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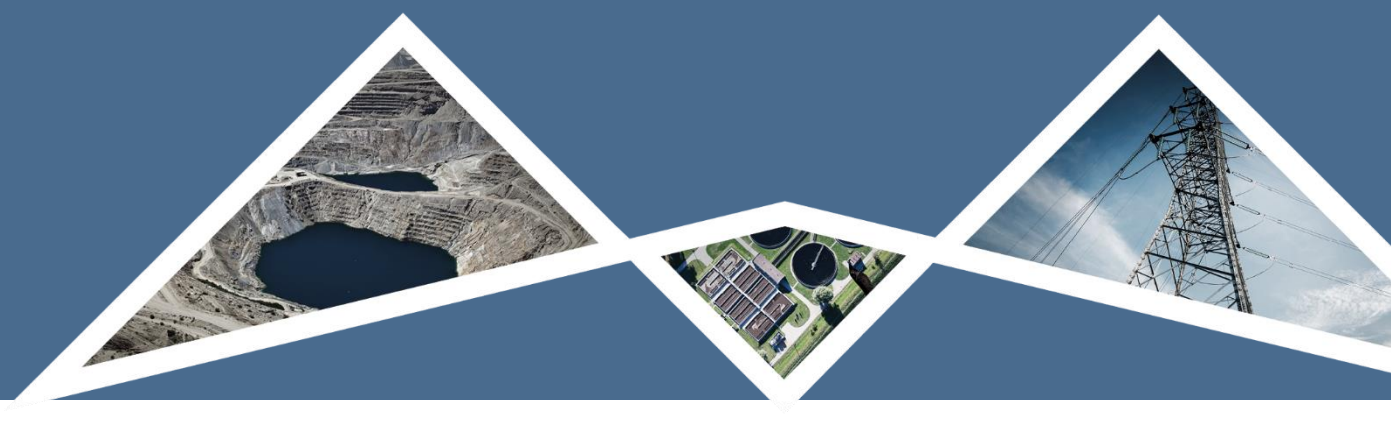
SCOPING REPORT

THE PROPOSED NUVEST RECOVERY SOLUTIONS (PTY) LTD CHEMICAL PLANT ON LAND PARCEL 110, BATOLIET ROAD IN MEYERTON, GAUTENG PROVINCE

NOVEMBER 2023



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2023/11/27	REVISION 1	Scoping Report for Public Review & Comment

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LIST OF ABBREVIATIONS / ACRONYMS

CA	Competent Authority
CBA	Critical biodiversity area
CMA	Catchment Management Agency
DFFE	Department of Forestry, Fisheries and the Environment
DMRE	Department of Mineral Resources and Energy
DSR	Draft Scoping Report
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environmental Conservation Act (Act 73 of 1989
EIA	Environmental Impact Assessment
EIR	Environmental Impact Report

EMPR	Environmental Management Programme Report
ESA	Ecological Support Area
FSR	Final Scoping Report
GHG	Green House Gas
Ha	Hectares
HIA	Heritage Impact Assessment
I&Aps	Interested and Affected Parties
IBC	Intermediate Bulk Container
IDP	Integrated Development Plan
NEMA	National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998)
PHRAG	Provincial Heritage Resources Authority Gauteng
WULA	Water Use Licence Application
NWA	National Water Act (Act No. 36 of 1998)
SAHRA	South African Heritage Resources Agency
SAHRIS	South African Heritage Resources Information System
WTW	Water Treatment Works

GLOSSARY OF TERMS

This section provides a catalogue of terms and definitions, which may be used in this report and, or other documents drafted for the project.

Table 1: Glossary of terms

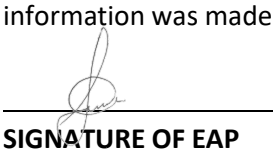
Term	Definition	Reference
Clearing/Clearance	Clearing/Clearance refers to the removal of vegetation through permanent eradication and in turn no likelihood of regrowth. 'Burning of vegetation (e.g. fire- breaks), mowing grass or pruning does not constitute vegetation clearance, unless such burning, mowing or pruning would result in the vegetation being permanently eliminated, removed or eradicated'.	Department of Environmental Affairs, 2017. Clearance of Indigenous Vegetation Explanatory Document
Competent Authority	In respect of a listed activity or specified activity, means the organ of state charged by this Act with evaluating the environmental impact of that activity and, where appropriate, with granting or refusing an environmental authorisation in respect of that activity.	National Environmental Management Act (NEMA), 1998 (Act 107 of 1998) as amended, NEMA 1998 hereafter
Critical Biodiversity Area	Areas that are deemed important to conserve ecosystems and species. For this reason, these areas require protection.	South African National Biodiversity Institute (SANBI)
Duty of Care	Every person who causes, has caused or may cause significant pollution or degradation of the environment to take reasonable measures to prevent such pollution or degradation from occurring, continuing or recurring, or, in so far as such harm to the environmental is authorised by law or cannot reasonably be avoided or stopped, to	NEMA, 1998

Term	Definition	Reference
	minimise and rectify such pollution and degradation of the environment. "	
Decommissioning	means to take out of active service permanently or dismantle partly or wholly, or closure of a facility to the extent that it cannot be readily recommissioned;	NEMA, EIA Regulations, 2014, as amended
Environment	the surroundings within which humans exist and that are made up of— **(21)** the land, water and atmosphere of the earth; (ii) micro-organisms, plant and animal life; (iii) any part or combination of (i) and (ii) and the interrelationships among and between them; and (iv) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and well-being.	National Environmental Management Act 1998 (Act No. 107 of 1998), as amended, NEMA hereafter
Environmental Assessment Practitioners	The individual responsible for the planning, management, coordination or review of environmental impact assessments, strategic environmental assessments, environmental management programmers or any other appropriate environmental instruments introduced through regulations.	NEMA, 1998
Indigenous vegetation	Refers to vegetation consisting of indigenous plant species occurring naturally in an area, regardless of the level of alien infestation and where the topsoil has not been lawfully disturbed during the preceding ten years.	NEMA, EIA Regulations, 2014, as amended
Interested and Affected Parties (IAPs)	a) any person, group of persons or organisation interested in or affected by such operation or activity; and (b) any organ of stale that may have jurisdiction over any aspect of the operation or activity.	NEMA, 1998
Phased Activity	Means an activity that is developed in phases over time on the same or adjacent properties to create a single or linked entity, but excludes any activity for which an environmental authorisation has been obtained in terms of the Act or the Environment Conservation Act, 1989 (Act No. 73 of 1989);	NEMA, EIA Regulations, 2014, as amended
Protected Area	A protected area is a clearly defined geographical space, recognised, dedicated and managed, through legal or other effective means, to achieve the long-term conservation of nature with associated ecosystem services and cultural values.	International Union for Conservation of Nature (IUCN)
	These are areas aimed at the protection and conservation of areas which are ecologically viable and have high biodiversity. Example of Protected Areas include but are not limited to National Parks, Nature Reserves, world heritage sites and marine protected areas	National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
Public Participation Process	In relation to the assessment of the environmental impact of any application for an environmental authorisation, means a process by which potential Interested and Affected Parties are given opportunity to comment on, or raise issues relevant to, the application.	NEMA, 1998, as amended

Term	Definition	Reference
Species of Conservation Concern	IUCN Red List definition: Threatened species, and other species of significant conservation importance: Extinct, Extinct in the Wild, Near Threatened, Data Deficient. In South Africa, the following additional categories are added: Rare, Critically Rare.	SANBI

AFFIRMATION OF ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)

I ***Vukosi Mabunda***, a Registered EAP employed by ***Environmental Impact Management Services (Pty) Ltd*** declare that the information provided in this report is correct and relevant to the activity / project, that comments from interested and affected parties have been incorporated into this report that the information was made available to interested and affected parties for their comments.



SIGNATURE OF EAP

27 November 2023

DATE

1 INTRODUCTION

1.1 Background

NuVest Recovery Solutions (Pty) Ltd is a South African company that was founded in 2017. The company specializes in the development and implementation of technologies and chemistries for the sustainable recovery of resources. NuVest Recovery Solutions' products and services help businesses to reduce their environmental impact, save money, and improve their returns (NuVest Recovery Solutions, 2019).

NuVest Recovery Solutions (hereafter NuVest) proposes to develop a chemical plant located on 110 Batoliet Road in Meyerton, within the Sedibeng District Municipality, Gauteng Province. The proposed plant production capacity is based on producing 10t/day of chlorine. The plant will have a bulk storage capacity of approximately 17 473 tonnes with a maximum single storage capacity of 4 617 tonnes (13 074m^3) of chemicals within the facility. The chemical plant will specialize in the production of sodium hydroxide (NaOH), chlorine (Cl_2), and hydrogen (H_2) through the chlor-alkali process. These three intermediate products will then be further processed to produce hydrochloric (HCl) acid, bleach (12-13% sodium hypochlorite solution), and caustic lye (47% solution in water). No chlorine or hydrogen will be stored on site. Other chemicals (not produced on site will be delivered in road tankers and offloaded into the bulk tanks before decanting into IBCs and or polycans.

Environmental Impact Management Services (Pty) Ltd. (EIMS) has been appointed by EcoPartners (Pty) Ltd on behalf of NuVest as the Environmental Assessment Practitioners (EAPs) to assist with undertaking the necessary application processes (including the statutory public participation) and to compile and submit the required documentation in support of application for:

- Environmental Authorisation (EA) in accordance with the NEMA- Listed activity/ies:
    - GNR984 Listing Notices 2; Activity 4 and 6
- Additional listed activities may be identified during the EIA process:
    - Atmospheric Emissions Licence in accordance with the requirements of the National Environmental Management: Air Quality Act (Act 39 of 2004) – Category: 7; Sub-Categories 7.1, 7.2, and 7.7.

The proposed chemical plant is located on 110 Batoliet Road in Meyerton, Gauteng Province. Meyerton is a small town lying 18 km north of Vereeniging in Gauteng. It is situated in the Midvaal Local Municipality in the Sedibeng District Municipality. Essentially a rural area, Meyerton lies south of Johannesburg falling into an area known as the Vaal Triangle – a roughly triangular locale bounded by Vereeniging, Vanderbijlpark and Sasolburg – although Meyerton, which lies just north of Vereeniging, is included in this area. Together they form a substantial urban region that straddles the Vaal River and is home to some major industry - Sasol and ISCOR's. The proposed chemical plant is 40m southeast of the R59 southbound, in the Randvaal area of Gauteng. The nearest town to the site is Henley-on-Klip located to the south. Batoliet Road passes the front of the property, and its suburb is locally referred to as Highbury. The site locality details are indicated in **Table 2** below.

Table 2: Site property details

Item	Details
Physical Address of Property	110 Batoliet Road, Valley Settlements, Meyerton
Distance from closest town	Approximately 6km from Meyerton City Centre
Centre point of proposed area in GPS coordinates	26°30'38.04"S; 28° 02'40.46"E
Coordinates of property boundaries	NE Boundary: 26°30'34.82"S; 28° 02'38.52"E NW Boundary: 26°30'37.61"S; 28° 02'36.39"E SW Boundary: 26°30'41.19"S; 28° 02'42.25"E

	SE Boundary: 26°30’38.34”S; 28° 02’44.46”E
Area size (Ha)	2.1Ha

1.2 Purpose of this Report

The purpose of the scoping phase is to gather information on the proposed site and establish an understanding of the study area and the receiving environment. This phase will also determine how the proposed activities will potentially impact on the environment. The Assessment of alternatives e.g., activity, location, design, etc. will be considered in this report. The report will further identify any Interested and Affected Parties in the study area, engage with such parties and relevant authorities and identify environmental issues and potential impacts. This Scoping report is intended to guide the EIA process and the required specialist studies by:

- Providing an overview of the legal requirements with regards to the proposed chemical plant;
- Provide a project description of the proposed chemical plant as well as the anticipated environmental and social impacts that will be further investigated in the EIA phase;
- Setting the scope for the EIA process as well as the Terms of Reference (ToR) for the proposed specialist studies; and
- Outlining the approach and methodologies to be used in the Scoping and EIA phase including the impact assessment methodology.

1.3 Assumptions and Limitations

The following assumptions have been made in the undertaking of the scoping process:

- The application is limited to the proposed NuVest Recovery Solutions Chemical Plant site in Meyerton;
- The information provided by the applicant is accurate, adequate, unbiased, and no information that could change the outcome of the EIA process has been withheld;
- The preliminary site sensitivity verification and desktop assessments are sufficient for the scoping phase and the information that will be obtained from the specialist studies for this project during the EIA Phase will be accurate, objective and sufficient for the level of assessment required;
- Detailed assessment of the positive and negative environmental impacts of the proposed chemical plant will be undertaken during the Environmental Impact Assessment phase;
- In accordance with the Protection of Personal Information Act (Act 4 of 2013), personal information (emails, contact numbers, address) are blanked out and excluded during the Public Participation and only provided to the competent authority officials; and
- Personal information of I&APs made available to the competent authority shall only be used by the authorities to confirm or obtain information regarding this specific project.

1.4 Scoping and Environmental Impact Assessment Requirements

The list of activities applied for in terms of the NEMA EIA Regulations 2014 as amended are discussed in **Section 2.3**. These listed activities triggered by the proposed development of NuVest chemical plant must follow the required Environmental Impact Assessment process as required by the NEMA EIA Regulations 2014, as amended, as set out in Government Notice Regulations 982 in Government Gazette No. 40772 of 7 April 2017. Based on these Regulations, a Scoping and EIA process must be followed. The Application Form will be submitted to the competent authority, the Gauteng Department of Agriculture and Rural Development (GDARD). GDARD is the relevant Competent Authority as per the 2014 NEMA EIA Regulations application procedures as the applicant is a private company and the proposed development of a chemical plant in Meyerton (Gauteng Province) is in line with the identified activities which the Member of the Executive Council of the National Department of Forestry, Fisheries and the Environment (DFFE) has delegated to provincial departments.

1.5 The Scoping Phase

The Scoping and EIA process must be undertaken in accordance with the 2014 EIA Regulations No. 982, as amended. The main objectives of the current Scoping Phase, in terms of the regulatory requirements stipulated in *Appendix 2* of the 2014 EIA Regulations, are to:

a) identify the relevant policies and legislation relevant to the activity;

b) motivate the need and desirability of the proposed activity, including the need and desirability of the activity in the context of the preferred location;

c) identify and confirm the preferred activity and technology alternative through an impact and risk assessment and ranking process;

d) 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;

e) identify the key issues to be addressed in the assessment phase;

f) 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

g) 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.

Once the Draft scoping process is complete, a Final Scoping Report must be prepared detailing the scope of the EIA required for the proposed activities. This Scoping Report has been compiled in accordance with the requirements set out in Appendix 2 of the 2014 EIA Regulations, as amended, which outlines the contents of a Scoping Report and provides the requirements necessary for undertaking the Public Participation Process. A final scoping report will be prepared and submitted to the competent authority (GDARD) for review and decision making. GDARD will communicate the decision within 45-days of submission of the final scoping report. The decision can either be an acceptance or rejection of the scoping report. The process can only proceed into the EIA Phase upon the receipt of approval of the scoping report. It must be noted that the approval may be issued with recommendations and/or requirements for the EIA Phase.

1.6 Report Structure

This report has been compiled in accordance with the 2014 NEMA EIA Regulations, as amended. A summary of the report structure, and the specific sections that correspond to the applicable regulations, is provided in **Table 3** below.

