous original contents) etc.
	Organic Waste	Canteen, food and cooking waste
	Mixed Industrial	Wood, plastic, packaging etc.

Generation of Hazardous Waste

The table below provides a summary of the typical hazardous waste types that are likely to be generated on site during construction. Hazardous waste generation and inappropriate management and disposal has the potential to lead to contamination of soil, groundwater and surface water.

Waste Category	Waste Type	Typical Constituents
Hazardous Waste	Oily Waste	Used lubricant and hydraulic oils and hydrocarbon based solvents
	Oil Contaminated Waste	Solid material (rags etc.) that has come into contact with and contains traces of oil or grease
	Brine (pending classification)	Dewatered brine from water treatment facility

Sanitation Waste

Sewage and other wastewater generated from washrooms, etc. are similar to domestic wastewater. It is anticipated that the sewage will be discharged into conservancy tank.

Mitigation Considerations

- Despite the modest volumes of waste anticipated to be generated by the Project, recycling opportunities should be sought in order to reduce the volume of waste to landfill and harness commercial benefits for both the project team and local community.
- Provisions of suitable waste receptacles for temporary storage of general and hazardous waste (in compliance with Material Safety Data Sheets).
- Collection and disposal of hazardous waste at appropriately licences landfills and proof of disposal to be retained by contractors and facility operators.

Recommended EIA Phase Studies

No further studies are recommended.

6.9 BIODIVERSITY

The key activities associated with development activities that may affect the ecology of the area include vegetation clearance for the GH&A facility and associated infrastructure, roads and other hard infrastructure. The following impacts have been identified:

Construction Phase Impacts

Loss and Fragmentation of Vegetation and Habitat

Temporary fragmentation of vegetation communities can lead to disturbance and potential loss of portion of certain vegetation types and associated floral species assemblages (habitat destruction). Permanent loss of floral Species of Conservation Concern (SCC) may occur if the proposed site footprint and construction activities takes place within sensitive habitat units.

Impacts on CBAs and broad-scale ecological processes

The Project site includes a CBA (Irreplaceable and Optimal) and a wetland area to the north of the Vaal River (near the southern part of the site) is mapped as an ESA. While CBAs are not necessarily no-go areas, development within CBAs is not encouraged as such development may compromise the ecological functioning of the CBA or result in direct biodiversity loss within the CBA if not approached carefully and managed effectively.

Loss and Displacement of Fauna

The construction of project infrastructure will require the clearance vegetation (possibly providing refuge or breeding grounds to fauna). These activities will cause disturbance and displacement of local fauna (including possible threatened or protected species) due to habitat loss; and/or direct mortalities. Although it is assumed that the majority of fauna species will move to different areas because of disturbance, some protected fauna species have very specific habitat requirements, and the disturbance of sensitive habitats will result in displacement to less optimal habitats.

Secondary impacts associated include the destruction and disturbance to local breeding grounds and nesting sites; leading to potential decrease in population densities of threatened and protected species. If development takes place within the sensitive habitats permanent loss of faunal SCC carrying capacity will potentially occur.

Some mammals and reptiles would be vulnerable to illegal collection or poaching during the construction phase as a result of the large number of construction personnel that are likely to be present.

Proliferation of alien invasive plant species

The disturbance associated with the construction phase of the project will render the disturbed areas vulnerable to alien plant invasion. Some alien plant invasion is inevitable and regular alien plant clearing activities would be required to limit the extent of this problem. Once the natural vegetation has returned to the disturbed areas, the site will be less vulnerable to alien plant invasion, however, the roadsides and pipeline areas are likely to remain the focus of alien plant invasion for years.

Operational Phase Impacts

Proliferation of alien invasive plant species

Proliferation of alien invasive plant species has the potential to manifest during the operational phase. In addition, daily operational activities at the site may deter certain species from the area, resulting in a loss in broad-scale landscape connectivity.

Cumulative Impacts

Cumulative impacts might occur due to the presence of the Camden Renewable Energy Complex proposed in proximity to the study area. The footprint of these two developments will likely be cumulative, with the ecological impact of all facilities operating in combination likely to exceed the sum of individual parts.

Mitigation Considerations

- The preferred project layout must avoid sensitive habitats as far as possible.
- Minimise development footprint within high sensitivity areas and ensure that final development layout takes account of areas identified as sensitive during the field survey. Some avoidance and changes to the layout may be required if some areas with a high abundance of species of concern are shown to occur within the preferred development areas.
- Sensitive faunal habitats such as drainage lines and wetlands must be avoided as far as possible.
- Detailed biodiversity assessment is required to determine sensitivity, quantify potential impacts to flora and fauna, and provide for recommendation of mitigation measures.
- Alien and invasive vegetation control should take place throughout the duration of the construction and operation phases. An alien management plan must be part of the EMPr.

The main mitigation measures, other than required Management Plans for plant rescue, rehabilitation, and alien plant management, are related to infrastructure location, which is a planning phase measure. Specific recommendations will form part of the outcome of the EIA.

Recommended EIA Phase Studies

A detailed terrestrial ecological assessment will be carried out in the EIA phase. Refer to **Section 7** of this Report for the Plan of Study for the Terrestrial Ecology Assessment.

6.10 AVIFAUNA

Construction Phase Impacts

Displacement due to disturbance during the Construction Phase

Construction activities could impact on birds breeding, foraging and roosting in or in close proximity of the proposed facility through transformation of habitat, which could result in temporary or permanent displacement. Unfortunately, very little mitigation can be applied to reduce the significance of this impact as the total permanent transformation of the natural habitat within the construction footprint of the facility is unavoidable. The loss of habitat for priority species due to direct habitat transformation associated with the construction of the proposed facility and up to 132kV overhead power line is likely to be moderate due to the small size of the footprint, but ideally high quality grassland should be avoided if possible.

The priority species which are potentially vulnerable to this impact are the following: Secretarybird, Denham's Bustard, White-bellied Bustard, Blue Crane, Grey Crowned Crane, Blue Korhaan, African Grass Owl..

Operational Phase Impacts

Electrocution

Electrocution refers to the scenario where a bird is perched or attempts to perch on the electrical structure and causes an electrical short circuit by physically bridging the air gap between live components and/or live and earthed components (van Rooyen 2000). The electrocution risk is largely determined by the pole/tower design. In the case of the proposed up to 132kV grid connection between the facility and the MTS, the electrocution risk is envisaged to be negligible because the small length of line (approximately 100m). The only priority species which may be potentially at risk of electrocution due to the up to 132kV grid connection power line is Cape Vulture (depending on which design will ultimately be used). However, the species is likely to occur sporadically, and the presence of large 400kV transmission lines in close proximity to the proposed facility also helps to reduce the risk, in that the vultures would most likely prefer to perch on these 400kV towers.

Collisions

Collisions are perhaps the biggest threat posed by high voltage lines to birds in southern Africa (Van Rooyen 2004). Most heavily impacted upon are bustards, storks, cranes and various species of waterbirds, and to a lesser extent, vultures. These species are mostly heavy-bodied birds with limited manoeuvrability, which makes it difficult for them to take the necessary evasive action to avoid colliding with transmission lines (Van Rooyen 2004, Shaw et al. 2017). However, the small length of line (approximately 100m) significantly reduces the potential collision risk.

Cumulative Impacts

Cumulative impacts might occur due to the presence of the Camden Renewable Energy Complex proposed in proximity to the study area. The footprint of these two developments will likely be cumulative, with the ecological impact of all facilities operating in combination likely to exceed the sum of individual parts.

Mitigation Considerations

- Vegetation clearance should be limited to what is necessary.
- The mitigation measures proposed by the biodiversity specialist must be strictly enforced.
- Development in high sensitivity grassland must be limited as far as possible
- Conduct a pre-construction inspection to identify Red List species that may be breeding within the project footprint to ensure that the impacts to breeding species (if any) are adequately managed.
- Construction activity should be restricted to the immediate footprint of the infrastructure as far as possible.
- Access to the remainder of the site should be strictly controlled to prevent unnecessary disturbance of priority species.
- Measures to control noise and dust should be applied according to current best practice in the industry.
- Development in high sensitivity grassland must be limited as far as possible.
- Eskom approved Bird flight diverters should be installed on the entire line for the full span length on the earthwire (according to Eskom guidelines – five metres apart). Light and dark colour devices must be alternated to provide contrast against both dark and light backgrounds respectively.
- A raptor-friendly pole design must be used, and the pole design must be approved by the avifaunal specialist.

Recommended EIA Phase Studies

The EIA Phase will entail the implementation of one avifaunal surveys and a full assessment of the likely impacts and available mitigation options, based on the results of systematic and quantified monitoring, in line with the monitoring protocols. Refer to **Section 7** of this Report for the Plan of Study for the Avifauna Assessment.