Table 3: Report structure

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(1)(a):	Details of – i. The Environmental Assessment Practitioner (EAP) who prepared the report; and ii. The expertise of the EAP, including a curriculum vitae;	***Section 1.7*** ***Appendix 2***
Appendix 2(1)(b):	The location of the activity. Including – i. The 21-digit Surveyor General code of each cadastral land parcel; ii. Where available, the physical address and farm name; iii. Where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;	***Section 1.1*** ***Table 5***
Appendix 2(1)I:	A plan which locates the proposed activity or activities applied for at an appropriate scale, or, if it is – i. A linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or ii. On a land where the property has not been defined, the coordinates within which the activity is to be undertaken;	***Figure 1*** ***Figure 2*** ***Chapter 2***
Appendix 2(1)(d):	A description of the scope of the proposed activity, including – i. All listed and specified activities triggered; ii. A description of the activities to be undertaken, including associated structures and infrastructure;	***Section 2.3***
Appendix 2(1)I:	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***
Appendix 2(1)(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 2.4***

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
Appendix 2(1)(g):	A full description of the process followed to reach the proposed preferred activity, site and location within the site, including –	
	i. Details of all alternatives considered;	***Section 4***
	ii. Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;	***Section 5***
	iii. 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;	***Section 5.6***
	iv. The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	***Section 6***
	v. 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 – a. Can be reversed; b. May cause irreplaceable loss or resources; and c. Can be avoided, managed or mitigated;	***Section 7***
	vi. 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 8.4***
	vii. Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;	***Section 7***
	viii. The possible mitigation measures that could be applied and level of residual risk;	***Section 7***
	ix. The outcome of the site selection matrix;	***Nil***
	x. If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and	***Nil***
	xi. A concluding statement indicating the preferred alternatives, including preferred location of the activity;	***Section 4***
Appendix 2(1)(h):	A plan of study for undertaking the environmental impact assessment process to be undertaken, including –	***Section 8***
	i. A description of the alternatives to be considered and assessed within the preferred site, including the option of not proceeding with the activity;	***Section 8.1***
	ii. A description of the aspects to be assessed as part of the environmental impact assessment process;	***Section 8.2***
	iii. Aspects to be assessed by specialists;	***Section 8.3***
	iv. A description of the proposed method of assessing the environmental aspects, including a description of the proposed method assessing the environmental aspects to be assessed by specialists;	***Section 8.4***
	v. A description of the proposed method of assessing duration and significance;	***Section 8.5***
	vi. An indication of the stages at which the competent authority will be consulted;	***Section 8.7***

Environmental Regulation	Description – NEMA Regulation 982 (2014) as amended	Section in Report
	vii. Particulars of the public participation process that will be conducted during the environmental impact assessment process; and viii. A description of the tasks that will be undertaken as part of the environmental impact assessment process; ix. 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 8.7*** ***Section 8.2***
Appendix 2(2)(i)	An undertaking under oath or affirmation by the EAP in relation to – i. The correctness of the information provided in the report; ii. The inclusion of comments and inputs from stakeholders and interested and affected parties; and iii. 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;	*Page ix* *Appendix 2*
Appendix 2(2)(j):	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;	*Page ix* *Appendix 2*
Appendix 2(2)(k):	Where applicable, any specific information required by the competent authority; and	*N/A*
Appendix 2(2)(l):	Any other matter required in terms of section 24(4)(a) and (b) of the Act.	*N/A*

1.7 Details of the Environmental Assessment Practitioner

EIMS is appointed by EcoPartners (Pty) Ltd on behalf of NuVest Recovery Solutions (Pty) Ltd to assist in preparing and submitting the Environmental Authorisation application form, the Scoping and Environmental Impact Assessment Reports and to conduct the required public participation process in support of the proposed chemical plant located on 110 Batoliet Road in Meyerton, Gauteng Province. EIMS is a private and independent environmental management-consulting firm that was founded in 1993. EIMS is an independent specialised environmental consulting firm offering the full spectrum of environmental management services across all sectors within the African continent. EIMS has successfully completed many hundreds of assignments over the years with an excess of 28 years' experience in conducting EIA's for both the government and private sector. Please refer to the EIMS website (www.eims.co.za) for examples of EIA documentation currently available. In terms of Regulation 13 of the NEMA EIA Regulations (GNR 982) 2014 as amended, an independent EAP, must be appointed by the applicant to manage the application for an environmental authorisation. EIMS and the compiler of this report are compliant with the definition of an EAP as defined in Regulations 1 and 13 of the NEMA EIA Regulations, as well as Section 1 of the NEMA. This includes, inter alia, the requirement that EIMS is:

- Objective and independent;
- Has expertise in conducting EIA's;
- Comply with the NEMA, the environmental regulations and all other applicable legislation;
- Considers all relevant factors relating to the application; and
- Provides full disclosure to the applicant and the relevant environmental authority.

The contact details of the EIMS consultant (EAP) who compiled this Report are presented in **Table 4.**

Table 4: Details of the Environmental Assessment Practitioner

Principal EAP:	**Mr. Vukosi Mabunda**
Tel No:	+27 11 789 7170
Fax No:	+27 86 571 9047
E-mail:	vukosi@eims.co.za
Professional Registrations:	• Registered Environmental Assessment Practitioner with Environmental Assessment Practitioner Association of South Africa – EAPASA (Reg. No: 134178) • Professional Natural Scientist with the South African Council for Natural Scientific Professions – SACNASP (Reg. No: 2019/867).
Assistant EAP:	**Jessica Jordaan**
Tel No:	+27 11 789 7170
Fax No:	+27 86 571 9047
E-mail:	Jessica@eims.co.za

This Scoping Report was prepared by Vukosi Mabunda (with the assistance of Jessica Jordaan), a Registered Environmental Assessment Practitioner (EAP) employed by EIMS. His CV is included as **Appendix 2** of this report. Mr Vukosi Mabunda is currently an Environmental Assessment Practitioner and a Geographic Information Systems (GIS) Specialist with 5 years' working experience. Vukosi is a Registered Environmental Assessment Practitioner with the Environmental Assessment Practitioners Association of South Africa (EAPASA). He is one of the few dual registered professionals with SACNASP as a Professional Geospatial Scientist and Professional Environmental Scientist. Vukosi has dual professional background in Geographic and Environmental Sciences with a Master of Science Degree in Geography obtained in 2021 from the University of Johannesburg. In addition to his experience in Environmental Compliance Monitoring and applications for Water Use License Applications, Vukosi has successfully completed numerous environmental impacts assessments for both linear and footprint developments as indicated in his CV (**Appendix 2**).

1.8 Description of the Property

The proposed NuVest chemical plant site is located on Portion Parcel 110 (T0IR06840000011000000), Valley Settlements, Meyerton within the Midvaal Local Municipality administrative region. The property is owned by the applicant's sister company (Nuvest Group Properties (Pty) Ltd) and landowner consent for the proposed development has been obtained by the applicant. The physical address of the proposed development site is number 110 Batoliet Road, Randvaal, Meyerton and the site centre coordinates are 26°30'38.04"S; 28° 02'40.46"E. The proposed development site is approximately 32km southwest of Johannesburg Business District Centre (CBD). Details of the application area, the location as well as the properties are included in **Table 5** below.

Table 5: Property details of the proposed development area

Application Area (Ha)	**2.1 Ha**	
Magisterial District	Meyerton Main Seat of Midvaal	
Distance and direction from nearest towns	Approximately 6km north of Meyerton City Centre Approximately 23km southwest of Alberton Approximately 32km southwest of Johannesburg CBD Approximately 30km northeast of Vanderbijlpark	
Cadastral Information	**Farm / Erf Details**	**21 Digit Surveyor General Code**
	Parcel 110	T0IR06840000011000000
	Town / Township / Suburb	**Administrative Area / Region**
	Valley Settlements, Meyerton	Midvaal Local Municipality

The land use immediately surrounding the proposed chemical plant consists mainly of built-up areas (urban residential, urban informal and urban industrial), cultivated land and grassland. Waterbodies, wetlands, mines and quarries and forested land are also located in surrounding areas, more than 500m away from the site in terms of regulated areas for a watercourse (**Figure 1** and **Figure 2**). The larger area surrounding the proposed plant is classified as rural in nature.

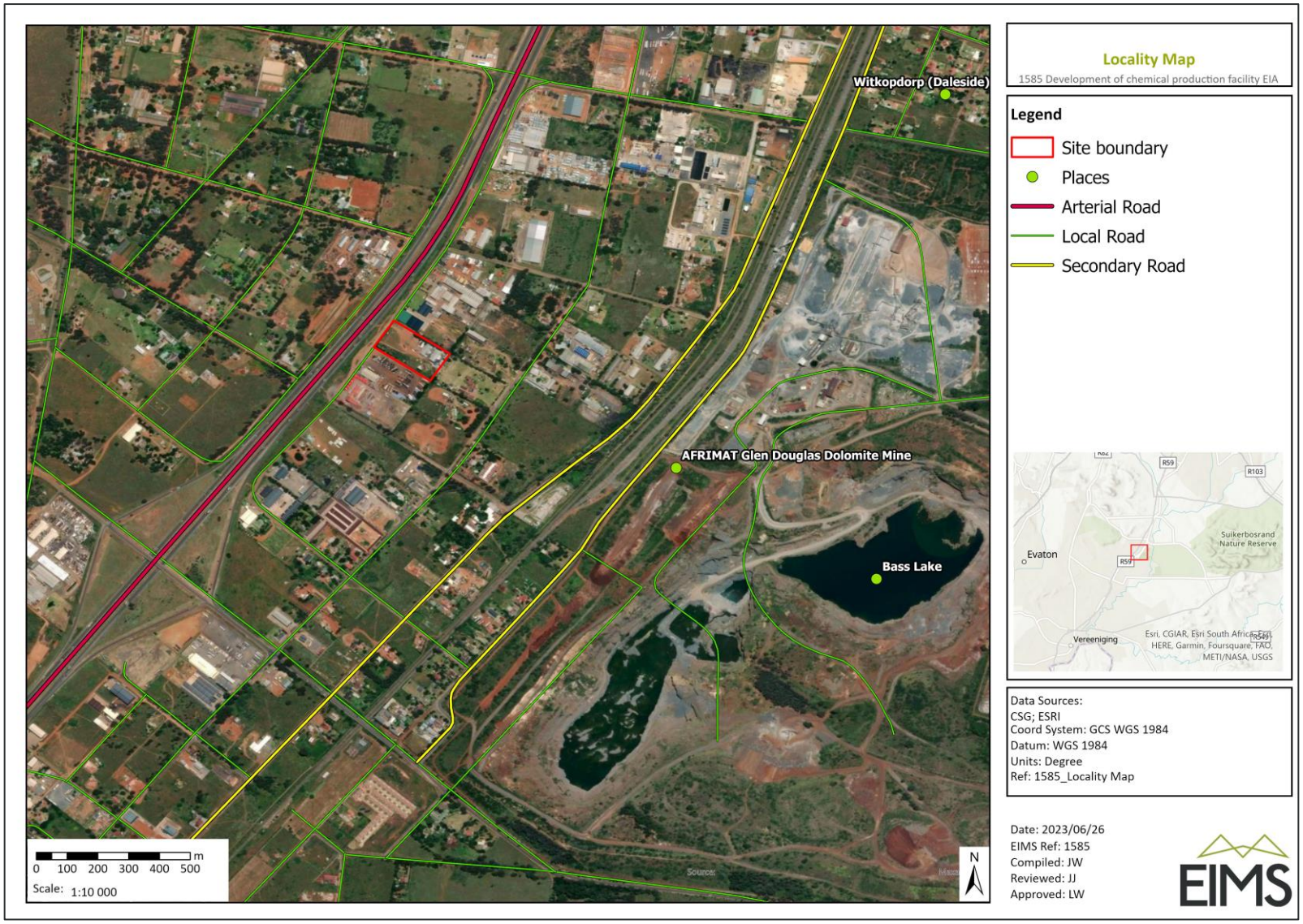


Figure 1: Site locality map

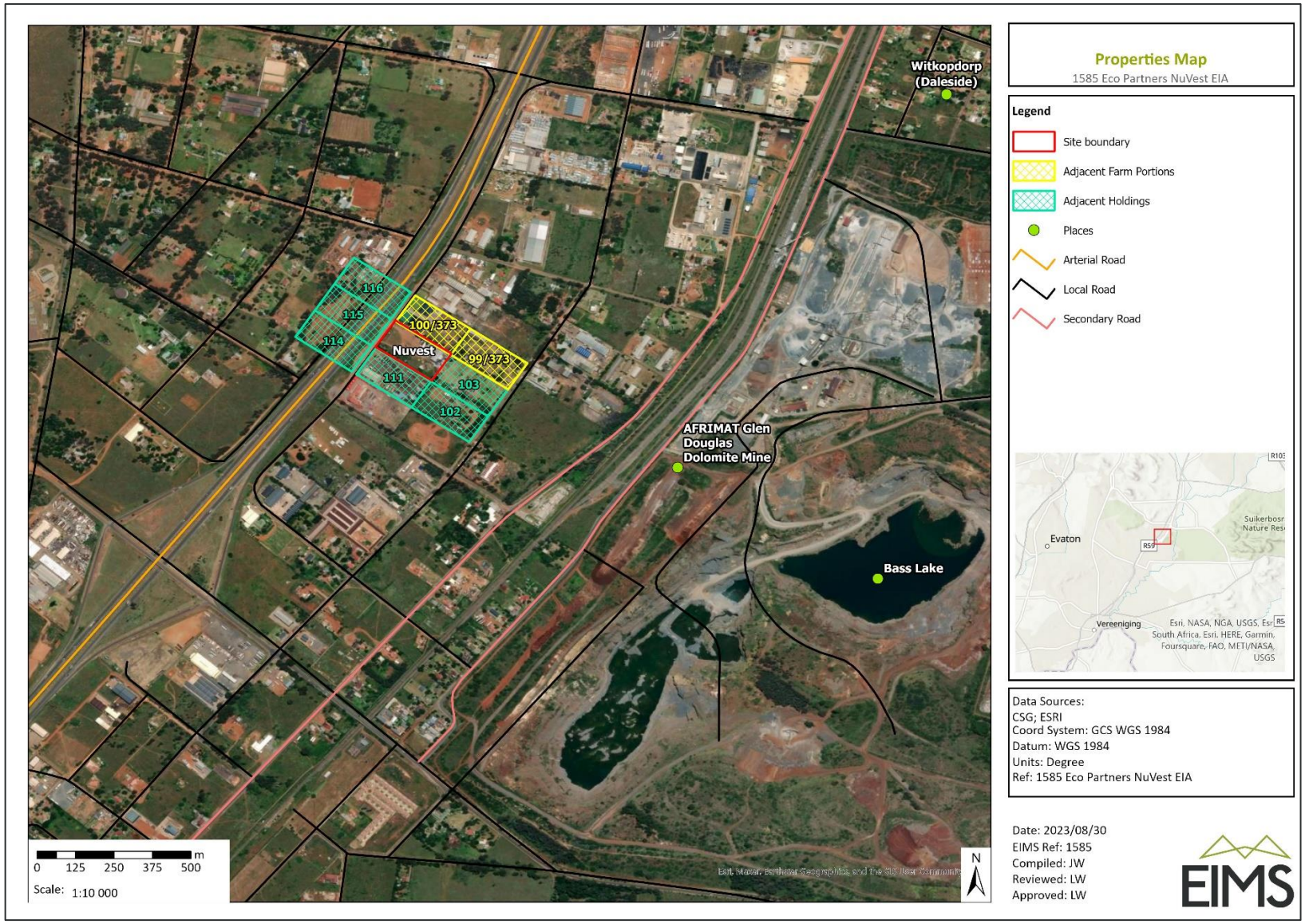


Figure 2: Site properties map

2 DESCRIPTION AND SCOPE OF THE PROPOSED ACTIVITY

This section contains a description of the project history followed by a detailed description of the proposed NuVest Project with its associated infrastructure. At the end of this section, the applicable listed activities relating to the project are presented.

2.1. Brief Project History

The NuVest Group started in 2012 with NuVest Chemicals. NuVest Chemicals imports and supplies chemical raw materials into the South African market and offers services and products to the entire Southern African region. NuVest Recovery Solutions has been in operation since 2017; with product and service offerings that include technology aimed at eliminating, reducing, re-using and recycling resources, with a focus on savings achieved throughout the supply chain. NuVest seeks to expand its production and supply and therefore, proposes to develop the NuVest chemical plant in Meyerton.

2.2. Project Description

NuVest Recovery Solutions (hereafter NuVest) plans to develop a chemical manufacturing plant in Meyerton, Gauteng Province. Currently the facility imports and locally sources dry and liquid chemicals. The dry chemicals are stored in the dry chemicals warehouse before dispatch to clients. The liquid chemicals are mostly acids i.e., nitric acid, sulphuric acid, phosphoric acid etc. The acids are delivered in road tankers and directly offloaded into Intermediate Bulk Containers (IBCs) which are moved into the liquid warehouse for storage before dispatch.

The proposed plant production capacity is based on producing 10t/day of chlorine. The plant will have a bulk storage capacity of approximately 17 473 tonnes with a maximum single storage capacity of 4 617 tonnes (13 074m^3) of chemicals within the facility. The chemical plant will specialize in the production of sodium hydroxide (NaOH), chlorine (Cl_2), and hydrogen (H_2) through the chlor-alkali process. These three intermediate products will then be further processed to produce hydrochloric (HCl) acid, bleach (12-13% sodium hypochlorite solution), and caustic lye (47% solution in water). No chlorine or hydrogen will be stored on site. Other chemicals (not produced on site will be delivered in road tankers and offloaded into the bulk tanks before decanting into IBCs and or polycans.