6.11 VISUAL AND LANDSCAPE

Construction Phase Impacts

During the construction phase of the proposed Camden I GH&A Facility and associated infrastructure, there will be some visual impacts on motorists and inhabitants during the construction and decommissioning periods resulting from laydown areas, construction vehicles, dust and equipment. These impacts will be transitory in nature for the duration of construction /decommissioning and include the following:

- Potential visual intrusion resulting from large construction vehicles and equipment;
- Potential visual effect of construction laydown areas and material stockpiles.
- Potential impacts of increased dust emissions from construction activities and related traffic;
- Potential visual scarring of the landscape as a result of site clearance and earthworks; and
- Potential visual pollution resulting from littering on the construction site.

Operational Phase Impacts

The operation of the Camden I GH&A Facility will have a visual impact on the following receptors:

- Potential alteration of the visual character of the area;
- Potential visual intrusion resulting from the various components of the Facility;
- Potential visual clutter caused by substation and other associated infrastructure on-site.
- Potential visual effect on surrounding farmsteads; and
- Potential visual impact on the night time visual environment.

Cumulative impacts

- Combined visual impacts from mining, industrial, infrastructural and renewable energy development in the broader area could potentially alter the sense of place and visual character of the area; and
- Combined visual impacts from mining, industrial, infrastructural and renewable energy development in the broader area could potentially exacerbate visual impacts on visual receptors.

Mitigation Considerations

- Carefully plan to minimise the construction period and avoid construction delays.
- Position laydown areas and related storage/stockpile areas in unobtrusive positions in the landscape, where possible.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Vegetation clearing should take place in a phased manner.
- Make use of existing gravel access roads where possible.
- Limit the number of vehicles and trucks travelling to and from the proposed sites, where possible.
- Maintain a neat construction site by removing litter, rubble and waste materials regularly.
- Restrict vegetation clearance on the site to that which is required for the correct operation of the facility.
- As far as possible, limit the number of maintenance vehicles which are allowed to access the site.
- Ensure that dust suppression techniques are implemented on all gravel access roads.

- As far as possible, limit the amount of security and operational lighting present on site.
- Light fittings for security at night should reflect the light toward the ground and prevent light spill.
- Lighting fixtures should make use of minimum lumen or wattage.
- Mounting heights of lighting fixtures should be limited, or alternatively, foot-light or bollard level lights should be used.
- If economically and technically feasible, make use of motion detectors on security lighting.

Recommended EIA Phase Studies

The scoping phase Visual Impact Assessment (VIA) report has adequately assessed the visual impacts of the proposed Camden GH&A Facility and no further field investigation will be required. The EIA Phase study will entail updating the scoping phase VIA report, and will include a review of the findings of the VIA in accordance with detailed site layouts and a comparative assessment of the layout alternatives provided. Following comments from the relevant stakeholders, the final report will be updated and submitted with the final EIA report. Refer to **Section 7** of this Report for the Plan of Study for the Visual Impact Assessment.

6.12 HERITAGE AND CULTURAL RESOURCES

Construction Phase Impacts

Disturbance to Known Cultural Resources

Construction activities may lead to disturbance or destruction of cultural resources (archaeological and historical remains and sacred sites e.g. graves) should the development footprint encroach on identified cultural/heritage sites.

Chance find of Cultural Resources

Earthworks may accidentally expose unidentified subsurface fossil remains. This will result in a lost opportunity to preserve local cultural heritage and historical records should appropriate management measures not be in place (e.g. Chance Find Procedure).

Operational Phase Impacts

No impacts anticipated.

Mitigation Considerations

- Chance Find Procedure must be included in the EMPr.
- Areas of potential heritage sensitivities that are identified in the EIA phase, should be demarcated.

Recommended EIA Phase Studies

A field-based Heritage Impact Assessment, as defined in section 38 of the NHRA, will be undertaken during the EIA phase of the assessment. Refer to **Section 7** of this Report for the Plan of Study for the Heritage Impact Assessment.

6.13 PALAEONTOLOGY

Construction Phase Impacts

The construction phase will entail surface clearance as well as excavations into the superficial sediment cover and underlying bedrock. The development may adversely affect potential fossil heritage within the study area by destroying, damaging, disturbing or permanently sealing-in fossils preserved at or beneath the surface of the ground that are then no longer available for scientific research or other public good.

Operational Phase Impacts

No impacts anticipated.

Mitigation Considerations

- If a chance find is made then all work must cease in the immediate vicinity of the find. The Environmental Control Officer must report the find to the relevant Heritage Agency (South African Heritage Research Agency, SAHRA). Mitigation of chance fossil finds reported by the Environmental Control Officer would involve the recording, sampling and / or collection of chance fossil finds and associated geological data by a professional palaeontologist during the construction phase of the development. The palaeontologist concerned with potential mitigation work would need a valid fossil collection permit from the relevant Heritage Agency and any material collected would have to be curated in an approved depository (e.g. museum or university collection).

Recommended EIA Phase Studies

The study area is of insignificant to moderate to very high paleontological sensitivity and according to the SAHRIS palaeontological sensitivity map must be subjected to a palaeontological assessment in the EIA phase. Refer to **Section 7** of this Report for the Plan of Study for the Palaeontological Impact Assessment.

6.14 TRAFFIC

Construction Phase Impacts

Increased traffic generation around the study area by construction vehicles

The construction phase is expected to generate additional traffic volumes on the local road network due to the transport of raw materials and machinery to site.

Deterioration of the surrounding road network due to an increase of traffic around the site

Raw materials and machinery will be transported to the study area during the construction phase. This may result in potential damage to the existing road network. It is expected that the bulk of the construction plant would remain on site during construction. The impact of the heavy vehicles on the surrounding roads is considered to be negligible.

Transportation of abnormal loads during the construction phase

The construction phase will result in impacts on roads users due to the need to transport over-sized components to site. It is anticipated that the transport route(s) between the origin of the components and the facility may include national, provincial and local roads.

Operational Phase Impacts

The operational phase of the facility will require very presence of staff personnel, except for those undertaking inspection, maintenance and repair works. Furthermore, the operational phase will require the regular transport of product from the facility. The traffic impact on the surrounding roads is anticipated to increase.

Mitigation Considerations

- The movement of vehicles into and out of the site must be managed such as ensuring that abnormal loads are moved outside of peak traffic hours.
- Stagger component delivery to the site.
- All drivers should comply with the relevant traffic laws and regulations.
- Abnormal vehicle routes and management plans may be required dependant on the type and route of the abnormal vehicle loads. Abnormal vehicles may require special permits and route plans from the relevant road authority. These permits are the responsibility of the developer and its logistics/freight companies.
- Undertake regular maintenance of gravel roads during the construction phase.

Recommended EIA Phase Studies

A Traffic Impact Statement will form part of the EIA phase. The Traffic Specialist study will assess potential impacts of the proposed route during the construction phase and identify potential and suitable alternatives for construction vehicle access to the site. Refer to **Section 7** of this Report for the Plan of Study for the Traffic Impact Statement.

6.15 SOCIO-ECONOMIC

Construction Phase Impacts

Creation of local employment, training, and business opportunities

The construction phase will create employment opportunities that will benefit members from the local communities in the area, specifically Ermelo. These opportunities will include opportunities for low, semi and highly workers. Most of the employment opportunities will accrue to Historically Disadvantaged (HD) members of the community. A percentage of the wage bill will be spent in the local economy which will also create opportunities for local businesses in the local towns in the area, specifically Ermelo. Given relatively high local unemployment levels and limited job opportunities in the area, this will represent a significant, if localised, social benefit. The capital expenditure associated with the construction phase will also create opportunities for local businesses. Due to the presence of the mining and energy sector, there are likely to qualified companies in Ermelo that can provide the required services and products. The local service sector will also benefit from the construction phase. The potential opportunities would be linked to accommodation, catering, cleaning, transport, and security, etc. associated with the construction workers on the site.

The hospitality industry in the area will also benefit from the provision of accommodation and meals for professionals (engineers, quantity surveyors, project managers, product representatives etc.) and other (non-construction) personnel involved on the project. Experience from other construction projects indicates that the potential opportunities are not limited to on-site construction workers but also to consultants and product representatives associated with the project.

Impact of construction workers on local communities

The presence of construction workers poses a potential risk to family structures and social networks. While the presence of construction workers does not in itself constitute a social impact, the manner in which construction workers conduct themselves can impact on local communities. The most significant negative impact is associated with the disruption of existing family structures and social networks. This risk is linked to potentially risky behaviour, mainly of male construction workers, including:

- An increase in alcohol and drug use.
- An increase in crime levels.
- The loss of girlfriends and/or wives to construction workers.
- An increase in teenage and unwanted pregnancies.
- An increase in prostitution.
- An increase in sexually transmitted diseases (STDs), including HIV.

The objective will be to source as many of the low and semi-skilled workers locally. These workers will be from the local community and form part of the local family and social networks. This will reduce the risk and mitigate the potential impacts on the local community. The potential impact on the local community is therefore likely to be negligible.

Influx of job seekers

Large construction projects tend to attract people to the area in the hope that they will secure a job, even if it is a temporary job. These job seekers can in turn become "economically stranded" in the area or decide to stay on irrespective of finding a job or not. While the proposed project on its own does not constitute a large construction project, the establishment of a number of renewable energy projects in the area may attract job seekers to the area. As in the case of construction workers employed on the project, the actual presence of job seekers in the area does not in itself constitute a social impact. However, the way in which they conduct themselves can impact on the local community. The main areas of concern associated with the influx of job seekers include:

- Impacts on existing social networks and community structures.
- Competition for housing, specifically low-cost housing.
- Competition for scarce jobs.
- Increase in incidences of crime.

These issues are similar to the concerns associated with the presence of construction workers and are discussed above. Given the location of the project the potential for large scale economically motivated in-migration and subsequent labour stranding is likely to be negligible.

Risk to safety, livestock, and farm infrastructure

The presence on and movement of construction workers on and off the site poses a potential safety threat to local famers and farm workers in the vicinity of the site. In addition, farm infrastructure, such as fences and gates, may be damaged and stock losses may also result from gates being left open and/or fences being damaged, or stock theft linked either directly or indirectly to the presence of farm workers on the site. The potential risks (safety, livestock, and farm infrastructure) can be effectively mitigated by careful planning and managing the movement of construction on and off the site workers during the construction phase.

Increased risk of grass fires

The presence of construction workers and construction-related activities on the site poses an increased risk of grass fires that could, in turn pose, a threat to livestock, crops, wildlife and farm infrastructure. The potential risk of grass fires will be higher during the dry, windy winter months from May to October. The impacts will be largely local and can be effectively mitigated.

Nuisance impacts associated with construction related activities

Construction related activities, including the movement of heavy construction vehicles of and on the site, has the potential to create dust, noise and safety impacts and damage roads. The impacts will be largely local and can be effectively mitigated.

Impacts associated with loss of farmland

The activities associated with the construction phase and establishment of the proposed project and associated infrastructure will result in the disturbance and loss of land available for grazing. The impact on farmland associated with the construction phase can be mitigated by minimising the footprint of the construction related activities and ensuring that disturbed areas are fully rehabilitated on completion of the construction phase. In addition, the landowner will be compensated for the loss of land.

Operational Phase Impacts

Produce green hydrogen and ammonia for the South Africa economy

The aim of the project is to produce commercially usable green hydrogen and ammonia that can be used as a fuel for transport in hydrogen fuel cells and or in different industrial uses. The ammonia will be primarily used for the production of ammonium nitrate (fertiliser) and manufacture of plastics, explosives, textiles, pesticides, and other chemicals. Ammonia can also be used as a stable ‘carrier’ of hydrogen, allowing hydrogen to be readily stored and transported. This will assist to reduce South Africa’s carbon footprint.

Creation of employment and business opportunities

The proposed development will create full time employment opportunities during the operational phase that will be available to the local community. The operational phase will also create business and procurement opportunities which will benefit local companies in the area.

Generate income for affected landowners

The proponent will enter into rental agreements with the affected landowners for the use of the land for the establishment of the proposed projects. In terms of the rental agreement the affected landowners will be paid an annual amount dependent upon the number of wind turbines located on the property. The additional income will reduce the risk to his livelihoods posed by droughts and fluctuating market prices for livestock, crops, and farming inputs, such as fuel, feed etc. Given the risks posed by climate change the additional income represents a significant benefit for the affected landowner.

Potential impacts associated with noise and odours

The operational phase has the potential to generate noise and create odours that may impact on adjacent landowners. This would impact on quality of life, may have health implications, and may also impact on property values. It is assumed that a noise, air quality, health risk assessment and hazardous installation assessment are being undertaken as part of the EIA process. The results of these studies will be reviewed

Potential health and safety risks associated with plant incidents

Incidents during the operational phase have the potential to release ammonia gas and other potentially harmful substances that may pose a health risk to adjacent landowners. It is assumed that health risk assessment and hazardous installation assessment are being undertaken as part of the EIA process. The results of these studies will be reviewed.

Cumulative Impacts

Cumulative impact on sense of place

The potential cumulative impacts on the areas sense of place will be largely linked to potential visual impacts. As indicated above, the potential impact of the proposed facility and associated infrastructure on the areas sense of place is likely to be limited. This is due to impact of the Camden Power Station and associated power lines on the areas rural sense of place. The cumulative impacts are also likely to be low with mitigation. This will be confirmed during the assessment phase.

Mitigation Considerations

- Ensuring local communities (through formal channels such as ward councillors and Department of Labour) are made aware of the potential opportunities available during construction in order for expectations to be managed appropriately.
- Prioritisation of local labour through implementing contractor policies.
- Undertake a survey of industries and businesses in the local area to identify potential suppliers.
- The developer and contractors must make HIV/AIDS awareness and prevention program development and implementation a condition of contract for all suppliers and sub-contractors.

Recommended EIA Phase Studies

Based on the Scoping Assessment, the majority of social issues have been identified. A site visit will be undertaken during the EIA Phase of the Scoping Impact Assessment (SIA). The site visit will include interviews with key stakeholders and interested and affected parties. Refer to **Section 7** of this Report for the Plan of Study for the SIA.

6.16 CLIMATE CHANGE

Construction Phase Impacts

Greenhouse Gas Emissions

A GHG is any gaseous compound in the atmosphere that is capable of absorbing infrared radiation, thereby trapping and holding heat in the atmosphere. By increasing the heat in the atmosphere, greenhouse gases are responsible for the greenhouse effect, which ultimately leads to global warming and contributes to the negative effects of climate change.

The manufacturing of the materials associated with the project, and associated transportation of materials to and from the construction areas will result in indirect GHG

emissions. The exhaust emissions will contribute to the presence of GHGs in the atmosphere.

Measures could be considered in respect of the construction phase i.e. attempting to implement GHG emissions reductions measures within the EPC contractor's activities. However, given the site locality, it is anticipated that typical measures (such as stipulating that the EPC contractor measure and report on their GHG emissions during construction and try to incentivise a reduction via the use of energy efficient trucks etc.) are unlikely to be practical or worth the effort (or cost).

Climate Risks and Vulnerability

Loss of topsoil and vegetation community due to soil erosion can be exacerbated by climate change as soil erosion is mostly the result of extreme but short rainfall events. Therefore, changes of precipitation intensity and frequency could exacerbate soil erosion processes.

Operational Phase Impacts

Reduced Greenhouse Gas Emissions

Carbon dioxide (CO_2) is one of the major GHGs under the UN Framework Convention on Climate Change, and a priority GHG in terms of the National Environmental Management: Air Quality Act - Declaration of Greenhouse Gases as Priority Air Pollutants (GN. R710, 2017). CO_2 is emitted from the combustion of fossil fuels. There will be no GHG emissions directly associated with the facility in the operational phase due to the nature of the technology.

Mitigation Considerations

Due to the fact that the proposed development will have no impact on climate, mitigation measures are not deemed necessary. The implementation of the project can be regarded as having a mitigatory effect in terms of contributing to the curbing of South African's CO2 emission increases.

Recommended EIA Phase Studies

No further studies are recommended.

6.17 SUMMARY OF IMPACT SIGNIFICANCE SCREENING

This section provides an overview of the likely significance of construction phase (Table 6-1:), operational phase (Table 6-2:) and initial cumulative impacts (**Table 6-3**) presenting the results of the impact screening tool based on two criteria, namely probability and consequence (outlined in **Section 4.5**). This is used as a guide to determine whether additional assessment may be required in the EIA phase.

Table 6-1: Construction Phase Impacts

ASPECT	IMPACT	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
Air Quality	Dust Emissions	Negative	3	1	**Low**	**No**
Noise and Vibrations	Noise and Vibration Emissions	Negative	3	1	**Low**	**No**
Topography, & Geology	Constructability	Negative	3	1	**Low**	**No**

ASPECT	IMPACT	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
Soils, Land Capability and Agricultural Potential	Loss of agricultural potential by soil degradation	Negative	4	3	**High**	**Yes**
	Loss of agricultural potential by occupation of land	Negative	4	3	**High**	
Surface water	Loss of aquatic species of special concern	Negative	3	3	**Medium**	**Yes**
	Damage or loss of riparian and wetlands systems and disturbance of the waterbodies during construction	Negative	3	3	**Medium**	
	Potential impact on localised surface water quality	Negative	3	3	**Medium**	
	Impact on habitat change and fragmentation related to hydrological regime changes	Negative	3	3	**Medium**	
Groundwater	Ground Contamination	Negative	3	1	**Low**	**No**
Hazardous Substances and Pollutants	Soil, groundwater and surface water contamination	Negative	3	3	**Medium**	**No**
Waste Generation	Generation of General Waste	Negative	3	2	**Medium**	**No**
	Generation of Hazardous Waste	Negative	3	2	**Medium**	
	Sanitation Waste	Negative	3	2	**Medium**	
Biodiversity	Loss and Fragmentation of Vegetation and Habitat	Negative	4	3	**High**	**Yes**