The proposed plant production capacity is based on producing at least 10t/day of chlorine. The plant is intended to produce caustic soda solution, hydrogen gas, chlorine as primary products from the electrolysis of brine. Solid salt will be dissolved in water to form saturated brine, which is fed into the electrolyser. The hydrogen and chlorine gas leaving the electrolyser are used to make hydrochloric acid. Part of the chlorine and the caustic solution are used in the production of sodium hypochlorite. The proposed plant will include a tank farm for storage of bulk chemicals produced. Other chemicals (not produced on site will be delivered in road tankers and offloaded into the bulk tanks before decanting into IBCs and or polycans. The size of the bulk storage tanks will either be 50m^3, 100m^3, 150m^3, 250m^3, 100m^3, or 2 500m^3 based on preliminary calculations and there will be a total of 10 bulk tanks. A basic preliminary site layout diagram is given in **Figure 3** with the detailed tank farm chemicals indicated in **Table 6** while basic process for the proposed chlor-alkali plant, as well as the receiving of tankers and containers are given in **Table 7**. The proposed facility will consist of the following facilities as indicated in **Figure 3**:

- Site Office:
- Warehouse;
- Receiving and dispatching areas;
- IBC Storage;
- Main Plant;
- Tank Farm (28 Chemical Tanks):

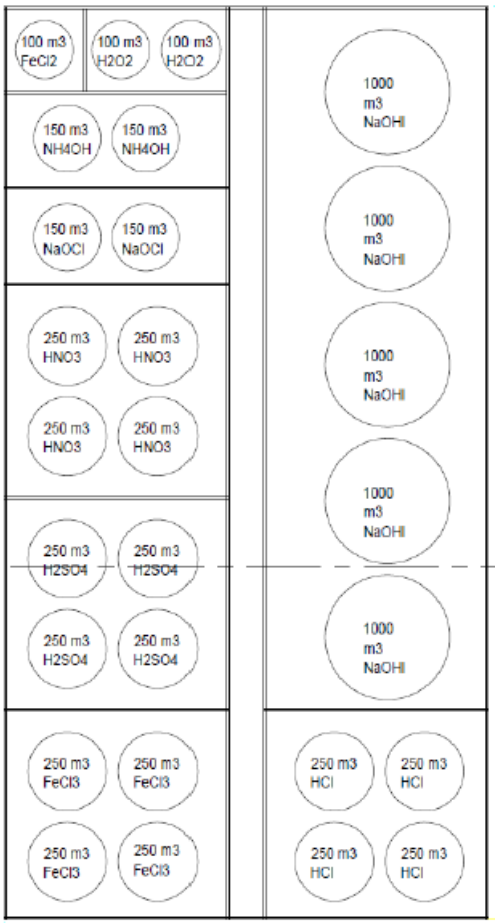


Figure 3: Proposed site layout of the NuVest Chemical Plant

Table 6: Proposed material storage at the Nuvest Chemical Facility Tank Farm

Material	Formula	Tank Capacity (tons)	Quantity of Tanks	Total Storage Capacity (tons)	Maximum Single Storage Capacity (tons)
Nitric acid 57%	HNO_3	50	3	150	370
Hydrogen Peroxide 40%	H_2O_2	20	2	40	112
Hydrochloric acid 33%	HCl	300	4	1200	300
Ammonium hydroxide	NH_4OH	150	2	300	150
Sodium Hypochlorite	NaClO	181	2	362	180
Sodium Hydroxide	NaOH	2130	5	10650	2130
Sulphuric acid	H_2SO_4	460	4	1840	460
Ferrous Chloride	$FeCl_2$	109	1	109	193
Ferric Chloride	$FeCl_3$	700	4	2800	700
Diesel	$C_{12}H_{23}$	22	1	22	22
	TOTAL	**4122**	**28**	**17473**	**4617**

A detailed description of the chlor-alkali process is given below.

i. Chlor-Alkali Process

Solid salt (NaCl) will be dissolved in water to form a saturated brine. The brine will be fed into the electrolyser, which is a bank of membrane electrolysis cells. Each electrolysis cell will comprise of an anode and a cathode, which are separated by an ion-exchange membrane (**Figure 3**). This membrane will allow the diffusion of sodium

(Na+) ions and a certain quantity of water into the cathode compartment, while it inhibits the diffusion of the other ions. Voltage will be applied across the cell, upon which sodium ions and a little water will pass through the membrane into the cathode compartment, thus separating the Na+ ions from the ions in the anode compartment. Hydrogen gas and hydroxide (OH-) ions will be generated from water (H_2O) at the cathode. The OH- ions will then react with the Na+ ions in the cathode compartment to produce NaOH. Chlorine gas will be generated at the anode.

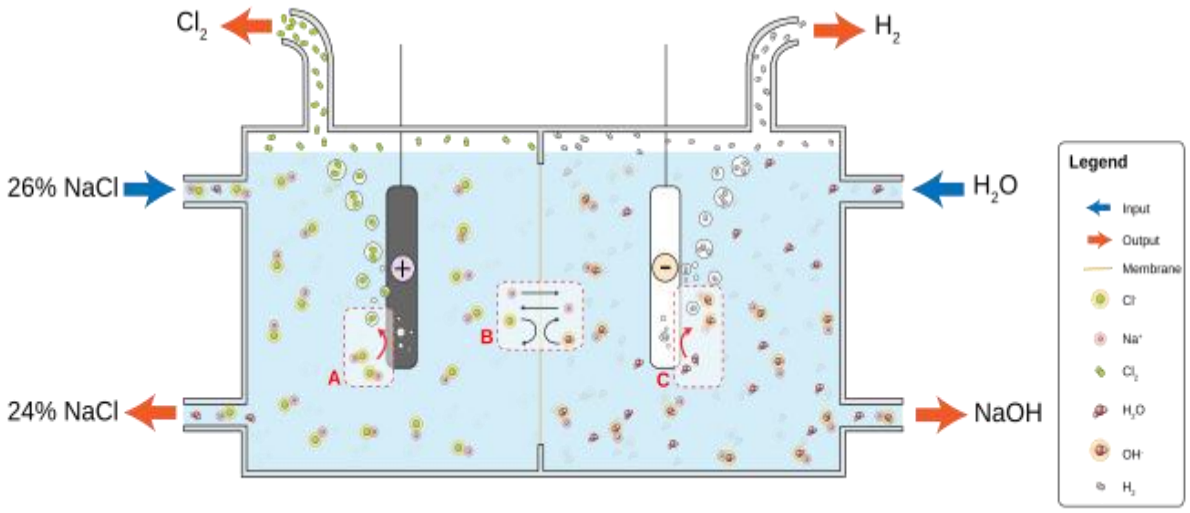


Figure 4: Dynamic Model of Chlor-alkali Membrane Process (Budiarto, et. Al., 2017).

ii. Processing into final products

The chlorine gas leaving the electrolysis cell will be converted into three products: liquid chlorine, sodium hypochlorite (NaClO), and hydrochloric acid (HCl). The chlorine gas that leaves the electrolysis cell will be saturated with water and will contain some oxygen. It will be cooled, filtered and dried to remove water and impurities. The chlorine will then be drawn out, compressed to liquefy it, and stored as Cl_2 or mixed with liquified hydrogen to produce HCl. Similarly, the hydrogen gas that leaves the electrolysis cell will be saturated with water, which will be partially removed by cooling of the gas. The gas will then be drawn out, compressed to liquify it, and mixed with liquified chlorine to produce HCl.

The caustic soda liquid (NaOH) solution that leaves the electrolysis cell will have a concentration of approximately 32%, which will be increased to about 47% using an evaporation process, to either be sold at this concentration, or to be mixed with liquified chlorine to produce NaClO. The production of caustic soda flakes by further evaporating the 47% caustic soda solution will not be undertaken at the proposed chemical plant, based on information provided by the developer.

iii. Brine treatment and recirculation

The brine in the anode will be depleted by electrolysis. The depleted brine leaving the cell will be saturated with chlorine and contaminated with the by-products of the electrolysis reaction. The brine will be de-chlorinated (i.e., removal of dissolved Cl_2 from wastewater/effluent), treated (i.e., removal of dissolved Na+ from wastewater/effluent), and re-circulated into the brine feed stream.

Table 7: Unit Processes associated with the proposed NuVest Chemical Plant (Rayten Engineering Solutions (Pty) Ltd, 2021)

Unit Process	Unit Process Function	Type
Receiving of tankers and containers		
Receiving of tankers	Tankers of different products are received on site, after which a sample of the product from each tanker is collected for testing. The products	Batch

Unit Process	Unit Process Function	Type
	in the tankers are then offloaded into different intermediate bulk containers (IBC's) for storage at designated bays.	
Receiving of containers (imports)	Container shipments arrive at the tank farm on site, after which products gets offloaded onto pallets that then get wrapped and placed on designed bays.	Batch
Product Manufacture		
Product blending	Some of the products that have been received are blended to the required specifications to manufacture the desired products, which are stored at designed bays before being sold.	Batch
Chlor-alkali process	Solid salt (NaCl) is dissolved in water to form a saturated brine, which is then fed into the electrolyser where it is electrolysed to form caustic soda (NaOH) in solution. Cl_2 and H_2 gas are also evolved from the chlor-alkali process.	Continuous
Concentration of caustic soda solution	The caustic soda liquid (NaOH) solution that leaves the electrolysis cell has a concentration of ~32%, which is increased to ~ 47% using an evaporation process, to either be sold at this concentration, or to be mixed with liquified Cl_2 to produce NaClO.	Continuous
HCl acid synthesis	Manufacture of 30 – 33% HCl acid by mixing compressed and liquified Cl_2 and H_2 gases evolved from the chlor-alkali process.	Continuous
Product Storage and Distribution		
Storage tanks	Storage of manufactured products (i.e., 47% caustic soda solution, 12 – 13% NaClO and 30 – 33% HCl acid) in vertical fixed roof tanks. Storage of commodity chemicals for re-sale (i.e., 98% sulphuric acid, 60% nitric acid, 50% potassium hydroxide, ferrous sulphate, etc) in vertical fixed roof tanks.	Continuous
Product dispatch	Manufactured products and commodity chemicals are sold and loaded onto trucks or tankers for transport to various customers.	Batch

A summary of raw materials that will be used at the proposed chemical plant is shown in **Table 8** below. It must be noted that the design consumption rate for NaCl, which is the main raw material for the chlor-alkali process, is yet to be confirmed by the applicant, the materials are not necessarily raw materials but commodity chemicals for re-sale and are once-off chemicals that are asked for from time to time which may differ from time to time.

Table 8: Raw Materials associated with the proposed NuVest Chemical Plant (Rayten Engineering Solutions (Pty) Ltd, 2021)

Raw Material Type	Design Consumption Rate (quantity)	Units (quantity/period)
Sodium chloride (NaCl)	TBC	tonnes/month
98% Sulphuric acid (2)	500	m^3/month
60% Nitric acid (2)	500	m^3/month
Ferrous sulphate (2)	1 000	m^3/month
50% Potassium hydroxide (2)	500	m^3/month

2.3. Listed and Specified Activities Triggered

In terms of Section 24(2) of NEMA, the Minister and/or any MEC in concurrence with the Minister may identify activities which require authorisation as these activities may negatively affect the environment. Environmental Impact Assessment (EIA) Regulations were promulgated in 2014 and amended in 2021 in terms of Section 24(5) and Section 44 of the National Environmental Management Act (NEMA), Act 107 of 1998 and consist of the following:

- *Regulation 982* provide details on the processes and procedures to be followed when undertaking an Environmental Authorisation process (also referred to as the EIA Regulations);
- *Listing Notice 1* (Regulation 983) defines activities which will trigger the need for a Basic Assessment process;
- *Listing Notice 2* (Regulation 984) defines activities which trigger an Environmental Impact Assessment (EIA) process. If activities from both R 983 and R 984 are triggered, then an EIA process will be required; and
- *Listing Notice 3* (Regulations 985) defines certain additional listed activities for which a Basic Assessment process would be required within identified geographical areas.

The above regulations were assessed to determine whether the proposed project will trigger any of the above listed activities, and if so, which Environmental Authorisation Process would be required. The triggered listed activities presented in **Table 9** will require authorisation in terms of GNR 984 Listing Notice 2 of the NEMA EIA Regulations 2014 as amended. A Scoping and EIA process is required in line with all the requirements of the NEMA EIA Regulations, 2014, as amended.

Table 9: Listed Activities in terms of NEMA EIA Regulations, 2014 as amended.

Activity No	Activity Description	Applicability
National Environmental Management Act Environmental Impact Assessment Regulations - 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.	The proposed chemical plant processes involve the storage and handling of dangerous goods (i.e., Sulphuric acid, Nitric acid, Ferrous sulphate, etc.) where such storage occurs in containers with a combined capacity of at least 13 074 cubic metres.
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.	Dust and gases are key pollutants of concern associated with the operations at the proposed chemical plant and will be emitted from the following key sources including, heavy construction activities, chemical storage tanks, and stack emissions/breathing vents. As such, the operation of the proposed chemical plant triggers sub-categories 7.1 (production and or use in manufacturing of chlorine), 7.2 (production of acids) and 7.7 (production of caustic soda) in terms of Section 21 of the National Environmental Management Air Quality Act (NEM:AQA) (No. 39 of 2004) and thus require an Atmospheric Emission License.
National Environmental Management: Air Quality Act: Section 21 List of activities: Category 7: Inorganic Chemicals Industry		
7.1	Production and/or use in manufacturing of ammonia, fluorine, fluorine compounds, hydrogen cyanide and chlorine gas (Excluding metallurgical processes related activities regulated under category 4). All installations producing and/or using more than 100 tons per annum of any of the listed compounds.	The proposed chemical plant involves the processing and/or use of chlorine gas (byproduct) greater than 1 000m^3 or 350 tons per annum.
7.2	The production, bulk handling and/or use in manufacturing of hydrofluoric, hydrochloric, nitric and sulphuric acid (including oleum) in concentration exceeding 10%. Processes in which oxides of sulphur are emitted through the production of acid sulphites of alkalis or alkaline earths or through the production of liquid sulphur or sulphurous acid. Secondary production of hydrochloric acid through regeneration.	The proposed chemical plant involves the production and/or processing of acids (i.e., hydrochloric, sulphuric and nitric acids) at approximately 6 000m^3 per month or 25 000 tons per annum.

Activity No	Activity Description	Applicability
	All installations producing, handling and/or using more than 100 tons per annum of any of the listed compounds (Excluding metallurgical processes related activities regulated under category 4).	
7.7	Production of caustic soda. All installations producing more than 10 tons per month	The proposed chemical plant involves the production and/or processing of sodium hydroxide at approximately 5 000m^3 or 1 700 tons per month.

2.4. Need and Desirability of The Proposed Activity

The needs and desirability analysis component of the "Guideline on need and desirability in terms of the EIA Regulations (Notice 819 of 2014)" includes, but is not limited to, describing the linkages and dependencies between human well-being, livelihoods and ecosystem services applicable to the area in question, and how the proposed development's ecological impacts will result in socio-economic impacts (e.g., on livelihoods, loss of heritage site, opportunity costs, etc.). **Table 10** present the needs and desirability analysis undertaken for the project.

Table 10: Needs and desirability analysis for the proposed NuVest chemical plant project.

Ref No.	Question	Answer
A	**Securing ecological sustainable development and use of natural resources**	
i.	How were the ecological integrity considerations considered in terms of: Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Systems, Conservation Targets, Ecological drivers of the ecosystem, Environmental Management Framework, Spatial Development Framework (SDF) and global and international responsibilities.	Although the study area has been significantly disturbed, based on the proposed development and site sensitivity verification, several specialist studies form part of this application and environmental impact assessment including: • Air Quality Impact Assessment; • Major Hazard Installation Risk Assessment; • Terrestrial Biodiversity Compliance Statement; and • Aquatic and Wetland Compliance Statement; These studies will assist in identifying any Threatened Ecosystems, Sensitive and vulnerable ecosystems, Critical Biodiversity Areas, Ecological Support Areas, Conservation Targets and Ecological drivers of the ecosystem. Where sensitive species or ecosystem drivers were identified, relevant mitigation measures were put forward to prevent or minimise the impacts. The findings and impact assessment will be discussed during the EIA Phase.
ii.	How will this project disturb or enhance ecosystems and / or result in the loss or protection of biological diversity? What measures were explored to avoid these negative impacts, and where these negative impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	The proposed development site is approximately 2ha and based on the preliminary assessments, the study area is largely disturbed, it is not anticipated that there be any areas of ecological importance that will be identified by the specialists. However, should the ecologist identify such an area of species of conservation concern, then best environmental practices will be recommended (mitigation hierarchy). As stipulated in the mitigation hierarchy, the EAP / Ecologist will recommend to first avoid adverse impacts, then minimize impacts that cannot be avoided, and lastly offset, or compensate for, unavoidable impacts.