ASPECT	IMPACT	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
	Impacts on CBAs and broad-scale ecological processes	Negative	4	3	**High**	
	Loss and Displacement of Fauna	Negative	4	3	**High**	
	Proliferation of alien invasive plant species	Negative	4	3	**High**	
Avifauna	Displacement due to disturbance during the Construction Phase	Negative	4	3	**High**	**Yes**
Visual and Landscape	Potential visual intrusion resulting from large construction vehicles and equipment	Negative	3	2	**Medium**	**Yes**
	Potential visual effect of construction laydown areas and material stockpiles.	Negative	3	2	**Medium**	
	Potential impacts of increased dust emissions from construction activities and related traffic	Negative	3	2	**Medium**	
	Potential visual scarring of the landscape as a result of site clearance and earthworks	Negative	3	2	**Medium**	
	Potential visual pollution resulting from littering on the construction site	Negative	3	1	**Low**	
Heritage and Cultural Resources	Disturbance to known Cultural Resources	Negative	3	2	**Medium**	**Yes**

ASPECT	IMPACT	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
	Chance Find of Cultural Resources	Negative	3	2	**Medium**	
Palaeontology	Chance Find of Palaeontological resources	Negative	3	2	**Medium**	**Yes**
Traffic	Increased traffic generation around the study area by construction vehicles	Negative	3	1	**Low**	**Yes**
	Deterioration of the surrounding road network due to an increase of traffic around the site	Negative	3	2	**Medium**	
	Transportation of abnormal loads during the construction phase	Negative	4	1	**Medium**	
Socio-Economic	Creation of local employment, training, and business opportunities	Positive	2	3	**Medium**	**Yes**
	Impact of construction workers on local communities	Negative	3	3	**Medium**	
	Influx of job seekers	Negative	3	3	**Medium**	
	Risk to safety, livestock, and farm infrastructure	Negative	3	3	**Medium**	
	Increased risk of grass fires	Negative	3	3	**Medium**	
	Nuisance impacts associated with construction related activities	Negative	3	3	**Medium**	
	Impacts associated with loss of farmland	Negative	3	3	**Medium**	
Climate Change	Greenhouse Gas Emissions	Negative	2	1	**Very Low**	**No**

ASPECT	IMPACT	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
	Climate Risks & Vulnerabilities	Negative	2	1	**Very Low**	

Table 6-2: Operational Phase Impacts

ASPECT	IMPACT	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
Air Quality	Bulk Storage Tank Emissions		2	2	**Low**	**Yes**
	Storage of NH_3		2	2	**Low**	
Noise and Vibrations	Noise Emissions	Negative	3	3	**Medium**	**Yes**
Soils, Land Capability and Agricultural Potential	Enhanced agricultural potential through increased financial security for farming operations	Positive	3	3	**Medium**	**Yes**
	Prevention of crop spraying by aircraft over land occupied by turbines.	Negative	4	3	**High**	
	Interference with farming operations	Negative	4	3	**High**	
Surface Water	Increased runoff, sedimentation and erosion	Negative	3	3	**Medium**	**Yes**
Groundwater	Ground Contamination	Negative	3	1	**Low**	**No**
Hazardous Substances and Pollutants	Soil, groundwater and surface water contamination	Negative	3	3	**Medium**	**No**
	Major Hazardous Installation	Negative	3	3	**Medium**	**Yes**
Waste Generation	Generation of General Waste	Negative	3	2	**Medium**	**Yes**

ASPECT	IMPACT	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
	Generation of Hazardous Waste	Negative	3	3	**Medium**	
	Sanitation Waste	Negative	3	2	**Medium**	
Biodiversity	Proliferation of alien invasive plant species	Negative	3	3	**Medium**	**Yes**
Avifauna	Electrocution	Negative	4	3	**Medium**	**Yes**
	Collisions	Negative	4	3	**Medium**	
Visual	Potential alteration of the visual character of the area;	Negative	4	3	**High**	**Yes**
	Potential visual intrusion resulting from the various components of the Facility	Negative	4	3	**High**	
	Potential visual clutter caused by substation and other associated infrastructure on-site	Negative	3	3	**Medium**	
	Potential visual effect on surrounding farmsteads	Negative	4	3	**High**	
	Potential alteration of the night time visual environment	Negative	3	3	**Medium**	
Social	Produce green hydrogen and ammonia for the South Africa economy	Positive	3	3	**Medium**	**Yes**
	Creation of employment and business opportunities	Positive	3	3	**Medium**	
	Generate income for affected landowners	Positive	3	3	**Medium**	

ASPECT	IMPACT	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
	Benefits associated with the socio-economic development contributions	Positive	3	3	**Medium**	
	Visual impact and impact on sense of place	Negative	4	3	**High**	
	Potential impacts associated with noise and odours	Negative	3	3	**Medium**	
	Potential health and safety risks associated with plant incidents	Negative	3	3	**Medium**	
Climate Change	Reduced GHG Emissions	Positive	4	3	**High**	**No**

Table 6-3: Initial Cumulative Impacts

RECEPTOR	DESCRIPTION	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
Noise and Vibrations	Cumulative Noise Emissions	Negative	3	3	**Medium**	**Yes**
Soils, Land Capability and Agricultural Potential	Cumulative Agricultural Impacts	Negative	4	3	**High**	**Yes**
Biodiversity	Cumulative impacts on biodiversity	Negative	4	3	**High**	**Yes**
Avifauna	Cumulative Collision impacts	Negative	4	3	**Medium**	**Yes**
	Cumulative Electrocution Impacts	Negative	4	3	**Medium**	

RECEPTOR	DESCRIPTION	NATURE	PROBABILITY	CONSEQUENCE	SIGNIFICANCE (BEFORE MITIGATION)	FURTHER ASSESSMENT REQUIRED
Visual	Combined visual impacts from mining, industrial, infrastructural and renewable energy development in the broader area could potentially alter the sense of place and visual character of the area	Negative	4	3	**High**	**Yes**
	Combined visual impacts from mining, industrial, infrastructural and renewable energy development in the broader area could potentially exacerbate visual impacts on visual receptors	Negative	4	3	**High**	
Social	Cumulative impact on sense of place	Negative	4	3	**High**	**Yes**

7 PLAN OF STUDY FOR EIA

7.1 PLAN OF STUDY FOR EIA TERMS OF REFERENCE

Table 7-1: outlines the structure of the plan of study as required in terms of Annexure 2 of GNR 982.

Table 7-1: Plan of Study Requirements

PLAN OF STUDY CHAPTER	INFORMATION REQUIREMENT AS PER GNR 982
Description of EIA Tasks	— A description of the tasks that will be undertaken as part of the environmental impact assessment process.
Description of Alternatives	— A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity.
Aspects to be Assessed in the EIA Process	— A description of the aspects to be assessed as part of the environmental impact assessment report process.
Specialist Studies	— Aspects to be assessed by specialists.
Impact Assessment Methodology	— A description of the proposed method of assessing the environmental aspects, including a description of the proposed method of assessing the environmental aspects including aspects to be assessed by specialists. — A description of the proposed method of assessing duration and significance.
Environmental Impact Report	— Contents of EIAR as specified in GNR 982 (as amended) Annexure 2
Stakeholder and Authority Engagement	— An indication of the stages at which the competent authority will be consulted. — Particulars of the public participation process that will be conducted during the environmental impact assessment process.

7.2 OVERVIEW OF THE EIA PHASE TASKS

The EIA phase will consist of the following tasks; each of these tasks is detailed separately in the following sub-sections:

- Specialist studies;
- Continuation of authority and stakeholder engagement;
- Assessment of the significance of potential impacts; and
- Preparation of the EIA Report.

7.3 DESCRIPTION OF ALTERNATIVES

The EIA process identifies two types of project alternatives:

- Concept Level Alternatives, which relate to the site, technology and process alternatives
- Detailed Level Alternatives which relate to working methods and mitigation measures

The feasibility of the higher-level concept alternatives have been considered and assessed within **Section 2.4** of the DSR. The Detailed Level Alternatives will be addressed within the EIA Report.

7.4 ASPECTS TO BE ASSESSED IN THE EIA PROCESS

Table 7-2 outlines the key aspects that were identified in the scoping phase; these aspects will be subject to further assessment in the EIA Phase

Table 7-2: Summary of aspects to be addressed in the EIA Phase

ENVIRONMENTAL ASPECT	IMPACT
Air Quality	Dust Emissions
	Bulk Storage Tank Emissions
	Storage of NH_3
Noise and vibrations	Noise and vibration emissions during construction
	Noise disturbance and nuisance to sensitive receptors during operational phase
	Cumulative impacts
Soils, Land Capability and agricultural Potential	Loss of agricultural potential by soil degradation
	Loss of agricultural potential by occupation of land
	Reduction in land available for cultivation and grazing animals
	Enhanced agricultural potential through increased financial security for farming operations
	Cumulative impacts
Surface water	Loss of aquatic species of special concern
	Damage or loss of riparian and wetlands systems and disturbance of the waterbodies during construction
	Potential impact on localised surface water quality
	Impact on habitat change and fragmentation related to hydrological regime changes
	Impact on aquatic systems through the possible increase in surface water runoff on form and function - Increase in sedimentation and erosion.
	Cumulative impacts
Hazardous Substances And Pollutants	Major Hazardous Installations
Biodiversity	Loss and Fragmentation of Vegetation and Habitat

	Impacts on CBAs and broad-scale ecological processes
	Loss and Displacement of Fauna
	Proliferation of alien invasive plant species
	Impact on provincial Conservation
	Cumulative impacts
Avifauna	Displacement due to disturbance during construction
	Electrocutions
	Collisions
	Cumulative impacts
Visual and Landscape	Visual impact during construction and decommissioning
	Potential alteration of the visual character of the area
	Potential visual intrusion resulting from the various components of the Facility
	Potential visual clutter caused by substation and other associated infrastructure on-site.
	Potential visual effect on surrounding farmsteads
	Potential alteration of the night time visual environment
	Cumulative visual impacts
Heritage and Cultural Resources	disturbance or destruction of cultural resources
Palaeontology	Physical disturbance of palaeontological sites
Traffic	Increased traffic generation around the study area by construction vehicles
	Deterioration of the surrounding road network due to an increase of traffic around the site
	Transportation of abnormal loads during the construction phase
Socio-economic	Creation of local employment, training, and business opportunities
	Impact of construction workers on local communities
	Influx of job seekers

	Risk to safety, livestock, and farm infrastructure
	Increased risk of grass fires
	Nuisance impacts associated with construction related activities
	Impacts associated with loss of farmland
	Generate income for affected landowners
	Produce green hydrogen and ammonia for the South Africa economy
	Visual impact and impact on sense of place
	Potential impacts associated with noise and odours
	Potential health and safety risks associated with plant incidents
	Cumulative impact on sense of place

7.5 SPECIALIST STUDIES TO BE UNDERTAKEN

The following specialist assessments have been commissioned for the EIA Phase:

- Air quality Impact Assessment
- Soils and Agricultural Potential Assessment;
- Archaeological and Cultural Heritage Assessment;
- Palaeontology Impact Assessment;
- Visual Impact Assessment;
- Biodiversity Impact Assessment (inclusive of terrestrial biodiversity, plant species and animal species);
- Freshwater Assessment;
- Avifauna Impact Assessment;
- Environmental Acoustic (Noise) Impact Assessment;
- Social Impact Assessment;
- Qualitative Risk Assessment;
- Desktop Geotechnical Assessment; and
- Desktop Traffic Assessment.

It should be noted that the specialist studies will be undertaken according to the procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Sections 24(5)(a) and (h) and Section 44 of the NEMA (GNR 320, dated 20 March 2020), where applicable.

7.5.1 AGRICULTURAL IMPACT ASSESSMENT

The terms of reference for the EIA phase is to produce Agricultural Agro-Ecosystem Specialist Assessment that complies with all the requirements of the agricultural protocol. These assessments will require fieldwork and collection of agricultural data.

7.5.2 TERRESTRIAL BIODIVERSITY ASSESSMENT

The relative sensitivity of habitats in different parts of the study area differs from location to location. The sensitivity assessment was done as a screening exercise primarily through interpretation of aerial imagery in combination with habitat assessments that were not within specific footprint areas. Although footprint areas have been designated as sensitive in some cases, it is important to assess footprint areas in detail to ascertain whether local conditions justify the sensitivity categorisation or not. It is therefore important that all footprint areas within mapped sensitive areas (MEDIUM-HIGH, HIGH and VERY HIGH) are assessed in the field to confirm sensitivity.

A detailed terrestrial ecology assessment will be carried out in the EIA phase and will include the following:

- Confirmation of sensitivities, buffers and the presence of ESAs and CBAs on site.
- A comprehensive site visit and field assessment in order to characterise the vegetation and plant communities present at the site in greater detail. This includes habitat mapping, developing species lists and descriptions of the typical and dominant species within the site and the potential impact of the development on these habitats and plant communities.
- Identification and quantification of the abundance and distribution of species of conservation concern within the site and especially within the development footprint.
- Evaluate the possible impact of the development on landscape connectivity in the field based on the likely use of the area as a corridor for movement by fauna as well as any local impacts on faunal communities. This should include the identification of any corridors that should be kept clear of development at the site and any buffers required around such features.
- Identify sensitive faunal habitats that should be avoided and measures that should be implemented to reduce impacts on fauna in general.
- Consider the potential impact of the development on CBAs and broad-scale ecological processes at the site. This should consider the habitats affected by the current development as well as the overall impact of renewable energy development in the area at a broader scale.
- Evaluate, based on the site attributes, what the most applicable mitigation measures to reduce the impact of the development on the site would be and if there are any areas where specific precautions or mitigation measures should be implemented.
- Assess the impacts identified above in light of the site-specific findings and the layout to be provided by the developer.

7.5.3 FRESHWATER IMPACT ASSESSMENT

The assessment will include the following aspects related to aquatic features associated with the site:

- A detailed assessment of the study area. This will cover the development footprint in relation to available information related to wetland / riverine ecosystems functioning, river classification, flow regime, water quality, physical, biota, and riparian habitat within the region.
- Identification of aquatic features and assessing impacts on, specifically, NFEPA features, important wetlands and rivers.
- Undertake a wetland delineation and classification.
- A functional assessment of the identified wetlands.
- A risk assessment of the identified wetlands.
- Wetland Mitigation measures.
- A map demarcating the relevant local drainage area of the respective waterbodies, and the respective catchments within a 500m radius of the study area. This will demonstrate, from a holistic point of view the connectivity between the site and the surrounding regions, i.e. the zone of influence.
- The determination of the ecological state of any aquatic systems, estimating their biodiversity, conservation and ecosystem function importance with regard ecosystem services.
- Recommend buffer zones and No-go areas around any delineated wetland areas based on the relevant legislation, e.g. Conservation Plan guidelines or best practice.

- Assess the potential impacts, based on the supplied methodology.
- Provide mitigations regarding project related impacts on the identified aquatic features
- Provide the relevant aspects with regard compiling the Environmental Management / Monitoring Plans.
- Supply geo-referenced GIS shape files of the aquatic areas.

The Freshwater Impact Assessment must be undertaken to align with the requirements for a WULA/GA.

7.5.4 AVIFAUNA IMPACT ASSESSMENT

The following are proposed for the EIA Phase:

- The implementation of at least one avifaunal survey in the high season to inform the assessment of the potential impacts of the planned infrastructure within the development footprint . The monitoring protocol is guided by the following:
  - 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 NEMA when applying for Environmental Authorisation (Gazetted October 2020). The Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Terrestrial Animal Species was published on 30 October 2020. This protocol applies also for the assessment of all impacts requiring authorisation
- The avifaunal specialists report will be structured around the following terms of reference:
  - Description of the affected environment from an avifaunal perspective.
  - Discussion of gaps in baseline data and other limitations.
  - Description of the methodology that was used for the field surveys.
  - Comparison of the site sensitivity recorded in the field with the sensitivity classification in the DFFE National Screening Tool and adjustment if necessary.
  - Provision of an overview of all applicable legislation.
  - Provision of an overview of assessment methodology.
  - Identification and assessment of the potential impacts of the proposed development on avifauna including cumulative impacts.
  - Provision of sufficient mitigation measures to include in the Environmental Management Programme (EMPr).
  - Conclusion with an impact statement whether the project is fatally flawed or may be authorised.
- For each anticipated impact, management recommendations for the design, construction, and operational phase (where appropriate) will be drafted for inclusion in the project EMPr.

7.5.5 ACOUSTIC (NOISE) IMPACT ASSESSMENT

The environmental acoustic specialist study for the Camden I GH&A Facility as part of the EIA phase will comprise the following:

BASELINE ASSESSMENT

To contextualise the study, a baseline assessment will be conducted comprising the following:

- An assessment of the existing noise climate in the vicinity of the site through baseline noise monitoring:
- Day and night-time noise monitoring will be conducted at the two identified sensitive receptor locations. All sound level measurement procedures will be undertaken according to the relevant South African Code of Practice, South African National Standards (SANS) 10103:2008 as well as in line with the International Finance Corporation (IFC) Environmental Health and Safety Guidelines for Noise.
- Sound level measurements will be undertaken using a CasellaTM Type 1 Integrating Sound Level Meter. Monitoring will be conducted in fifteen-minute intervals, with the day-time monitoring occurring between 07:00 and 22:00, and the night-time monitoring between 22:00 and 07:00, as per the IFC Guidelines.
- As per the recently published GNR 320 of the National Environmental Management Act , night-time monitoring will take place over a minimum of two nights, with each sample taken at two different times of the night in order to record the typical ambient sound levels at the different time of night.

- Assessment of monitored results against the relevant South Africa and IFC guideline rating levels.

DESKTOP ASESSSMENT

A desktop assessment of the proposed project will be undertaken. This will include assessment of potential sources related to the facility and their potential for creating noise in relation to surrounding receptors. This assessment will not comprise any calculations or modelling, but rather a literature-based assessment determining potential impacts.

ENVIRONMENTAL ACOUSTIC DESKTOP REPORT

A detailed Environmental Acoustic Desktop report will be provided detailing findings of the baseline assessment (monitoring) and desktop assessment, together with any recommendations determined.

7.5.6 HERITAGE AND PALAEONTOLOGICAL IMPACT ASSESSMENT

The scoping study did not identify any fatal flaws for the proposed Camden GH&A Facility. To comply with the National Heritage Resources Act (Act 25 of 1999) it is recommended that a Phase 1 HIA must be undertaken for the study area.