Ref No.	Question	Answer
iii.	How will this development pollute and / or degrade the biophysical environment? What measures were explored to either avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	The proposed chemical plant will produce emissions, polluting the atmosphere and may contaminate the soil and groundwater in the case of the containers spilling and incident not rectified. An air quality impact assessment has been commissioned for the proposed develop to identify the extent of the anticipated air pollution and recommend mitigation measures. It is anticipated that the plant will consist of a bunded factory to prevent spills contaminating the soil and/or groundwater resources.
iv.	What waste will be generated by this development? What measures were explored to avoid waste, and where waste could not be avoided altogether, what measures were explored to minimise, reuse and / or recycle the waste? What measures have been explored to safely treat and/or dispose of unavoidable waste?	This development will possibly generate various general and hazardous waste, the majority of which will be generated during the construction phase. The general waste will be stored in designated areas and through the process of recovery and recycling, the volume of general waste being disposed to landfill will be minimised. The hazardous portion of the waste stream will also be adequately stored prior to disposal at a suitably licenced hazardous waste disposal facility. Safe disposal certificates will be obtained from the disposal facility used.
v.	How will this project disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Based on the National Web-Based Screening Tool Report, the relative Archaeological and Cultural Heritage Theme relative sensitivity is *Very Low*. During the site sensitivity verification, no Archaeological and Cultural features were identified. Therefore, the proposed project will likely not disturb or enhance landscapes and / or sites that constitute the nation's cultural heritage. However, a Chance Find Protocol procedure has been recommended by the EAP should there be any discoveries during the construction phase, likely through excavations.
vi.	How will this project use and / or impact on non-renewable natural resources? What measures were explored to ensure responsible and equitable use of the resources? How have the consequences of the depletion of the non-renewable natural resources been considered? What measures were explored to firstly avoid these impacts, and where impacts could not be avoided altogether, what measures were explored to minimise and remedy the impacts? What measures were explored to enhance positive impacts?	Based on the preliminary information, the proposed chemical plant process will use solar energy from a nearby solar plant by Symtech Solar under a wheeling agreement. It is understood that Symtech Solar is currently developing a 70MW solar plant close to the proposed Nuvest chemical plant site. As per the initial agreement between the applicant and Symtech Solar, it is proposed that the chemical plant will receive an initial 5 Megawatt (MW) of energy from the solar plant and will be increased to 10MW by 2025.
vii.	How will this project use and / or impact on renewable natural resources and the ecosystem of which they are part? Will the use of the resources and / or impacts on the ecosystem jeopardise the integrity of the resource and / or system taking into account carrying capacity restrictions, limits of acceptable change, and thresholds? What measures were explored to firstly avoid the use of resources, or if avoidance is not possible, to minimise the use of resources?	Refer to item *A (vi)* of this table (above).
viii.	What measures were taken to ensure responsible and equitable use of the resources? What measures were explored to enhance positive impacts?	Refer to item *A (vi)* of this table (above).

Ref No.	Question	Answer
ix.	Does the proposed project exacerbate the increased dependency on increased use of resources to maintain economic growth or does it reduce resource dependency (i.e., de-materialised growth)?	The proposed development is a chemical plant which converts raw materials into finished products and as such exacerbate the increased dependency on increased use of resources to maintain economic growth.
x.	Does the proposed use of natural resources constitute the best use thereof? Is the use justifiable when considering intra- and intergenerational equity, and are there more important priorities for which the resources should be used?	The proposed development does not involve the use of natural resources.
xi.	Do the proposed location, type and scale of development promote a reduced dependency on resources?	The location, type and scale of the proposed development promotes a reduced dependency on the importation of chemical products from other countries.
xii.	How were a risk-averse and cautious approach applied in terms of ecological impacts:	
xiii.	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	In order to prevent repetition, the reader is directed to the assumptions and limitations presented in **Section 1.3.**
xiv.	What is the level of risk associated with the limits of current knowledge?	The level of risk is considered low at this stage and will be further interrogated during the EIA phase (where applicable).
xv.	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	A Major Hazard Installation Risk Assessment in addition to the other specialist studies indicated above form part of this EIA process in order to identify areas of high sensitivity and even no-go areas. In this manner, a risk-averse and cautious approach can be more fully realised in future project planning.
B	**How will the ecological impacts, resulting from this development, impact on people's environmental right in terms following?**	
i.	Negative impacts: e.g. access to resources, opportunity costs, loss of amenity (e.g. open space), air and water quality impacts, nuisance (noise, odour, etc.), health impacts, visual impacts, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	The main negative impacts identified and associated with the proposed development will be air pollution, nuisance and health impacts over time. The applicant has commissioned an EIA process to identify and mitigate impacts associated with the proposed development. The EIA process will be undertaken at a more strategic level assessment of the receiving environment within proposed development corridors which allows input from numerous specialist disciplines to identify highly sensitive or no-go areas which can then be excluded from development where necessary. However, it must also be noted that there will be positive impacts associated with the proposed development such as of job creation.
ii.	Positive impacts: e.g. improved access to resources, improved amenity, improved air or water quality, etc. What measures were taken to enhance positive impacts?	Refer to item *B (i)* of this table (above).
iii.	Describe the linkages and dependencies between human wellbeing, livelihoods and ecosystem services applicable to the area in question and how the development's ecological impacts will result in socio-economic impacts (e.g. on livelihoods, loss of heritage site, opportunity costs, etc.)?	A low impact on third party wellbeing, livelihoods and ecosystem services is foreseen at this stage of this application as the predominant land use of the adjacent affected properties is built-up industrial, and the site sensitivities from a socio-economic and biophysical point of view will be identified during the EIA Phase.
iv.	Based on all of the above, how will this development positively or negatively impact on ecological integrity objectives / targets / considerations of the area?	As described above, this project is anticipated to have a low overall impact on the ecological integrity objectives or targets due to the largely transformed nature of the site and the small extent of the proposed development.

Ref No.	Question	Answer
v.	Considering the need to secure ecological integrity and a healthy biophysical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the "best practicable environmental option" in terms of ecological considerations?	As part of the scoping phase, suitable alternatives are being considered and will be finalised in the EIA phase once due consideration of alternatives has been completed. Therefore, at this stage of the application process, this aspect is yet to be concluded.
vi.	Describe the positive and negative cumulative ecological / biophysical impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and existing and other planned developments in the area?	The proposed development of a chemical plant at the proposed Meyerton site is anticipated to have a low overall negative cumulative ecological and biophysical impacts due to the largely transformed nature of the site (low ecological sensitivity) and the small extent of the proposed development. As the area is largely an industrial area, the additional atmospheric pollutants from the chemical plant will increase to the cumulative poor air quality in the area which may lead to health issues over time. The development of the plant will however, result in a positive socio-economic cumulative impact largely through job creation and uplifting of the community.
C	**Promoting justifiable economic and social development**	
i.	**What is the socio-economic context of the area, based on, amongst other considerations, the following:**	
ii.	The IDP (and its sector plans' vision, objectives, strategies, indicators and targets) and any other strategic plans, frameworks or policies applicable to the area,	Details of the Midvaal Local Municipality IDP is provided in **Section 3.19**.
iii.	Spatial priorities and desired spatial patterns (e.g., need for integrated of segregated communities, need to upgrade informal settlements, need for densification, etc.),	The proposed development will provide job opportunities to the locals and as such, aligning to the IDP.
iv.	Spatial characteristics (e.g., existing land uses, planned land uses, cultural landscapes, etc.), and	The chemical plant is proposed within a predominant land use of built-up industrial and thus, within the planned land use.
v.	Municipal Economic Development Strategy ("LED Strategy").	The proposed project will promote and support the sustainability of existing raw material business and assist in increasing local economic growth through extending the output production of chemicals.
vi.	Considering the socio-economic context, what will the socio-economic impacts be of the development (and its separate elements/aspects), and specifically also on the socio-economic objectives of the area?	The development of the chemical plant will result in a positive socio-economic cumulative impact largely through job creation and uplifting of the community.
vii.	Will the development complement the local socio-economic initiatives (such as local economic development (LED) initiatives), or skills development programs?	The proposed project will promote and support the sustainability of existing local raw material business and logistics (packaging and distribution). This will complement the local socio-economic initiatives identified for the area.
viii.	How will this development address the specific physical, psychological, developmental, cultural and social needs and interests of the relevant communities?	It is not anticipated that the proposed development will affect any specific physical, psychological, developmental, cultural and social needs and interests of the communities. Public participation to identify any specific needs has been initiated and will continue throughout the entire EIA process.

Ref No.	Question	Answer
ix.	Will the development result in equitable (intra- publicter-generational) impact distribution, in the short- and long-term? Will the impact be socially and economically sustainable in the short- and long-term?	Refer to the preliminary impact assessment and mitigation measures in **Section 7** this report.
D	**In terms of location, describe how the placement of the proposed development will:**	
i.	Result in the creation of residential and employment opportunities in close proximity to or integrated with each other.	The proposed development will provide general job opportunities to the local community. In prioritisation of the local employment, the need for transportation of people over long distances will be reduced. The transportation of goods to the respective clients will, however, remain the same as the same transport process and distances from the plant to the developer will likely remain the same.
ii.	Reduce the need for transport of people and goods.	Refer to item *D (i)* of this table (above).
iii.	Result in access to public transport or enable non-motorised and pedestrian transport (e.g., will the development result in densification and the achievement of thresholds in terms of public transport),	Refer to item *D (i)* of this table (above).
iv.	Compliment other uses in the area,	Refer to item *C (iv)* of this table (above). The proposed chemical plant is proposed within a predominant land use of built-up industrial and thus, within the planned land use.
v.	Be in line with the planning for the area.	Refer to item C of this table.
vi.	For urban related development, make use of underutilised land available with the urban edge.	Not applicable. The proposed project is not urban related development.
vii.	Optimise the use of existing resources and infrastructure,	The proposed chemical plant development will utilize the existing facilities, expanding/upgrading where necessary.
viii.	Opportunity costs in terms of bulk infrastructure expansions in non-priority areas (e.g. not aligned with the bulk infrastructure planning for the settlement that reflects the spatial reconstruction priorities of the settlement),	Refer to item *D (vii)* of this table (above).
ix.	Discourage "urban sprawl" and contribute to compaction / densification.	The proposed project is tightly nestled within the existing land parcel. Due to the nature of the proposed project, the influx of additional workers to the area as a direct result of the proposed project is not anticipated.
x.	Contribute to the correction of the historically distorted spatial patterns of settlements and to the optimum use of existing infrastructure in excess of current needs	Refer to items *D (i – iv)* of this table.
xi.	Encourage environmentally sustainable land development practices and processes	As already indicated, the proposed development will implement the best environmental practices.
xii.	Take into account special locational factors that might favour the specific location (e.g. the location of a strategic mineral resource, access to the port, access to rail, etc.),	The proposed development is within a specified land parcel (110) and the proposed layout has taken into consideration the best favourable locations for the optimization of the plant processes.

Ref No.	Question	Answer
xiii.	The investment in the settlement or area in question will generate the highest socio-economic returns (i.e. an area with high economic potential).	The proposed project will indirectly allow NuVest Recovery Solutions to continue contributing to the local, regional and national Gross Domestic Product (GDPs), and also on the local communities through continued employment of employees and local contractors.
xiv.	Impact on the sense of history, sense of place and heritage of the area and the socio-cultural and cultural-historic characteristics and sensitivities of the area, and	Refer to item *A (v)* of this table.
xv.	In terms of the nature, scale and location of the development promote or act as a catalyst to create a more integrated settlement.	The proposed project will indirectly contribute to continued employment in the region.
E	**How was a risk-averse and cautious approach applied in terms of socio-economic impacts:**	
i.	What are the limits of current knowledge (note: the gaps, uncertainties and assumptions must be clearly stated)?	Refer to **Section 1.3** of this report.
ii.	What is the level of risk (note: related to inequality, social fabric, livelihoods, vulnerable communities, critical resources, economic vulnerability and sustainability) associated with the limits of current knowledge?	The level of risk is low as the project is not expected to have far reaching negative impacts on socio-economic conditions.
iii.	Based on the limits of knowledge and the level of risk, how and to what extent was a risk-averse and cautious approach applied to the development?	As the level of risk is low, a low risk averse and cautious approach has been implemented to limit the impact on the surrounding environment. Specialist assessments will be undertaken during the EIA phase and will determine additional risks and mitigation measures.
F	**How will the socio-economic impacts resulting from this development impact on people's environmental right in terms following:**	
i.	Negative impacts: e.g. health (e.g. HIV-Aids), safety, social ills, etc. What measures were taken to firstly avoid negative impacts, but if avoidance is not possible, to minimise, manage and remedy negative impacts?	Refer to the impact assessment in **Section 7** of this report.
ii.	Positive impacts. What measures were taken to enhance positive impacts?	Refer to the impact assessment in **Section 7** of this report.
iii.	Considering the linkages and dependencies between human wellbeing, livelihoods and ecosystem services, describe the linkages and dependencies applicable to the area in question and how the development's socioeconomic impacts will result in ecological impacts (e.g. over utilisation of natural resources, etc.)?	Refer to the impact assessment in **Section 7** of this report.
iv.	What measures were taken to pursue the selection of the "best practicable environmental option" in terms of socio-economic considerations?	Refer to the impact assessment in **Section 7** of this report.
v.	What measures were taken to pursue environmental justice so that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons (who are the beneficiaries and is the development located appropriately)? Considering the need for social equity and justice, do the	Refer to the public participation in **Section 5**, the impact assessment in **Section 7** and plan of study and methodology in **Section 8** of this report. The chemical plant will be in line with the regulatory requirements and provide financial provision to ensure that the mitigation measures proposed can be carried out.

Ref No.	Question	Answer
	alternatives identified, allow the "best practicable environmental option" to be selected, or is there a need for other alternatives to be considered?	
vi.	What measures were taken to pursue equitable access to environmental resources, benefits and services to meet basic human needs and ensure human wellbeing, and what special measures were taken to ensure access thereto by categories of persons disadvantaged by unfair discrimination?	By conducting a Scoping and Environmental Impact Assessment Process, the applicant ensures that equitable access has been considered. Refer to the impact assessment in **Section 7** of this report.
vii.	What measures were taken to ensure that the responsibility for the environmental health and safety consequences of the development has been addressed throughout the development's life cycle?	Refer to the impact assessment in **Section 7** of this report. The EIA and EMPr will specify the required measures and timeframes within which mitigation must be implemented.
G	**What measures were taken to:**	
i.	Ensure the participation of all interested and affected parties.	Refer to the public participation undertaken to date in **Section 5** and plan of study and methodology for the EIA in **Section 8** of this report. The public participation process undertaken for the proposed project included the advertisement and site notice made available in English and Afrikaans to assist in understanding of the project. Further public consultation such as review of the Scoping Report (SR) and Environmental Impact Assessment Report (EIR) as well as meetings (if necessary) will be undertaken throughout the lifecycle of the EA process.
ii.	Provide all people with an opportunity to develop the understanding, skills and capacity necessary for achieving equitable and effective participation,	
iii.	Ensure participation by vulnerable and disadvantaged persons,	
iv.	Promote community wellbeing and empowerment through environmental education, the raising of environmental awareness, the sharing of knowledge and experience and other appropriate means,	
v.	Ensure openness and transparency, and access to information in terms of the process,	
vi.	Ensure that the interests, needs and values of all interested and affected parties were taken into account, and that adequate recognition were given to all forms of knowledge, including traditional and ordinary knowledge,	
vii.	Ensure that the vital role of women and youth in environmental management and development were recognised and their full participation therein will be promoted?	
viii.	Considering the interests, needs and values of all the interested and affected parties, describe how the development will allow for opportunities for all the segments of the community (e.g., a mixture of low-, middle-, and high-income housing opportunities) that is consistent with the priority needs of the local area (or that is proportional to the needs of an area)?	Refer to item *G (i – vii)* above. Initial consultation to register with the project has already been undertaken. Further public engagements will be undertaken during the public review and commenting periods of the DSR and Draft EIR.
ix.	What measures have been taken to ensure that current and / or future workers will be informed of work that potentially might be harmful to human health or the environment or of dangers associated with the work, and what measures have been taken to ensure that the right of workers to refuse such work will be respected and protected?	Workers will be inducted and educated on a regular basis as to the environmental and safety risks that may occur within their work environment during the construction phase. Furthermore, adequate measures will be taken to ensure that the appropriate personal protective equipment is issued to workers based on the areas that they work and the requirements of their job.

Ref No.	Question	Answer
H	**Describe how the development will impact on job creation in terms of, amongst other aspects:**	
i.	The number of temporary versus permanent jobs that will be created.	At the time of compilation of this report, information regarding the detailed number of job opportunities associated with the proposed development was available. It is anticipated that NuVest will prioritize local labour / contractors for general work during construction and operational phase.
ii.	Whether the labour available in the area will be able to take up the job opportunities (i.e. do the required skills match the skills available in the area).	
iii.	The distance from where labourers will have to travel.	As local labourers will be prioritized as far as possible, there will likely be minimal distance travel requirements for staff.
iv.	The location of jobs opportunities versus the location of impacts.	The job opportunities will be local/regional whereas are the anticipated impacts such as air pollution may reach regional level.
v.	The opportunity costs in terms of job creation.	
I	**What measures were taken to ensure:**	
i.	That there were intergovernmental coordination and harmonisation of policies, legislation and actions relating to the environment.	The Scoping and EIA Process requires relevant governmental departments to be informed and provide comments (if any) for environmental applications. All identified relevant departments will be consulted by the EAP and requested to comment on the DSR and Draft EIR.
ii.	That actual or potential conflicts of interest between organs of state were resolved through conflict resolution procedures.	
iii.	What measures were taken to ensure that the environment will be held in public trust for the people, that the beneficial use of environmental resources will serve the public interest, and that the environment will be protected as the people's common heritage?	Refer to **Section 5** of this report, describing the public participation process implemented for the application, as well **Section 8** for the plan of study and methodology for the EIA phase.
iv.	Are the mitigation measures proposed realistic and what long-term environmental legacy and managed burden will be left?	The detailed impacts and associated mitigation measures will be provided in the EIA Phase in consultation with the specialist studies.
v.	What measures were taken to ensure that the costs of remedying pollution, environmental degradation and consequent adverse health effects and of preventing, controlling or minimising further pollution, environmental damage or adverse health effects will be paid for by those responsible for harming the environment?	Specialist studies will be undertaken, their findings and recommendations will be discussed during the EIA Phase. The EAP will compile and An Environmental Management Programme (EMPr) and recommendations to guide environmental compliance during construction and operational phase of the proposed development. The Environmental Authorisation (EA) will be issued to the applicant (NuVest) who will be required to comply with the conditions of the EA, EMPr and specialist recommendations, thus ensuring polluter must pay principle.
vi.	Considering the need to secure ecological integrity and a healthy bio-physical environment, describe how the alternatives identified (in terms of all the different elements of the development and all the different impacts being proposed), resulted in the selection of the best practicable environmental option in terms of socio-economic considerations?	Refer to **Section 4** for the description of alternatives considered and the rationale to the preferred alternatives.
vii.	Describe the positive and negative cumulative socio-economic impacts bearing in mind the size, scale, scope and nature of the project in relation to its location and other planned developments in the area?	The detailed positive and negative cumulative socio-economic impacts will be provided in the EIA Phase in consultation with the specialist studies.

3 POLICY AND LEGISLATIVE CONTEXT

This section provides an overview of the governing legislation identified which may relate to the proposed project. The primary legal requirement for this project stems from the need for an EA to be granted by the competent authority, which is the GDARD, in accordance with the requirements of the NEMA. In addition, there are numerous other pieces of legislation governed by many acts, regulations, standards, guidelines and treaties on an international, national, provincial and local level, which should be considered in order to assess the potential applicability of these for the proposed activity. The key legislation applicable to this project is discussed in the subsections below. The contents of this report are based on a review of the information that was available at the time of the compilation of the report. The discussion in this chapter is by no means an exhaustive list of the legal obligations of the applicant in respect of environmental management for the proposed chemical plant.

3.1. Constitution of the Republic of South Africa

The constitution of any country is the supreme law of that country. The Bill of Rights in chapter 2 section 24 of the Constitution of South Africa Act (Act No. 108 of 1996) makes provisions for environmental issues and declares that: *"Everyone has the right -*

a) to an environment that is not harmful to their health or well-being; and

b) to have the environment protected, for the benefit of present and future generations, through reasonable legislative and other measures that:

i. prevent pollution and ecological degradation;

ii. promote conservation; and

iii. secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development".

The State must therefore respect, protect, promote and fulfil the social, economic and environmental rights of everyone and strive to meet the basic needs of previously disadvantaged communities. The Constitution therefore recognises that the environment is a functional area of concurrent national and provincial legislative competence, and all spheres of government and all organs of state must cooperate with, consult and support one another if the State is to fulfil its constitutional mandate. The application for Environmental Authorisation for the proposed NuVest chemical plant will ensure that the environmental right enshrined in the Constitution contributes to the protection of the biophysical and social environment.

3.2. The National Environmental Management Act, 1998

The main aim of the National Environmental Management Act, 1998 (Act 107 of 1998 – NEMA) is to provide for co-operative governance by establishing decision-making principles on matters affecting the environment. In terms of the NEMA EIA Regulations, the applicant is required to appoint an EAP to undertake the EIA process, as well as conduct the public participation process towards an application for EA. In South Africa, EIAs became a legal requirement in 1997 with the promulgation of regulations under the Environment Conservation Act (ECA). Subsequently, NEMA was passed in 1998. Section 24(2) of NEMA empowers the Minister and any MEC, with the concurrence of the Minister, to identify activities which must be considered, investigated, assessed and reported on to the competent authority responsible for granting the relevant EA. On 21 April 2006, the Minister of Environmental Affairs and Tourism (now Department of Forestry, Fisheries and the Environment – DFFE) promulgated regulations in terms of Chapter 5 of the NEMA. These regulations, in terms of the NEMA, were amended several times between 2010 and 2022. The NEMA EIA Regulations, 2014, as amended, are applicable to this project.

The objective of the EIA Regulations is to establish the procedures that must be followed in the consideration, investigation, assessment and reporting of the listed activities that are triggered by the proposed project. The purpose of these procedures is to provide the competent authority with adequate information to make informed decisions which ensure that activities which may impact negatively on the environment to an unacceptable

degree are not authorised, and that activities which are authorised are undertaken in such a manner that the environmental impacts are managed to acceptable levels.

In accordance with the provisions of Sections 24(5) and Section 44 of the NEMA the Minister has published Regulations (GN R. 982) pertaining to the required process for conducting EIAs in order to apply for, and be considered for, the issuing of an EA. These EIA Regulations provide a detailed description of the EIA process to be followed when applying for EA for any listed activity.

An environmental Scoping and Impact Assessment process is reserved for activities which have the potential to result in significant impacts which are complex to assess. Scoping and Impact Assessment studies accordingly provide a mechanism for the comprehensive assessment of activities that are likely to have more significant environmental impacts. **Figure 5** below provides a graphic representation of all the components of a full EIA process. The listed activities the proposed project triggers and consequently requires authorisation prior to commencement are detailed in Section 2.3 (**Table 8**).

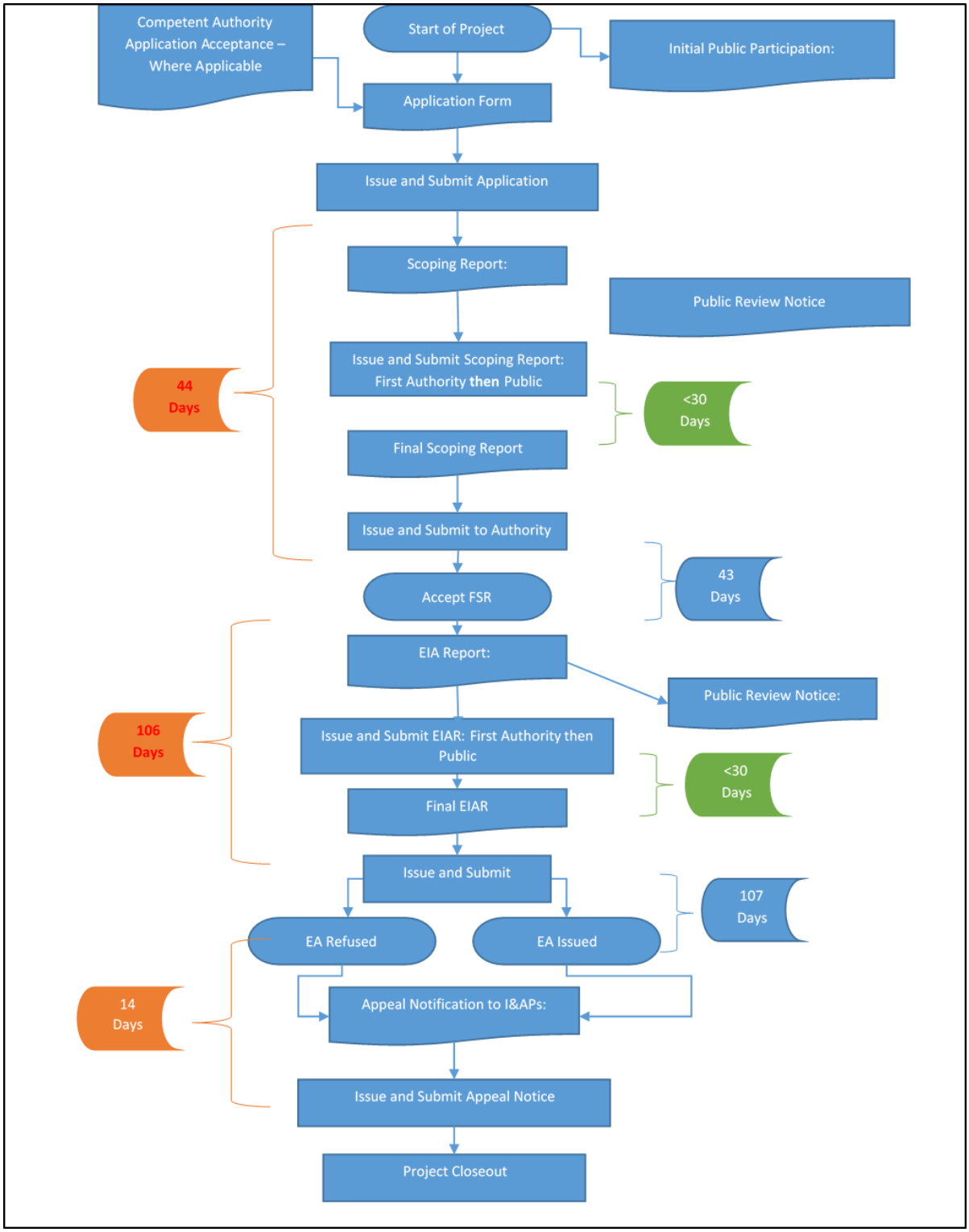


Figure 5: EIA process diagram.

NEMA is the main Environmental Legislation in South Africa and other Specific Environmental Management Acts (SEMA's) support its objectives. Examples of SEMA's include the following:

- National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008);
- National Water Act, 1998 (Act No. 36 of 1998);
- National Heritage Resources Act, 1999 (Act No. 25 of 1999);

- National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004); and
- National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004)

Some specific Environmental Management Legislation is discussed in **Sections 3.2 to 3.19.** The key principles of NEMA as outlined in Chapter 3 can be summarised as follows:

- sustainability must be pursued in all developments to ensure that biophysical and socio-economic aspects are protected; or
- there must be equal access to environmental resources, services and benefits for all citizens including the disadvantaged and the vulnerable. Adverse environmental impacts shall be distributed fairly among all citizens;
- environmental governance must include the participation of all interested and affected parties who must be catered for to allow their effective participation;
- Environmental management must place people and their needs at the forefront of its concern, and serve their physical, psychological, developmental, cultural and social interests equitably; and
- The polluter pays principle must be applied in all cases where any person has caused pollution or undertaken any action that led to the degradation of the environment.

3.3. NEMA Environmental Impact Assessment Regulations, 2014 as Amended

In terms of section 24(2) of NEMA, the Minister and or any MEC in concurrence with the Minister may identify activities that require authorisation as these activities may negatively affect the environment. The Act requires that in such cases the impacts must be considered, investigated and assessed before their implementation, and reported to the organ of state charged by law with authorising, permitting, or otherwise allowing the implementation of an activity. The NEMA EIA Regulations guide the processes required for the assessment of impacts of Listed Activities.

The requirement for the undertaking of Environmental Impact Assessments and Basic Assessments began in 1997 with the promulgation of the EIA Regulations under the Environment Conservation Act, 1989 (ECA) (Act No. 73 of 1989). These were followed by the 2006, 2010 and 2014 regulations. **Table 11** is a summary of the progression of the EIA regulations to date.

Table 11: Summary of the South African EIA regulations from inception to date

EIA Regulations	Government Gazette
EIA Regulations promulgated in terms of the ECA, Act No 73 of 1989	GNR 1182 & 1183: Government Gazette No 18261, 5 September 1997
Amendment of the ECA EIA Regulations	GNR 670 and GNR 672 of 10 May 2002, Government Gazette No 23401
2006 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 385, 386 and 387 Government Gazette No 28753, Pretoria, 21 April 2006
2010 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 543, 544, 545 and 546 Government Gazette No 33306, Pretoria, 18 June 2010
2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 982, 983, 984 and 985 Government Gazette No 38282, Pretoria, 04 December 2014
Current Amendment of the 2014 EIA Regulations promulgated in terms of the NEMA, Act No 107 of 1998	GNR 982, 983, 984 and 985 Government Gazette No 44701, Pretoria, 2021 as amended

The scoping and EIA process for the proposed NuVest chemical plant is undertaken in terms of the NEMA EIA Regulations, 2014, as amended.

3.4. The National Water Act, 1998

The National Water Act, 1998 (Act 36 of 1998 – NWA) makes provision for two types of applications for water use licences, namely individual applications and compulsory applications. The NWA also provides that the responsible authority may require an assessment by the applicant of the likely effect of the proposed licence on the resource quality, and that such assessment be subject to the NEMA EIA Regulations. A person may use water if the use is –

- Permissible as a continuation of an existing lawful water use (ELWU);
- Permissible in terms of a general authorisation (GA);
- Permissible under Schedule 1; or
- Authorised by a licence.

These water use processes are described in **Figure 6**.

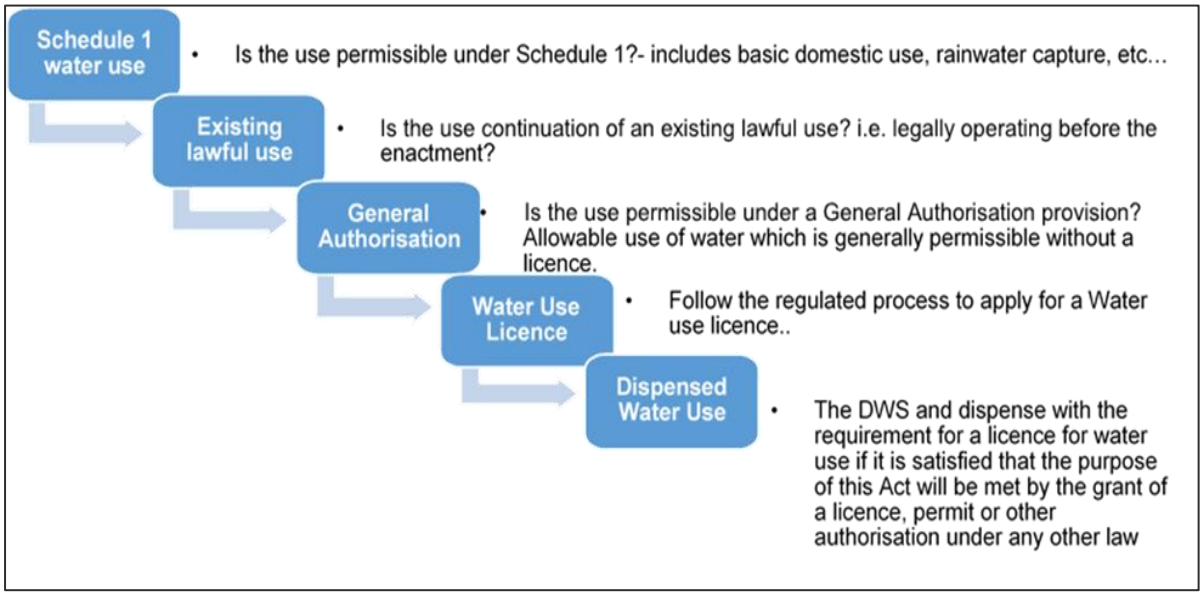


Figure 6: Authorisation processes for new water uses.