During the HIA the potential impact on heritage resources will be determined as well as levels of significance of recorded heritage resources. The HIA will also provide management and mitigation measures should any significant sites be impacted upon, ensuring that all the requirements of the SAHRA are met.

The study area is of insignificant to moderate to very high paleontological sensitivity and according to the SAHRIS palaeontological sensitivity map must be subjected to a palaeontological assessment in the impact assessment phase.

During the Public participation and stakeholder consultation process (advertisements & site notices) must reference the National Heritage Resources Act and include heritage concerns from stakeholders.

7.5.7 TRAFFIC IMPACT ASSESSMENT

The Traffic Impact Assessment will be conducted as follows:

- A site visit will be undertaken to obtain the following information:
  - Existing layouts and traffic control measures of intersections considered in the study;
  - Accesses to various properties surrounding the proposed development site;
  - Appropriateness of proposed site accesses;
  - Condition of the road network; and
  - Presence of existing public transport and non-motorised transport facilities.
- A weekday 12-hour traffic counts (6am to 6pm) will be conducted at affected intersections in relation to the potential access positions
- Description of the local and potentially affected road network, including planning and comment on the road condition, where information is available.
- Description of latent development in the vicinity of the facility that may also have an impact on the local road network.
- Assessment of the required site access, parking and internal circulation. Two access positions have provisionally been identified via local roads from the N11 freeway. These accesses will be confirmed during the preparation of the study and the final access position will be evaluated.
- Assessment of expected trip generation (construction & operational phases).
- Capacity analysis (construction & operational phases), including an assessment of the expected total E80's (heavy axle loading) for the life cycle of the facility.
- Assessment of public transport and Non-motorised transport (if applicable).
- Recommendations and conclusions with regards to the required traffic and transport related road upgrades.

7.5.8 VISUAL IMPACT ASSESSMENT

The scoping phase VIA report has adequately assessed the visual impacts of the proposed Camden I GH&A Facility and no further field investigation will be required. The focus of the EIA phase assessment will be to update the scoping phase VIA report. This will entail:

- A review of the findings of the VIA in accordance with detailed site layouts;
- A comparative assessment of the layout alternatives provided;
- Addressing any comments or concerns arising from the public participation process

7.5.9 SOCIAL IMPACT ASSESSMENT

The approach to undertaking the SIA study is based on the Western Cape Department of Environmental Affairs and Development Planning Guidelines for Social Impact Assessment (February 2007). These guidelines are based on international best practice. The key activities in the SIA process embodied in the guidelines include:

- Describing and obtaining an understanding of the proposed intervention (type, scale, and location), the settlements, and communities likely to be affected by the proposed project.
- Collecting baseline data on the current social and economic environment.
- Identifying the key potential social issues associated with the proposed project (construction, operational, and decommissioning phase). This requires a site visit to the area and consultation with affected individuals and communities.
- Assessing and documenting the significance of social impacts associated with the proposed development. Annexure B summarises the assessment methodology that will be used to assign significance ratings during the assessment process.
- Identifying alternatives and enhancement and mitigation measures.

The site visit will be undertaken during the Assessment Phase of the SIA. The site visit will include interviews with key stakeholders and interested and affected parties.

7.5.10 AIR QUALITY IMPACT ASSESSMENT

EMISSIONS CHARACTERISATION

An emissions inventory is a list of air pollution sources, their physical and chemical parameters, as well as the quantification of emissions. Emissions are calculated using emission factors or mass balance approaches, requiring chemical and activity data inputs.

ACTIVITY DATA

Activity data (i.e. storage tank specifications, forecasted throughputs, etc.) for this inventory was provided by the proponent. Unit processes and operating hours are presented in **Table 7-3**. Raw material throughputs, production rates and energy source consumption is presented in **Table 7-4**.

Table 7-3: Unit processes and operational times

Unit process	Function	Hours per day	Days per week	Days per year
Electrolyser	Separation of water into hydrogen and oxygen	24	7	365
Air separation	Separation of air into nitrogen and oxygen	24	7	365
Ammonia synthesis	Haber-Bosch synthesis of green ammonia	24	7	365

Unit process	Function	Hours per day	Days per week	Days per year
Bulk storage	Storage of hydrogen in pressure vessels and green anhydrous ammonia in bulk temperature-controlled storage tanks	24	7	365
Loading gantries	Filling of containers for dispatch by truck/rail	24	7	365

Table 7-4: Raw materials, products and energy sources

Category	Item	Consumption / Production rate	Unit
Raw materials	Water	320 000	tonnes/annum
Products	Green hydrogen	20 000	tonnes/annum
	Green ammonia	100 000	tonnes/annum
Energy	Renewable electricity	Not applicable – renewable energy supplied by the WEF and SEF (i.e. facility self-sustaining)	

EMISSIONS QUANTIFICATION

Emission factors are used to estimate emissions where actual emission data is not available. In most cases, these factors are averages of available data of acceptable quality and are generally assumed to be representative of long-term averages for all facilities in the source category. An emission factor is a value representing the relationship between an activity and the rate of emissions of a specified pollutant. Emission factors are always expressed as a function of the weight, volume, distance or duration of the activity emitting the pollutant. The general equation used for the estimation of emissions is:

$$E = A \times EF \times \left(1 - \frac{ER}{100}\right)$$

Where:

E = emission rate
A = activity rate
EF = emission factor
ER = overall emission reduction efficiency (%)

The *Modelling Regulations* recommend the use of published emission factors for national consistency, e.g. United States Environmental Protection Agency (USEPA) AP-42 emission factors[15]. As per the process description (**Section 2**), the only pollutant associated with the proposed processes that is relevant to Section 21 MES *Subcategory 7.1* is NH_3. As such, only potential sources of NH_3 are discussed in the sections that follow.

STORAGE TANKS

The proposed facility will store synthesised NH_3 product in bulk, however in a liquid state. Since NH_3 has a very low boiling point, NH_3 requires either temperature or pressure control to maintain a liquid phase and prevent product loss through evaporation.

PRINCIPLES OF BULK STORAGE TANK EMISSIONS

Evaporation is a natural process whereby a volatile liquid is converted into a vapour. The liquid's vapour pressure is the driving force causing evaporation. Vapour pressure is a measure of the force required to convert any volatile liquid into a gas. Molecular motion within the liquid is responsible for this force which is related to the composition of the liquid. Smaller molecule substances are more active and thus have higher vapour pressures. Higher temperatures increase molecular motion, increasing the vapour pressure with increasing temperature. As such, liquids with smaller molecular mass (i.e. g/mol) also have lower boiling points[16].

[15] USEPA (1995): Compilation of Air Pollutant Emission Factors (AP-42)
[16] TI-3 Petroleum Committee (1971): Control of Atmospheric Emissions from Petroleum Storage Tanks, in Journal of the Air Pollution Control Association, 21:5, 260 – 268 (URL: https://doi.org/10.1080/00022470.1971.10469526)

When vapour pressure causes the molecules of a liquid to vaporise (i.e. leave the liquid as a gas), the vapours disperse through the air space above the liquid surface, known as the 'vapour space'. Vapour molecules also condense and return to the liquid. A state of equilibrium is reached when the vapour space becomes saturated, with molecules leaving and returning to the liquid at the same rate. Due to diffusion, the composition of the vapour space becomes uniform throughout. At equilibrium, the percentage of the volatile compound (as a vapour) in the vapour space depends on the vapour pressure of the liquid[17].

Liquid temperature changes brought about by atmospheric conditions, can result in expansion or contraction of the tank contents. This change in the tank's vapour space causes the tank to 'breathe'. During the day, solar radiation heats the roof and walls of the tank, increasing the liquid temperature, resulting in expansion of the tank contents, as well as an increase in evaporation. The vapour within the vapour space above the liquid is also heated, increasing its volume, and resulting in an 'exhalation' of vapour through the tank vents. At night, the reverse processes condense the vapour and cause an intake of ambient air into the tank[18].

Evaporation loss only occurs when vapours are expelled from the vapour space and released to atmosphere. Two conditions must be present for evaporation loss to occur[19]:

1. Heat must be applied; and
2. The vapour evolved must be able to escape the vapour space.

Total atmospheric emissions (i.e. the emission rate) from a tank is thus a function of the rate of evaporation and the duration that vapour is released from the vapour space. The primary factors affecting the emission rate include the vapour pressure of the liquid at the liquid storage temperature (i.e. higher vapour pressure accelerates the rate of evaporation into the vapour space), temperature changes in the tank (i.e. higher temperatures increase the liquid vapour pressure and vapour volume within the vapour space), tank design and condition (i.e. mechanical conditions control the exposure of tank contents to rapid pressure changes or turbulence inside the tank), and operating schedule (i.e. the number of times a tank is filled and emptied over the assessment period) [20].