The purpose of the NWA is to ensure that the nation's water resources are protected, used, developed, conserved and managed in ways that take into account:

- Meeting basic human needs of present and future generations;
- Promoting equitable access to water;
- Redressing the results of past racial discrimination;
- Promoting the efficient, sustainable and beneficial use of water in the public interest; facilitation social and economic development;
- Providing for the growing demand for water use;
- Protecting aquatic and associated ecosystems and their biological diversity;
- Reducing and preventing pollution and degradation of water resources;
- Meeting international obligations;

- Promoting dam safety; and
- Managing floods and drought.

The NWA defines 11 water uses in Section 21 of the Act. A water use may only be undertaken if authorised by the Department of Water and Sanitation (DWS). The water uses for which an authorisation or licence can be issued include:

a) Taking water from a water resource;

b) Storing water;

c) Impeding or diverting the flow of water in a watercourse;

d) Engaging in a stream flow reduction activity contemplated in section 36;

e) Engaging in a controlled activity identified as such in section 37(1) or declared under section 38(1);

f) Discharging waste or water containing waste into a water resource through a pipe, canal, sewer, sea outfall or other conduits;

g) Disposing of waste in a manner which may detrimentally impact on a water resource;

h) Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;

i) Altering the bed, banks, course or characteristics of a watercourse;

j) Removing, discharging or disposing of water found underground if it is necessary for the efficient continuation of an activity or for the safety of people; and

k) Using water for recreational purposes.

The regulated area of a watercourse for section 21 activities of the Act water uses is similarly defined in terms of the Act as follows:

a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;

b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or

c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

A review of the NWA Section 21 activities was undertaken to assess if the proposed development triggers any activity. Based on the information provided by the developer, the proposed development does not trigger any NWA Section 21 activity.

3.5. The National Environmental Management Waste Act, 2008

The National Environmental Management: Waste Act, no 59 of 2008 (NEMWA) came into effect on the 1st of July 2009. The Waste Act places a general duty on a holder of waste to avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated; reduce, re-use, recycle and recover waste; where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner; manage the waste in such a manner that it does not endanger the health or the environment or cause a nuisance through noise, odour or visual impacts; prevent any employee

or any person under his or her supervision from contravening the Act; and prevent the waste from being used for an unauthorised purpose.

Section 16 of the NEMWA must also be considered which states the following:

1. A holder of waste must, within the holder's power, take all reasonable measures to-

a) "Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;

b) Reduce, re-use, recycle and recover waste;

c) Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;

d) Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts;

e) Prevent any employee or any person under his or her supervision from contravening the Act; and

f) Prevent the waste from being used for unauthorised purposes."

These general principles of responsible waste management will be incorporated into the requirements in the EMPr to be implemented for this project. Waste can be defined as either hazardous or general in accordance with Schedule 3 of the NEMWA (2014) as amended. "Schedule 3: Defined Wastes" has been broken down into two categories – Category A being hazardous waste; and Category B being general waste.

In order to attempt to understand the implications of these waste groups, it is important to ensure that the definitions of all the relevant terminologies are defined:

- Hazardous waste: means "*any waste that contains organic or inorganic elements or compounds that may, owning to the inherent physical, chemical or toxicological characteristic of that waste, have a detrimental impact on health and the environment and includes hazardous substances, materials or objects within business waste, residue deposits and residue stockpiles*."
- Residue deposits: means "*any residue stockpile remaining at the termination, cancellation or expiry of a prospecting right, mining right, mining permit, exploration right or production right*."
- Residue stockpile: means "*any debris, discard, tailings, slimes, screening, slurry, waste rock, foundry sand, mineral processing plant waste, ash or any other product derived from or incidental to a mining operation and which is stockpiled, stored or accumulated within the mining area for potential re-use, or which is disposed of, by the holder of a mining right, mining permit or, production right or an old order right, including historic mines and dumps created before the implementation of this Act*."
- General waste: means "*waste that does not pose an immediate hazard or threat to health or to the environment and includes – domestic waste; building and demolition waste; business waste; inert waste; or any waste classified as non-hazardous waste in terms of the regulations made under Section 69*."

Furthermore, the NEMWA provides for specific waste management measures to be implemented, as well as providing for the licensing and control of waste management activities. The NuVest Project is not expected to trigger listed waste activities, therefore, general principles of responsible waste management will be incorporated into the requirements in the EMPr for this project.

3.6. The National Environmental Management Air Quality Act, 2004

The National Environmental Management: Air Quality Act (Act No. 39 of 2004 as amended – NEMAQA) is the main legislative tool for the management of air pollution and related activities. The Object of the Act is:

- To protect the environment by providing reasonable measures for –
    i. the protection and enhancement of the quality of air in the republic;
    ii. the prevention of air pollution and ecological degradation; and
    iii. securing ecologically sustainable development while promoting justifiable economic and social development; and
- Generally, to give effect to Section 24(b) of the constitution in order to enhance the quality of ambient air for the sake of securing an environment that is not harmful to the health and well-being of people.

The NEMAQA mandates the Minister of Environment to publish a list of activities which result in atmospheric emissions and consequently cause significant detrimental effects on the environment, human health and social welfare. All scheduled processes as previously stipulated under the Air Pollution Prevention Act (APPA) are included as listed activities with additional activities being added to the list. The updated Listed Activities and Minimum National Emission Standards were published on the 22nd of November 2013 (Government Gazette No. 37054).

According to the NEMAQA, air quality management control and enforcement is in the hands of local government with District and Metropolitan Municipalities as the licensing authorities. Provincial government is primarily responsible for ambient monitoring and ensuring municipalities fulfil their legal obligations, with national government primarily as policy maker and co-ordinator. Each sphere of government must appoint an Air Quality Officer responsible for co-ordinating matters pertaining to air quality management. Given that air quality management under the old Act was the sole responsibility of national government, local authorities have in the past only been responsible for smoke and vehicle tailpipe emission control.

Listed Activities and Associated Minimum Emission Standards Identified in terms of Section 21 of the NEMAQA Published under GN 893 in GG 37054 of 22 November 2013 were assessed to determine if the proposed development triggers any of the identified activities. Based on the assessment, the proposed chemical plant triggers Category 7: Inorganic Chemicals Industry, sub-categories 7.1 (production and or use in manufacturing of chlorine), 7.2 (production of acids) and 7.7 (production of caustic soda) as indicated in **Section 2.3** of this report. Subsequently, the developer (NuVest) is required to apply for an Atmospheric Emission Licences (AEL) or amend the existing AEL if already obtained.

3.7. The Carbon Tax Act, 2019

The Carbon Tax Act gives effect to the polluter-pays-principle for large emitters and helps to ensure that firms and consumers take the negative adverse costs (externalities) into account in their future production, consumption and investment decisions. Firms are incentivized towards adopting cleaner technologies over the next decade and beyond.

The Government of South Africa has outlined its strong commitment to play its part in global efforts to mitigate Green House Gases (GHG) emissions as outlined in the National Climate Change Response Policy (NCCRP) of 2011 and the National Development Plan (NDP) of 2012. South Africa subsequently set its own domestic targets as outlined in the Nationally Determined Contribution (NDC), which was incorporated as the South African commitment in the Paris Agreement (convened by the United Nations Framework Convention on Climate Change (UNFCCC). South Africa ratified the Paris Agreement in November 2016. The carbon tax forms an integral part of ensuring that South Africa meets these targets. The carbon tax will initially only apply to scope 1 emitters in the first phase. The first phase will be from 1 June 2019 to 31 December 2022, and the second phase from 2023 to 2030.

The introduction of the carbon tax will also not have any impact on the price of electricity for the first phase. This will result in a relatively modest carbon tax rate ranging from R6 to R48 per tonne of CO_2 equivalent emitted,

which is a relatively low tax rate to further provide current significant emitters time to transition their operations to cleaner technologies through investments in energy efficiency, renewables, and other low carbon measures.

A review of the impact of the tax will be conducted before the second phase, after at least three years of implementation of the tax, and will consider the progress made to reduce GHG emissions in line with our NDC Commitments. Any person, company or entity who undertakes an activity (above a certain threshold) and is responsible for the release of GHG emissions is required to report on their emissions to the DFFE by the 31 March each year and pay tax on those emissions by July each year. NuVest is to ensure they comply with the Act as the proposed development entails the generation of emissions from the plant.

3.8. The National Dust Control Regulations, 2013

Dustfall is assessed for nuisance impact and not for inhalation health impact. The National Dust Control Regulations (Department of Environmental Affairs, 2013) prescribes measures for the control of dust in residential and non-residential areas. Acceptable dustfall rates are measured (using American Standard Testing Methodology (ASTM) D1739:1998 or equivalent) at and beyond the boundary of the premises where dust originates. In addition to the dustfall limits, the National Dust Control Regulations prescribe monitoring procedures and reporting requirements. Dust that may be created from the NuVest chemical plant project (including but not limited to the construction phase) will be managed in accordance with these Regulations.

3.9. The National Green House Gases Emission Reporting Regulations, 2017

Dustfall On 14 March 2014, the following six Green House Gases (GHGs) were declared as priority air pollutants in South Africa:

- Carbon dioxide (CO_2)
- Methane (CH_4)
- Nitrous Oxide (N_2O)
- Hydrofluorocarbons (HFCs)
- Perfluorocarbons (PFCs)
- Sulphur hexafluoride (SF_6)

National GHG Emission Reporting Regulations (Government Gazette No. 40762 of 3 April 2017), as amended (General Notice 994 in Government Notice 43712 of 11 September 2020), were published by the DFFE. A person identified as a Category A data provider in terms Annexure 1 of these regulations, must register their facilities using the online South African Greenhouse Gas Reporting System (SAGERS) (https://ghgreporting-public.environment.gov.za/GHGlanding/). Once registered the data provider must submit a GHG emissions inventory, activity data and report in the required format given under Annexure 3 of these regulations on an annual basis. All data must be provided annually, by the 31 March of the following year. Based on the EAPs preliminary assessment, the proposed chemical plant will likely not trigger Annexure A listed activities. However, should the proposed chemical plant trigger any of the activities in terms of Annexure A, NuVest Recovery Solutions would need to quantify and report on the proposed plant's GHG emissions by the 31 March of each year.

3.10. Vaal Triangle Airshed Priority Area Air Quality Management Plan, 2009

The Vaal Triangle Airshed Priority Area (VTAPA) was declared a Priority Area by the Minister of Environmental Affairs and Tourism on 28 May 2009 under the National Environmental Management Air Quality Act (Act No. 39 of 2004) (NEM:AQA) (Government Gazette, No. 32263 of 28 May 2009). The area was declared a priority area due to high pollutant concentrations within the area, especially particulates. However, in general, a Priority Area is usually associated with elevated ambient concentrations of criteria air pollutants such as PM_{10}, $PM_{2.5}$, SO_2 and

NO_x. A high number of emitters (industrial and non-industrial) are also concentrated in these areas. In order to meet the requirements of the NEM:AQA, an Air Quality Management Plan (AQMP) was compiled for the VTAPA and provides a management tool that can be used and implemented by departments and industry to ensure effective air quality management within the area. The primary aim of the AQMP is to provide a framework including short to long term strategies and programs that can be used to work towards achieving and maintaining compliance with the National Ambient Air Quality Standards within the VTAPA. NuVest Recovery Solutions are to adhere to the VTAPA Air Quality Management Plan.

3.11. The National Heritage Resources Act, 1999

The National Heritage Resources Act (Act 25 of 1999 – NHRA) stipulates that cultural heritage resources may not be disturbed without authorisation from the relevant heritage authority. Section 34(1) of the NHRA states that, "*no person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority…*" The NHRA is utilised as the basis for the identification, evaluation and management of heritage resources and in the case of Cultural Resource Management (CRM) those resources specifically impacted on by development as stipulated in Section 38 of NHRA, and those developments administered through the NEMA, the Mineral and Petroleum Resources Development Act 28 of 2002 (MPRDA) and the Development Facilitation Act (FDA) legislation. In the latter cases the feedback from the relevant heritage resources authority is required by the State and Provincial Departments managing these Acts before any authorisations are granted for a development. The last few years have seen a significant change towards the inclusion of heritage assessments as a major component of Environmental Impact Processes required by the NEMA and MPRDA.

The NEMA 23(2)(b) states that an integrated environmental management plan should, "*…identify, predict and evaluate the actual and potential impact on the environment, socio-economic conditions and cultural heritage*". A study of subsections (23)(2)(d), (29)(1)(d), (32)(2)(d) and (34)(b) and their requirements reveals the compulsory inclusion of the identification of cultural resources, the evaluation of the impacts of the proposed activity on these resources, the identification of alternatives and the management procedures for such cultural resources for each of the documents noted in the Environmental Regulations. A further important aspect to be considered of in the EIA Regulations under the NEMA relates to the Specialist Report requirements (Appendix 6 of EIA Regulations 2014, as amended).

The MPRDA defines 'environment' as it is in the NEMA and, therefore, acknowledges cultural resources as part of the environment. Section 39(3)(b) of this Act specifically refers to the evaluation, assessment and identification of impacts on all heritage resources as identified in Section 3(2) of the NHRA that are to be impacted on by activities governed by the MPRDA. Section 40 of the same Act requires the consultation with any State Department administering any law that has relevance on such an application through Section 39 of the MPRDA. This implies the evaluation of Heritage Assessment Reports in Environmental Management Plans or Programmes by the relevant heritage authorities.

According to the national web-based environmental screening tool (DFFE Screening Tool Report) promulgated into law on the 4th of October 2019 under NEMA EIA Regulations, 2014 as amended, the proposed development is located within an area of *very low* relative archaeological and cultural heritage theme sensitivity. An assessment of the NHRA and preliminary project information revealed that the proposed development does not trigger any activity within the NHRA. Therefore, a Heritage Impact Assessment will not be undertaken for the project. However, the South African Heritage Resources Agency (SAHRA), the Provincial Heritage Resources Authority Gauteng (PHRAG) and Association of Southern African Professional Archaeologists (ASAPA) will be provided with a copy of the DSR for review and comment.

3.12. The National Environmental Management Biodiversity Act, 2004

The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) aims to provide for the:

- Management and conservation of South Africa's biodiversity within the framework of the National Environmental Management Act,1998;
- 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 bio-prospecting involving indigenous biological resources; and
- The establishment and functions of a South African National Biodiversity Institute.

NEMBA is the most recent legislation pertaining to alien invasive plant (AIP) species. In August 2014, the list of Alien Invasive Species was published in terms of the NEMBA. The Alien and Invasive Species Regulations were published in the Government Gazette No. 44182, 24th of February 2021. The legislation calls for the removal and / or control of AIP species (Category 1 species). In addition, unless authorised thereto in terms of the NWA, no land user shall allow Category 2 plants to occur within 30 meters of the 1:50 year flood line of a river, stream, spring, natural channel in which water flows regularly or intermittently, lake, dam or wetland. Category 3 plants are also prohibited from occurring within proximity to a watercourse. Below is a brief explanation of the three categories in terms of the NEMBA:

- Category 1a: Invasive species requiring compulsory control. Remove and destroy. Any specimens of Category 1a listed species need, by law, to be eradicated from the environment. No permits will be issued.
- Category 1b: Invasive species requiring compulsory control as part of an invasive species control programme. Remove and destroy. These plants are deemed to have such a high invasive potential that infestations can qualify to be placed under a government sponsored invasive species management programme. No permits will be issued.
- Category 2: Invasive species regulated by area. A demarcation permit is required to import, possess, grow, breed, move, sell, buy or accept as a gift any plants listed as Category 2 plants. No permits will be issued for Category 2 plants to exist in riparian zones.
- Category 3: Invasive species regulated by activity. An individual plant permit is required to undertake any of the following restricted activities (import, possess, grow, breed, move, sell, buy or accept as a gift) involving a Category 3 species. No permits will be issued for Category 3 plants to exist in riparian zones.

Note that according to the Alien and Invasive Species Regulations, a person who has under his or her control a category 1b listed invasive species must immediately:

- Notify the competent authority in writing.
- Take steps to manage the listed invasive species in compliance with:
    - Section 75 of the NEMBA;
    - The relevant invasive species management programme developed in terms of regulation 4; and
    - Any directive issued in terms of section 73(3) of the NEMBA.

During the initial site sensitivity verification study, AIP were identified by the EAP. The presence of and type of AIP will be confirmed by the ecologist and relevant measures will be incorporated into the EMPr.

3.13. The National Web-Based Environment Screening Tool, 2019

On the 5th of July 2019, The Department of Forestry, Fisheries and the Environment (DFFE) issued a 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. The submission of this report is compulsory when applying for environmental authorisation in terms of Regulation 19 and Regulation 21 of the Environmental Impact Assessment Regulations, 2014 effective from the 4th of October 2019. The DFFE Screening Tool Report was generated on the 14th of June 2023. The Screening report is provided in **Appendix 5** of this report. The main findings to be discussed from the screening report are listed below.

The following summary of the study area's environmental sensitivities were identified in the Environmental Screening Report. The environmental sensitivities for the proposed development footprint are indicated on **Table 12**.

Table 12: Environmental Sensitivity of Project Area

Theme	Very High sensitivity	High sensitivity	Medium sensitivity	Low sensitivity
Agriculture Theme		X		
Animal Species Theme			X	
Aquatic Biodiversity Theme				X
Archaeological and Cultural Heritage Theme				X
Civil Aviation Theme		X		
Defence Theme				X
Palaeontology Theme	X			
Plant Species Theme				X
Terrestrial Biodiversity Theme	X			

The information collected by the specialists and EAP's assessment may be used to confirm or dispute (as may be applicable) the environmental sensitivity ratings identified by the National Screening Tool. Although the specialist studies will be undertaken during the EIA phase, the EAP has already undertaken a site sensitivity verification (**Appendix 6**) and EAPs assessments/theme and sensitivity ratings identified by the Screening Tool are summarized in **Table 13** below.

Table 13: Specialist Assessments/themes and Sensitivity Ratings identified by DFFE's Web-based Screening Tool

Assessment Theme	Sensitivity Rating as per Screening Report	Sensitivity Rating as per Verification	Response
Agriculture Theme	High	Low	Relative Agricultural Sensitivity was assessed to be *Low-Sensitive* by the Site Sensitivity Verification (SSV) attached as **Appendix 6**. The SSV found that there are agricultural activities within the extended area, with the closest agricultural field located approximately 2km east of the proposed site. However, the proposed development site is located within an industrial area and there are no agricultural activities within the immediate adjacent properties. In addition, the proposed development site is zoned for industrial use and the process are not likely to directly impact on the overall agricultural potential and/or production.
Animal Species Theme	Medium	Low	Relative Animal Species Sensitivity was assessed to be *Low-Sensitive* as the SSV found that the proposed development site has been significantly transformed and no fauna, species of conservation concern (SCC) was noted during the assessment.
Aquatic Biodiversity Theme	Low	Low	Relative Aquatic Biodiversity Theme Sensitivity was assessed to be *Low-Sensitive* as the SSV found that the study area is not located within the 100m nor 500m regulated areas for a rivers and wetlands respectively. In addition, the study area does not fall within a strategic water source area. Furthermore, study area is not located within The National Freshwater Ecosystem Priority Areas nor the South African Inventory of Inland Aquatic Ecosystems.
Archaeological and Cultural Heritage Theme	Low	Low	Relative Archaeological and Cultural Heritage Theme Sensitivity was assessed to be *Low-Sensitive* as the SSV found that there are no archaeological or physical cultural features within the proposed development footprint. There are no anticipated conflicts between archaeological or physical cultural features during the construction of the proposed chemical plant and that considering the very low archaeological and cultural heritage sensitivity of the area, no further archaeological and cultural heritage studies, ground truthing and/or permits (Phase II) are required pending the discovery of any archaeological or cultural heritage features during the construction phase.
Civil Aviation Theme	High	Low	Relative Civil Aviation Theme Sensitivity was assessed to be Low-Sensitive as the SSV found that there were no aviation facilities or infrastructures such as communication towers or airport within a 2km radius of the site. It must be noted that the site is located approximately 7.5km away from the nearest airport (Klipriver Airfield) and approximately 10km from Vereeniging Airport. Therefore, the construction of the chemical plant within the proposed development site was assessed to have a very low impact on Civil Aviation. The South African Civil Aviation Authority (SACAA) and the Air Traffic Navigation Services (ATNS) will be included as specific I&AP.
Defence Theme	Low	Low	Relative Defence Theme Sensitivity was assessed to be *Low-Sensitive* as there are no military bases / facilities present within the vicinity of the project site. The nearest military base is the Lenasia Military Base, located approximately 50 km northwest of the project site.

Assessment Theme	Sensitivity Rating as per Screening Report	Sensitivity Rating as per Verification	Response
Palaeontology Theme	Very High	Medium-Low	Based on the 1:250 000 SAHRIS PalaeoMap, the study area is located within a *Very-High Sensitivity*. However, the study area is located on a property which has been significantly transformed and the proposed development on entails excavations of the topsoil and subsoils only. No deeper excavations area anticipated. Therefore, the relative Palaeontology Theme Sensitivity was assessed to be *Medium-Sensitive*. The proposed chemical plant will likely not lead to detrimental impacts on the palaeontological resources of the area.
Plant Species Theme	Low	Low	Relative Plant Species Sensitivity was assessed to be *Low-Sensitive* as the SSV found that the proposed development site has been significantly transformed and minimal flora was noted during the assessment.
Terrestrial Biodiversity Theme	Very High	Low	Relative Animal Species Sensitivity was assessed to be *Low-Sensitive* as the SSV found that the proposed development site has been significantly transformed and no fauna, potential protected flora or species of conservation concern (SCC) was noted during the assessment.

Page 6 and 7 on the DFFE Screening Report indicates that certain Specialist Assessments must be undertaken for the proposed development. There is however an allowance of the EAP to motivate for the reasons for not including certain assessments in the assessment report. **Table 14** presents these Specialist Assessments/Studies as well as the motivations behind the EAP's decision of recommending or not recommending the undertaking of certain Specialist Assessments.

Table 14: Summary of discussions regarding the undertaking of specialist Assessments

SPECIALIST ASSESSMENT	DICUSSION AND MOTIVATION
Agricultural Impact Assessment	Although there are agricultural activities within the extended area, with the closest agricultural field located approximately 2km east of the proposed site. The proposed development site is located within an industrial area and there are no agricultural activities within the immediate adjacent properties. In addition, the proposed development site is zoned for industrial use and the chemical plant processes are not likely to directly impact on the overall agricultural potential and/or production of the areas. Furthermore, the relatively small size of the property (2.1ha) is not conducive to a viable conventional farming activity, i.e., too small for farming. As such, an Agricultural Impact Assessment for the project is not recommended by the EAP.
Archaeological and Cultural Heritage Impact Assessment	The National Web-Based Screening Tool Report found that the Relative Archaeological and Cultural Heritage Theme Sensitivity is *Low-Sensitive*. The SSV found that there are no archaeological or physical cultural features within the proposed development footprint. Therefore, the EAP does not recommend the undertaking of the Archaeological and Cultural Heritage Impact Assessment. It must be noted that no further archaeological and cultural heritage studies, ground truthing and/or permits (Phase II) are required pending the discovery of any archaeological or cultural heritage features during the construction phase.
Palaeontology Impact Assessment	Based on the 1:250 000 SAHRIS PalaeoMap and the National Web-Based Screening Tool Report, the study area is located within a Very-High Palaeo-Sensitivity area. However, the study area is located on a property which has been significantly transformed and the proposed development on entails excavations of the

SPECIALIST ASSESSMENT	DICUSSION AND MOTIVATION
	topsoil with no deep excavations anticipated. As such, the proposed chemical plant will likely not lead to detrimental impacts on the palaeontological resources of the area. It is consequently recommended by the EAP that no further palaeontological heritage studies, ground truthing and/or specialist mitigation are required pending the discovery of newly discovered fossils.
Terrestrial Biodiversity Impact Assessment	Although the National Web-Based Screening Tool Report found that the Relative Terrestrial Biodiversity Impact Assessment Theme Sensitivity is *Very High-Sensitive*, the site has been significantly transformed. Therefore, the EAP recommends that a Terrestrial Biodiversity Impact Compliance Assessment be undertaken to confirm if there are no Flora or Fauna SCC, or protected species within the development site and provide necessary mitigation measures.
Aquatic Biodiversity Impact Assessment	The Relative Aquatic Biodiversity Theme Sensitivity was assessed to be *Low-Sensitive* by both the National Web-Based Screening Tool Report and by the SSV. The study area is not located within the 100m and 500m regulated areas for a rivers and wetlands respectively as per desktop and site screening investigations. In addition, as per desktop assessments, the study area does not fall within a strategic water source area, nor located within the National Freshwater Ecosystem Priority Areas or the South African Inventory of Inland Aquatic Ecosystems. However, based on the nature of the proposed development (chemical plant) and its potential impacts on surface and groundwater, the EAP recommends that an Aquatic Biodiversity Compliance Statement be undertaken.
Hydrology Assessment	Similarly, to the findings and rationale for Aquatic Biodiversity Impact Assessment (above), the EAP does not recommend a Hydrological Impact Assessment.
Noise Impact Assessment	A noise impact assessment (NIA) predicts the impact that noise, from a proposed development, is likely to have on the surrounding area. An NIA is usually associated with large industries or developments with excessive noise generation such engineering companies, printing presses, textile mills, and metal works which immensely generate noise pollution. The noise from the machine's mechanical pneumatic drills, saws, and rotating belts usually produces intolerable sounds and are a nuisance to the public. Although the proposed development is a chemical plant, its footprint is only 2ha and the plant processes are not associated with excessive noise. As such, the EAP does not recommend an NIA for the proposed development.
Traffic Impact Assessment	A traffic impact study or traffic impact assessment is a study which assesses the effect that a particular development has on the transportation network. New developments are one of the major causes of traffic congestion in many of the major cities of developing countries, due to the absence of adequate mitigation measures. Developments usually increases and/or contributes to the traffic in the area during the construction phase as a result of construction vehicles going to and from the development site and traffic control measure such as 'Stop and Go'. It is anticipated that the proposed development of a chemical plant will not largely increase the traffic congestion as minimal construction vehicles will be used during the construction phase and during the operational phase, the delivery and collection trucks will operate using a scheduled approach and use the existing road network which is not currently overloaded. Based on the proposed capacity of the plant and load capacity of a 14-wheeler truck, it is anticipated that no more than five (5) 14-wheeler trucks will be using the road network a day.
Geotechnical Assessment	Based on the Geological Map Data obtained from the Council for Geosciences, the study area is predominantly underlain rocks from the Lyttleton Formation of the Malmani dolomite. There is acknowledged risks from development on dolomitic terrain for surface disturbances related to dewatering such as described in the West Rand and Ekurhuleni regions, but no dewatering is seen to be actively taking place in the Meyerton north area. In addition, the property does not appear to be located directly on dolomitic bedrock. As per the preliminary project information, the development of the chemical plant will only require shallow excavations to accommodate the foundations for the plant. As such, a geotechnical assessment is not recommended by the EAP. However, should project

SPECIALIST ASSESSMENT	DICUSSION AND MOTIVATION
	information change, the geotechnical assessment may be required to identify risks and provide founding solutions. It must be noted that geotechnical assessments are usually associated with the engineering aspect of the development and not the environmental process.
Socio-Economic Assessment	The overarching aim of undertaking a Socio-Economic Assessment of a projects is to develop an understanding of the current social and economic environment and aims to assess or assesses the potential impact of the project on the socio-economic environment. Socio-Economic Assessment are usually undertaken for projects which have an impact and/or affect the social and/or economic structures such as low-cost housing projects, mixed-use developments, upgrading of informal settlements, linear projects transecting different communities, etc. Based on the project information, proposed development footprint and the area, the EAP does not recommend a Socio-Economic Assessment for the project as it will not negatively impact on the socio-economic structures, but rather uplift the local community and economy at large through job creation and employment opportunities.
Plant Species Assessment	Although the National Web-Based Screening Tool Report found that the Relative Plant Species Theme Sensitivity is Low-Sensitive and the site has been significantly transformed, the EAP recommends that a Terrestrial Biodiversity Impact Compliance Assessment be undertaken to confirm if there are no Flora or Fauna SCC, or protected species within the development site. The Plant Species Assessment will be covered by the Terrestrial Biodiversity Impact Compliance Assessment.
Animal Species Assessment	Although the National Web-Based Screening Tool Report found that the Relative Animal Species Theme Sensitivity is Low-Sensitive and the site has been significantly transformed, the EAP recommends that a Terrestrial Biodiversity Impact Compliance Assessment be undertaken to confirm if there are no Flora or Fauna SCC, or protected species within the development site. The Animal Species Assessment will be covered by the Terrestrial Biodiversity Impact Compliance Assessment.

3.14. The Conservation of Agricultural Resources Act

The Conservation of Agricultural Resources (Act 43 of 1983) aims to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. In order to achieve the objectives of this Act, control measures related to the following may be prescribed to land users to whom they apply:

- The cultivation of virgin soil;
- The utilisation and protection of land which is cultivated;
- The irrigation of land;
- The prevention or control of waterlogging or salination of land;
- The utilisation and protection of vleis, marshes, water sponges, water courses and water sources;
- The regulating of the flow pattern of run-off water;
- The utilisation and protection of the vegetation;
- The grazing capacity of veld, expressed as an area of veld per large stock unit;
- The maximum number and the kind of animals which may be kept on veld;
- The prevention and control of veld fires;
- The utilisation and protection of veld which has burned;
- The control of weeds and invader plants;
- The restoration or reclamation of eroded land or land which is otherwise disturbed or denuded;
- The protection of water sources against pollution on account of farming practices;
- The construction, maintenance, alteration or removal of soil conservation works or other structures on land; and
- Any other matter which the Minister may deem necessary or expedient in order that the objects of this Act may be achieved.

Further, different control measures may be prescribed in respect of different classes of land users or different areas or in such other respects as the Minister may determine. Preliminary impacts on the agriculture and soil, biodiversity and water resources have been identified with regards to this project, and mitigation and management measures recommended. These will be updated during the EIA phase of this project as and where necessary.

3.15. The Spatial Planning and Land Use Management Act (SPLUMA)

The Spatial Planning and Land Use Management Act, No.16 of 2013, has been in effect since July 2015. Essentially SPLUMA applies to the governance of how land is used, which is significant for developers who are applying for land developments. The objectives of the act are to:

- provide for a uniform, effective and comprehensive system of spatial planning and land use management for the Republic;
- ensure that the system of spatial planning and land use management promotes social and economic inclusion;

- provide for development principles and norms and standards;
- provide for the sustainable and efficient use of land;
- provide for cooperative government and intergovernmental relations amongst the national, provincial and local spheres of government; and
- redress the imbalances of the past and ensure that there is equity in the application of spatial development planning and land use management systems.

The proposed site falls within an "Built-Up / Industrial" zone and the proposed development is a chemical plant (industrial facility), effectively being located within an appropriate land use zone.

3.16. The Noise Control Regulations, 1992

In terms of section 25 of the ECA, the National Noise Control Regulations (GN R. 154 – NCRs) published in Government Gazette No. 13717 dated 10 January 1992, were promulgated. The NCRs were revised under GN R. 55 of 14 January 1994 to make it obligatory for all authorities to apply the regulations. Provincial noise control regulations have been promulgated in Gauteng, Free State and Western Cape Provinces. The NCRs will need to be considered in relation to the potential noise that may be generated mainly during the construction phase of the proposed project. The two key aspects of the NCRs relate to disturbing noise and noise nuisance.

Section 4 of the Regulations prohibits a person from making, producing or causing a disturbing noise, or allowing it to be made produced or caused by any person, machine, device or apparatus or any combination thereof. A disturbing noise is defined in the Regulations as "*a noise level which exceeds the zone sound level or if no zone sound level has been designated, a noise level which exceeds the ambient sound level at the same measuring point by 7 dBA or more*."

Section 5 of the NCRs in essence prohibits the creation of a noise nuisance. A noise nuisance is defined as "*any sound which disturbs or impairs or may disturb or impair the convenience or peace of any person".* The South African National Standard 10103 also applies to the measurement and consideration of environmental noise and should be considered in conjunction with these Regulations.