Evaporative losses can thus be classified into three categories[21]:

1. Filling losses – vapour present in the vapour space is expelled when the tank is refilled, irrespective of the mechanism by which the vapours evolve. This type of loss is applicable to all tank types except floating roof tanks and closed system pressure vessels (i.e. bullets).
2. Breathing losses – vapour is expelled from the tank due to thermal expansion of the vapours within the vapour space when pressure or volume changes exceed the limits of containment (e.g. due to barometric pressure changes and/or an increase in the volume of vapour in the vapour space). Tanks installed underground or fitted with reflective coatings, insulation or shading mitigate breathing losses better.
3. Standing losses – vapour emission resulting from causes other than breathing or changing liquid levels, such as exposure of the liquid to the atmosphere due to improper seal fitment or open vents.

Therefore, the solution to reduce/limit/prevent atmospheric emissions from a storage tank includes reducing the heat applied to the liquid (i.e. sustaining the liquid temperature below the boiling point of the compound) and containing evolved vapours within the vapour space (i.e. prevent the release of vapours to atmosphere).

STORAGE OF NH_3 AT THE PROPOSED FACILITY

The proponent proposes an insulated, temperature-controlled (i.e. -33.34°C) storage tank solution. The temperature of the liquid will be maintained below boiling point to prevent evaporation of the product. The liquid vapour pressure of NH_3 at a temperature of -33.34 °C is zero[22]. Storage tank vents will remain closed to sustain this low liquid temperature and prevent any mechanically induced turbulence inside the tanks. Given that the vapour pressure is zero at the intended storage temperature, evaporation of the product will not occur. Therefore,

[17] TI-3 Petroleum Committee (1971): Control of Atmospheric Emissions from Petroleum Storage Tanks, in Journal of the Air Pollution Control Association, 21:5, 260 – 268 (URL: https://doi.org/10.1080/00022470.1971.10469526)
[18] TI-3 Petroleum Committee (1971): Control of Atmospheric Emissions from Petroleum Storage Tanks, in Journal of the Air Pollution Control Association, 21:5, 260 – 268 (URL: https://doi.org/10.1080/00022470.1971.10469526)
[19] TI-3 Petroleum Committee (1971): Control of Atmospheric Emissions from Petroleum Storage Tanks, in Journal of the Air Pollution Control Association, 21:5, 260 – 268 (URL: https://doi.org/10.1080/00022470.1971.10469526)
[20] TI-3 Petroleum Committee (1971): Control of Atmospheric Emissions from Petroleum Storage Tanks, in Journal of the Air Pollution Control Association, 21:5, 260 – 268 (URL: https://doi.org/10.1080/00022470.1971.10469526)
[21] TI-3 Petroleum Committee (1971): Control of Atmospheric Emissions from Petroleum Storage Tanks, in Journal of the Air Pollution Control Association, 21:5, 260 – 268 (URL: https://doi.org/10.1080/00022470.1971.10469526)
[22] Tanner Industries (1998): Customer Manual – Anhydrous Ammonia (URL: https://www.tannerind.com/PDF/blue-anhy-amm.pdf)

emissions from the bulk storage of NH_3 at the proposed facility is not anticipated under normal operating conditions.

EMISSIONS MODELLING

South Africa's *Modelling Regulations* recommend the use of the US EPA and American Petroleum Industry (API) TANKS 4.0.9d model for estimating emissions from bulk liquid storage tanks. TANKS is Windows-based software created on the emission estimation procedures from the US EPA's AP-42 emission estimation manual. TANKS uses chemical, meteorological, roof fitting and rim seal data to generate breathing and working loss estimates for various types of storage tanks.

While the US EPA considers the use of TANKS 4.0.9d to be appropriate for quantifying NH_3 emissions from bulk storage (if the proper constants are applied)[23], the software is inherently flawed in its ability to simulate liquid temperatures below 0°F (i.e. -28.12°C). As such, TANKS could not be used in this case to demonstrate the null emissions associated with the proponent's proposed refrigerated storage design.

MATERIAL LOADING/OFFLOADING

Emission factors for material loading/offloading operations have been established by the US EPA and Australian National Pollutant Inventory (NPI). These are however, flagged by both organisations as only applicable to organic liquids and specifically stated as "*not suitable for estimating emissions from ammonia, mineral acids or other inorganic compounds…*"[24]. As such, emissions from loading activities cannot be quantified.

RECOMMENDATIONS

It is recommended that, once operational, a mass balance approach be used to account for facility wide evaporative losses (if any).

MODELLING PROCEDURES

Atmospheric dispersion modelling mathematically simulates the transport and fate of pollutants emitted from a source to the atmosphere. Algorithms incorporate source criteria, surface topography, land use and meteorology to predict the downwind concentrations of these pollutants. These provide a useful tool to ascertain the spatial and temporal patterns of ground level pollutant concentrations arising from various point, line, area and volume sources. These outputs are primarily used in environmental and health impact assessments, risk assessments and to determine monitoring requirements, including spatial and temporal resolution.

As per the *Modelling Regulations* the level of assessment is dependent on technical factors such as geophysical and meteorological context and the complexity of the emissions inventory. The temporal and spatial resolution and accuracy required from a model must also be taken into account.

As explained above no evaporative losses are anticipated from the bulk storage of NH_3 (under a normal operating scenario), and no suitable methodology for quantifying emissions from loading activities is currently available. As such, emissions cannot be quantified ahead of the proposed facility's operational phase and thus a dispersion modelling assessment cannot be conducted at this time.

WAY FORWARD

THE APPLICABILITY OF SECTION 21 LICENSING

It is acknowledged that Section 22 of NEM:AQA requires any person operating an activity listed under Section 21 within the Republic of South Africa, to hold either a provisional atmospheric emissions license (PAEL) or AEL.

Conventional ammonia production is listed as *Subcategory 7.1*. The threshold trigger for this subcategory is the quantity of the relevant compound being manufactured (i.e. 100 tons per annum of NH_3 in this case) regardless of

[23] USEPA (1994): Development and Selection of Ammonia Emission Factors – Final Report (URL: https://nepis.epa.gov/Exe/ZyPDF.cgi/P100ERTR.PDF?Dockey=P100ERTR.PDF)
[24] NPI (2004): Inorganic Chemicals Manufacturing 2.0, pg 38 (URL: http://www.npi.gov.au/system/files/resources/5a02d47b-2130-ea94-a59b-e85965eae307/files/inorganic-chemical.pdf)

the process specifics or whether the pollutants regulated by this subcategory's MES apply. The licensing of the proposed green ammonia facility as a listed activity is not considered relevant for the following reasons:

- The proposed green ammonia production process using renewable energy for water and air separation is demonstrated to be a pollutant free process unlike conventional ammonia synthesis using catalytic steam reforming powered by fossil fuel combustion;
- According to the national department's *Section 21 Companion Document*[25], atmospheric emissions from *Subcategory 7.1.* are expected to be primarily by-products of the chemical reaction. In the proponent's case, the 'by-product' of the chemical reaction is NH_3 (i.e. the primary product for market), which is captured, cooled and stored as a liquid. It is highlighted that it would not make business sense for the proponent to release NH_3 to atmosphere at any point of the process, be it during manufacture, storage or dispatch;
- Mandatory licensing conditions include isokinetic stack emissions testing to demonstrate and regulate a facility's compliance with MES. There will be no flue gas stacks associated with NH_3 synthesis at the Camden I operations. Gases purged during air separation include process irrelevant gases present in the ambient air feedstock (e.g. carbon dioxide) which are a) not evolved in the process, b) not considered ambient pollutants; and c) not regulated by MES; and
- Fugitive emissions (specifically evaporation losses) of NH_3 from temperature controlled bulk storage tanks under a normal operating scenario is not possible and evaporation during truck loading for dispatch is anticipated to be negligible (if any)[26].

As such, WSP believe it is not the intention of the law for such a facility to trigger as a listed activity.

THE APPLICABILITY OF ATMOSPHERIC DISPERSION MODELLING

Should the licensing authority assert that the facility cannot operate legally without appropriate Section 21 licensing, our recommendation is that further assessment be conducted as part of a PAEL review process (i.e. once the proposed facility is operational). Section 37 of NEM:AQA states that an application for a PAEL or an AEL must be lodged with the licensing authority in the required format (i.e. via the online South African Atmospheric Emission Licensing Information Platform, SAAELIP) and accompanied by any such documentation and information required by that licensing authority. Section 30(d) of NEM:AQA states that an AQO may require an AIR[27] be submitted for the review of a P/AEL in terms of Section 45 (Review of PAELs and AELs). A P/AEL review is required at the interval specified within an existing license or when circumstances demand that a review is necessary. Section 38 of NEM:AQA (Procedure for license applications) does not stipulate an AIR as a mandatory submission for the initial P/AEL application.

Due to the lack of quantifiable emission data at this time, a dispersion modelling assessment for Camden I cannot be undertaken. Once operational, a facility wide emissions inventory can be compiled using a mass balance approach. The PAEL can stipulate that all product throughputs and physical emission data is measured and databased for input to inventory calculations and for annual reporting obligations. Further, a passive monitoring campaign (as a PAEL condition) for the measurement of ambient NH_3 concentrations along the facility's fenceline and at proximate receptors will provide context in terms of actual impact (if any).

7.6 IMPACT ASSESSMENT METHODOLOGY

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record

[25] DEA (2012): S21 Companion Document – Category 7 (URL: https://saaqis.environment.gov.za/Pagesfiles/S21%20Companion%20Document%20-%20Category%207_2012.PDF)
[26] Emission rates cannot be quantified due to methodological limitations and thus the volume of product loss during dispatch cannot be estimated as part of this Plan of Study
[27] Department of Environmental Affairs (2013): Regulations prescribing the format of the atmospheric impact report.

interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct,[28] indirect,[29] secondary[30] as well as cumulative[31] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[32] presented in **Table 7-5**.

Table 7-5: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	0 – 30		31 to 60		61 – 100
Significance Rating (Negative (-)	**Low (-)**		**Moderate (-)**		**High (-)**
Significance Rating (Positive (+)	**Low (+)**		**Moderate (+)**		**High (+)**

[28] Impacts that arise directly from activities that form an integral part of the Project.
[29] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[30] Secondary or induced impacts caused by a change in the Project environment.
[31] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[32] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

7.6.1 IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The mitigation sequence/hierarchy is shown in **Figure 7-1** below.

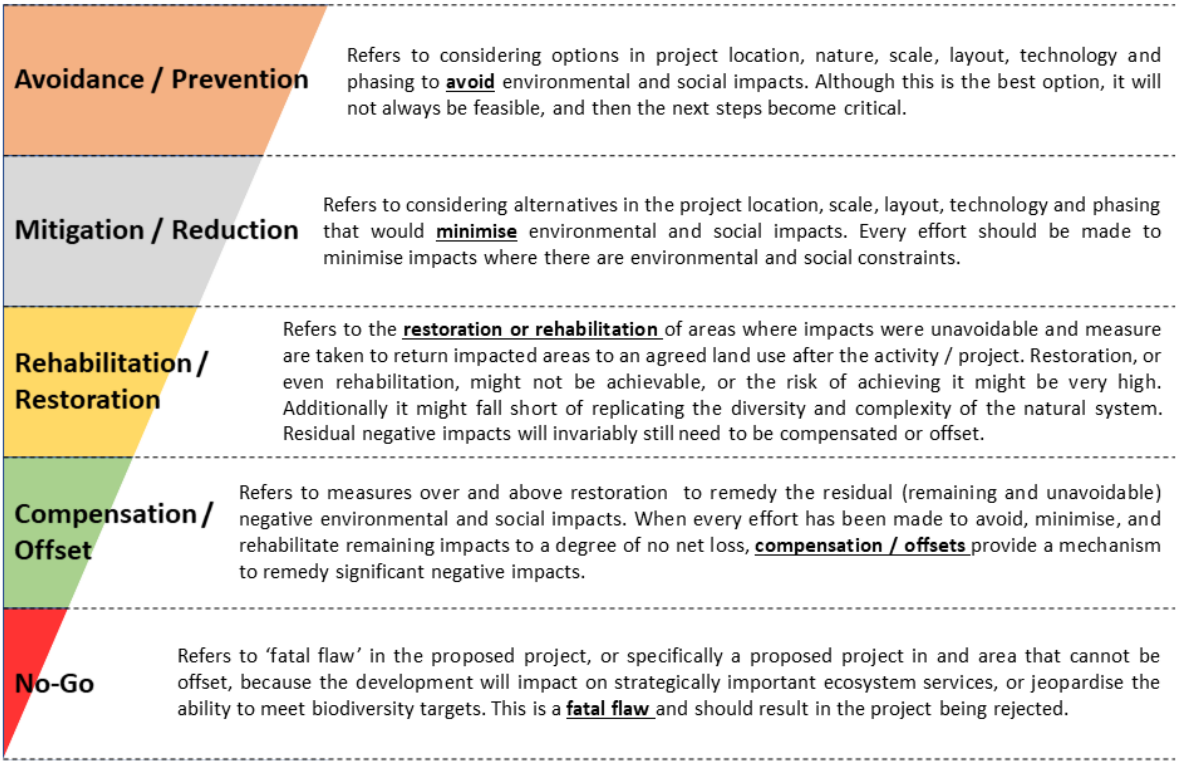


Figure 7-1: Mitigation Sequence/Hierarchy

The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

7.7 ENVIRONMENTAL IMPACT ASSESSMENT REPORT

Once the FSR has been approved the proposed project will proceed into detailed EIA phase, which involves the detailed specialist investigations.

WSP will produce a Draft EIAR after the completion of the required specialist studies. The Draft EIAR will provide an assessment of all the identified key issues and associated impacts from the Scoping phase. All requirements as contemplated in the EIA Regulations, 2014 (GNR 982, as amended) will be included in the Draft EIAR.

The Draft EIAR will contain, inter alia, the following:

- Details of the EAP who prepared the report and the expertise of the EAP to carry out the S&EIR process, including a curriculum vitae;
- The location of the activity, including the 21 digit Surveyor General code of each cadastral land parcel, where available, the physical address and farm name; and the coordinates of the boundary of the property or properties;
- A plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale;
- A description of the scope of the proposed activity, including all listed and specified activities triggered and being applied for; and a description of the associated structures and infrastructure related to the proposed project;
- 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;
- 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 location;
- A motivation for the preferred development footprint within the approved site;
- A full description of the process followed to reach the proposed development footprint within the approved site;
- Details of the public participation process undertaken;
- A summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;
- The environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
- The impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts;
- The methodology used in determining and ranking of potential environmental impacts and risks;
- Positive and negative impacts;
- An assessment of each identified potentially significant impact and risk;
- The possible mitigation measures that could be applied;
- An environmental impact statement;
- A description of any assumptions, uncertainties and gaps in knowledge;
- A reasoned opinion as to whether the proposed activity should or should not be authorised;
- An undertaking under oath or affirmation by the EAP; and
- An EMPr.

7.8 STAKEHOLDER AND AUTHORITY ENGAGEMENT

Public participation during the EIA phase revolves around the review of the environmental impact assessment findings, which will be presented in the Draft EIA Report. All stakeholders will be notified of the progress to date and availability of the Draft EIA Report, via mail, email and/or SMS. A legislated period of 30 consecutive days will be allowed for public comment. Reports will be made available in the following way:

- Distribution for comment at central public places, which were used during the Scoping phase (subject to Covid 19 status quo);
- The document will be made available to download from the WSP website; and
- Copies of CDs will be made available on request.

The EIA phase will provide the following information to I&APs:

- Initial Site Plan;
- Alternatives;
- A description of activities and operations to be undertaken;
- Baseline information;
- Specialist studies;
- Impact assessment;
- Management measures;
- Monitoring and measuring plan; and
- Closure details.

The information outlined above will be presented in one or more of the following:

- Notifications;
- Scoping Report;
- EIA Report; and
- EMPr.

All comments received during the EIA phase will be recorded in the comments and response report (CRR), which will be included in the draft and final EIA Reports. The final EIA Report will incorporate public comment received on the Draft EIA Report and will be made available for public review with hard copies distributed mainly to the authorities and key stakeholders.

All stakeholders will receive a letter notifying them of the authority's decision.

8 WAY FORWARD

This DSR contains:

- A description of the existing and proposed activities;
- A description of the alternatives considered to date;
- An outline of the proposed process to be followed;
- Information on the EAP and stakeholders who have chosen to participate in the project;
- An outline of the environment in which the project falls;
- Information on the potential environmental impacts to be studied in more detail during the EIAR phase of the project; and
- Information on the proposed specialist studies to be undertaken.

A number of environmental impacts have been identified as requiring some more in-depth investigation and the identification of detailed mitigation measures. Therefore, a detailed EIA is required to be undertaken in order to provide an assessment of these potential impacts and recommend appropriate mitigation measures.

The recommendation of this report is that detailed specialist studies as outlined in **Section 7.4** are undertaken.

This DSR is available for review from **25 February 2022 to 28 March 2022**. All issues and comments submitted to WSP will be incorporated in the CRR of the FSR.

The DSR will be submitted to the delegated competent authorities responsible for authorising this project.

If you have any further enquiries, please feel free to contact:

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APPENDIX

A EAP CV

APPENDIX

B EAP DECLARATION

APPENDIX

C SPECIALIST DECLARATIONS

APPENDIX

D HERITAGE SCOPING REPORT

APPENDIX

E DFFE SCREENING REPORT

APPENDIX

F

APPROVED PRE-APPLICATION MEETING MINUTES AND PUBLIC PARTICIPATION PLAN

APPENDIX

G STAKEHOLDER ENGAGEMENT

APPENDIX

G-1 I&AP DATABASE

G-2 NOTIFICATION LETTER

G-3 ADVERTISEMENT

G-4 SITE NOTICE

APPENDIX

H

AQUATIC SCOPING REPORT

APPENDIX

I

TERRESTRIAL ECOLOGY SCOPING REPORT

APPENDIX

J AVIFAUNA SCOPING REPORT

APPENDIX

K VISUAL SCOPING REPORT

APPENDIX

L SOCIAL SCOPING REPORT