There are a few South African scientific standards (SABS) relevant to noise from mines, industry and roads. They are:

- South African National Standard (SANS) 10103:2008 – 'The measurement and rating of environmental noise with respect to annoyance and to speech communication';
- SANS 10210:2004 – 'Calculating and predicting road traffic noise';
- SANS 10328:2008 – 'Methods for environmental noise impact assessments';
- SANS 10357:2004 – 'The calculation of sound propagation by the Concave method';
- SANS 10181:2003 – 'The Measurement of Noise Emitted by Road Vehicles when Stationary'; and
- SANS 10205:2003 – 'The Measurement of Noise Emitted by Motor Vehicles in Motion'.

The relevant standards use the equivalent continuous rating level as a basis for determining what is acceptable. The levels may take single event noise into account, but single event noise by itself does not determine whether noise levels are acceptable for land use purposes. With regards to SANS 10103:2008, the recommendations are likely to inform decisions by authorities, but non-compliance with the standard will not necessarily render an activity unlawful per se.

3.17. The Gauteng Environmental Management Framework

The Gauteng Department of Agriculture and Rural Development (GDARD) have developed an Environmental Management Framework Tool to streamline the requirements for an Environmental Impact Assessment (EIA) and reduce the need for the undertaking of EIA requirements, a reduction in timeframes for approvals and as a contribution towards reducing the cost of doing business in Gauteng. In this tool, several NEMA listed activities are excluded from the requirement to obtain an EA. Government Notice 164 in Government Gazette No. 41473 of 2 March 2018 presents a list of activities that are excluded from the need to obtain an Environmental Authorisation as they occur within Zones 1 and 5 of the Gauteng Provincial Environmental Management Framework (GPEMF). **Table 15** indicates the various zones of the GPEMF including *Zones 1 and 5.*

Table 15: Gauteng Provincial Environmental Management Framework Zones

ZONE	INTENTION
Zone 1: Urban development zone	The intention with this zone is to streamline urban development activities in it and to promote development infill, densification and concentration of urban development, in order to establish a more effective and efficient city region that will minimise urban sprawl into rural areas.
Zone 2: High control zone (within the urban development zone)	This zone is sensitive to development activities. Only conservation should be allowed in this zone. Related tourism and recreation activities must be accommodated in areas surrounding this zone
Zone 3: High control zone (outside the urban development zone)	This zone is sensitive to development activities and in several cases also have specific values that need to be protected. Conservation and related tourism and recreation activities should dominate development in this zone.
Zone 4: Normal control zone	**Intention** This zone is dominated by agricultural uses outside the urban development zone. Agricultural and rural development that support agriculture should be promoted
Zone 5: Industrial and large commercial focus zone Intention	The intention with Zone 5 is to streamline non-polluting industrial and large-scale commercial (warehouses etc.) activities in areas that are already used for such purposes and areas that are severely degraded but in proximity to required infrastructure.

The NuVest chemical plant site was found to fall within Zone 1 of the GPEMF (**Figure 7**). A study of the NEMA EIA Activities that are excluded under the GPEMF was undertaken and it was established that the identified triggered activities (Listing Notice 2 Activity 4 and 6) which are presented in **Section 2.4** are not listed on the GPEMF Excluded Listed Activities in Zone 1. This means that these activities are not excluded from the requirement to obtain an Environmental Authorisation within Zone 1. As such, the proposed NuVest chemical plant requires the undertaking of an environmental authorisation process.

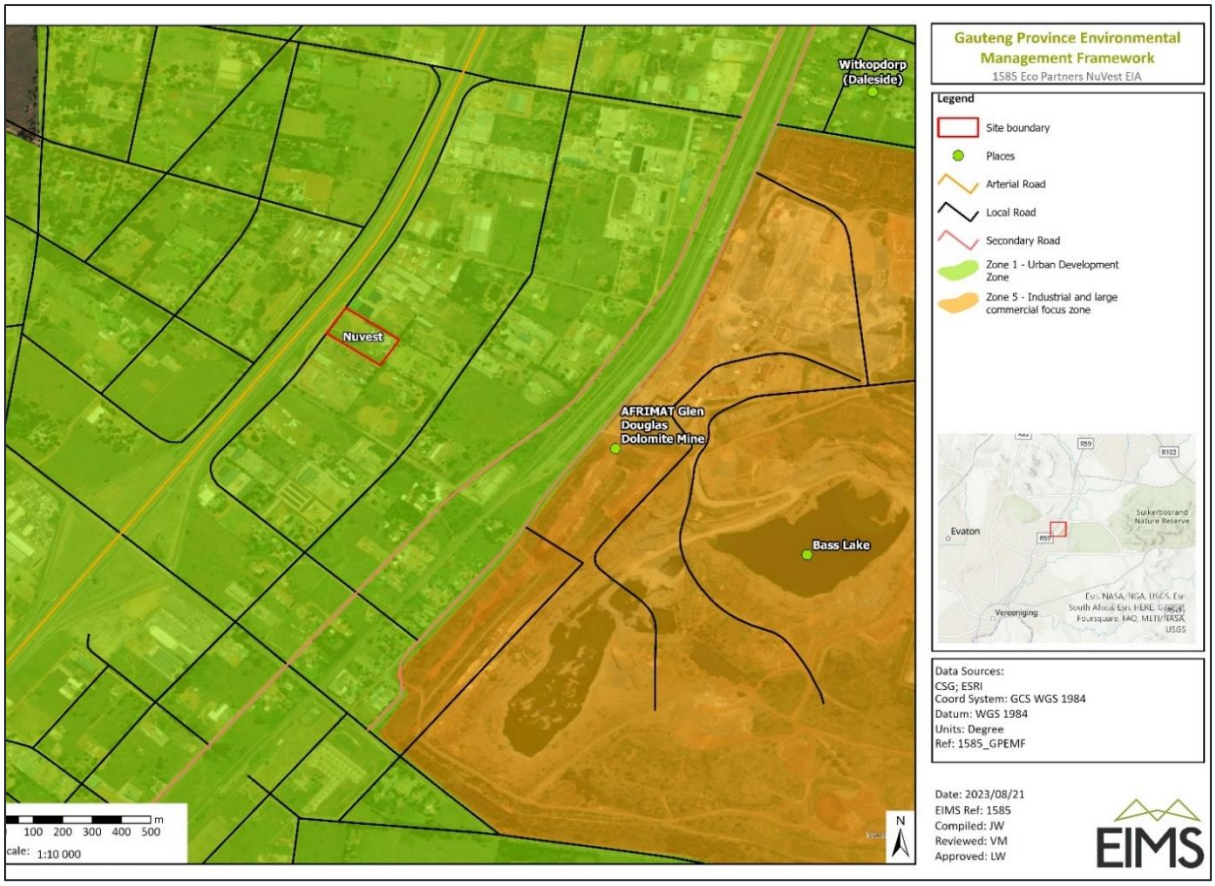


Figure 7: NuVest chemical plant Environmental Management Framework Map

3.18. The Gauteng Pollution Buffer Zones Guideline, 2017

The GDARD's Gauteng Buffer Zone Guideline was initially developed in 2002 and reviewed in 2006. GDARD has undertaken to revise the guideline to determine its effectiveness, relevance and applicability to the current operating environment in the province. The guideline was developed to ensure that pollution buffer areas are created between the pollution sources and the nearest human settlements. Over the years of using the buffer zone guideline, GDARD has realized that due to the constantly changing landscape in the province, as influenced by factors such as development pressure and technological changes, the sole reliance on just the buffer areas as stipulated in the authorisations, permits and licenses to protect the receiving environment from the effects of pollution, needs to be periodically enhanced. The department (GDARD) is continuously adopting the approach of integrated management of the buffer zones inclusive of stakeholders such as the municipalities and the industries.

GDARD is the responsible authority for issuing environmental authorisations in the Gauteng Province. The department has reviewed guidelines for Pollution Buffer Zones with an intention to provide direction on how to respond to the development applications that require pollution buffers due to their proximity to industrial and other land uses that may have a deleterious health effect on people. The purpose of this guideline is to ensure that the residents of the Gauteng province are protected from the emissions from pollution generators. Care should be taken in the placement of incompatible land uses with an emphasis on mitigation measures that will be implemented; this should not be a norm, but a consideration on a case by case basis.

Industries and other pollution sources identified in Gauteng were classified based on the department 's brief and the release or potential for the release of harmful effluent or emissions and associated nuisance factors like noise. The classification is made on the basis of the nature and level of pollution or potential release of effluents or emissions associated with particular industrial areas. Industrial areas with pollution risks that can have potentially serious health effects on a large scale have been placed in Category 1. Industrial areas with pollution risks that may cause minor health effects or with activities that result in nuisance rather than actual health

impacts were placed in Category 2. Industrial areas that pose little or no health impacts and that may result in a nuisance on a localized scale have been placed in Category 3. A review of the scope of the proposed development, the spatial location and GDARD's Gauteng Buffer Zone Guideline found that the proposed Nuvest chemical plant in Meyerton falls within Category 3. Category 3 industries have a best-case scenario buffer: of 100m and worst-case buffer of 50m. The only potentially significant environmental impact of these industries is the potential clash of scale and land use with residential areas. The noise impact of these operations is regarded to be insignificant. A spatial separation of 50 to 100m is sufficient to accommodate the difference in scale and land use.

3.19. Midvaal Local Municipality Integrated Development Plan

The Municipal Systems Act, (No 32 of 2000), compels municipalities to prepare Integrated Development Plans (IDPs). The IDP serves as a tool for the facilitation and management of developments within the municipal area of jurisdiction. In conforming to the Act's requirements, the Council of Midvaal Local Municipality (MLM) has delegated the authority to the Municipal Manager to prepare the IDP. The aim of the IDP for Midvaal is to present a coherent plan in order to achieve the vision of the municipality. The intention of this IDP is to link, integrate and co-ordinate development plans for MLM which are aligned with national, provincial and district development plans as well as planning requirements binding on the municipality in terms of legislation.

Based on Midvaal's IDP (2021/2022), the spatial layout of the Midvaal Local Municipal area is predominantly that of a rural area with extensive farming constituting approximately 50% of the total area of jurisdiction. In the Midvaal, manufacturing is the highest contributor to the local economy and furthermore has been earmarked as a key development area of the future. Manufacturers are typically high producers of air pollution (in its various forms), which can have a significant effect on the health of the population and the environment. A strong manufacturing industry can also result in a high level of effluent emissions, which may contain compounds that are a human health and environmental risk. Effluent can contaminate surface-and ground water aquifers, affecting water supply to communities or facilitate widespread ecosystem degradation. Midvaal is currently mandated to enforce compliance in primarily three areas of environmental management:

i. pollution (effluent) control
ii. biodiversity; and
iii. landscape

The proposed development of a chemical plant within Midvaal Local Municipality will be required to comply with the IDP and will be subjected to monitoring by municipal officials.

4 PROJECT ALTERNATIVES

In terms of the EIA Regulations published in Government Notice (GN) R982 of 2014, as amended, feasible and reasonable alternatives must be identified and considered within the environmental assessment process. An alternative is defined as *"…in relation to a proposed activity, means different means of meeting the general purpose and requirements of the activity, which may include alternatives to the:*

(a) property on which or location where it is proposed to undertake the activity;

(b) type of activity to be undertaken;

(c) design or layout of the activity;

(d) technology to be used in the activity;

(e) operational aspects of the activity; and

(f) Includes the option of not implementing the activity."

In terms of Section 24 of NEMA, the proponent is required to demonstrate that alternatives have been described and investigated in sufficient detail during the EIA process. It is important to highlight that alternatives must be practical, feasible, reasonable and viable to cater for an unbiased approach to the project and in turn to ensure environmental protection. In order to ensure full disclosure of alternative activities, it is important that various role players contribute to their identification and evaluation. Stakeholders have an important contribution to make during the EIA Process and each role is detailed as follows:

The role of the environmental assessment practitioner is to:

- encourage the proponent to consider all feasible alternatives;
- Identify reasonable alternatives;
- provide opportunities for stakeholder input to the identification and evaluation of alternatives;
- document the process of identification and selection of alternatives;
- provide a comprehensive consideration of the impacts of each of the alternatives; and
- document the process of evaluation of alternatives.

The role of the proponent is to:

- assist in the identification of alternatives, particularly where these may be of a technical nature;
- disclose all information relevant to the identification and evaluation of alternatives;
- be open to the consideration of all reasonable alternatives; and
- be prepared for possible modifications to the project proposal before settling on a preferred option.

The role of the public is to:

- assist in the identification of alternatives, particularly where local knowledge is required;
- be open to the consideration of all reasonable alternatives; and

- recognise that there is rarely one favoured alternative that suits all stakeholders and that alternatives will be evaluated across a broad range of criteria, including environmental, social and economic aspects.

Table 16 outlines the various alternative types that must be considered for each development**.** The extent of the applicability of each of these is further presented. It must be highlighted that the alternatives presented in the table are derived from both the the EIA Regulations (2014) as amended as well as the the Department of Environmental Affairs and Tourism's (now Department of Environmental, Fisheries and Forestry) 2004 Integrated Environmental Information Series on the Criteria for determining alternatives in EIA. Where the alternative is applicable to the project, it will be further discussed in this Scoping Report. The alternatives discussed further in this SR are as follows:

- The No-Go Option;
- Process alternatives; and
- Input alternatives.

Table 16: Project alternatives as per NEMA EIA Regulations, 2014 as amended.

ALTERNATIVE	COMMENT
No-go Option	The 'no-go' alternative is sometimes referred to as the 'no-action' alternative (Glasson *et al.,* 1999) and at other times the 'zero-alternative'. It assumes that the activity does not go ahead, implying a continuation of the current situation or the status quo. This alternative must be discussed on all projects as it allows for an assessment of impacts should the activity not be undertaken. **This alternative is discussed in this report.**
Activity alternatives	These are sometimes referred to as project alternatives, although the term activity can be used in a broad sense to embrace policies, plans and programmes as well as projects. Consideration of such alternatives requires a change in the nature of the proposed activity. This would entail a process where a different project is proposed instead of the chemical plant. **There is one proposed activity and no other activity alternative. Therefore, this alternative will not be discussed in this report.**
Location/ property alternatives	Location alternatives could be considered for the entire proposal or for a component of a proposal, for example the location of a processing plant within the property boundary. The latter is sometimes considered under site layout alternatives. A distinction should also be drawn between alternative locations that are geographically quite separate, and alternative locations that are in proximity. In the case of the latter, alternative locations in the same geographic area are often referred to as alternative sites. Based on the proposed development, the chemical plant will be limited to the small 2.1ha land parcel which is currently being used for a similar process and therefore **the location/property alternatives are not applicable to this project.**
Process alternatives	Various terms are used for this category, including technological alternative and equipment alternative. The purpose of considering such alternatives is to include the option of achieving the same goal by using a different method or process. An industrial process could be changed, or an alternative technology could be used. These are also known as technological and equipment alternative and will be discussed as they are applicable to the chemical plant processes. **These will be discussed in this report.**
Demand alternatives	Demand alternatives arise when a demand for a certain product or service can be met by some alternative means. This is applicable to the demand for a product or

ALTERNATIVE	COMMENT
	service. An example of this would be where there is a need to provide housing units. Examples of alternatives can be through managing demand through various methods or providing additional housing through either single dwelling residential units or mixed-use developments. Specific to the proposed project, **alternatives regarding the demand are not applicable and will not be discussed in this report.**
Scheduling alternatives	These are sometimes known as sequencing or phasing alternatives. In this case an activity may comprise several components, which can be scheduled in a different order or at different times and as such produce different impacts. **These are not applicable to the project and will not be discussed.**
Input alternatives	By their nature, input alternatives are most applicable to industrial applications that may use different raw materials or energy sources in their processes. Considering that the proposed development is a chemical plant which involves the conversion of raw materials into finished products, **input alternatives are applicable to the project and will be discussed.**
Routing alternatives	Consideration of alternative routes generally applies to linear developments such as power lines, transport, and pipeline routes. The proposed project is a chemical plant within a defined and reduced footprint. **Therefore, routing alternatives are not applicable to this development.**
Site layout alternatives	Site layout alternatives permit consideration of different spatial configurations of an activity on a particular site. This may include particular components of a proposed development or may include the entire activity. One suitable layout has been proposed for the chemical plant. **Based on this, site layout alternatives will not be covered in this report.**
Scale alternatives	In some cases, activities that can be broken down into smaller units can be undertaken on different scales. For example, a housing development within an overall mixed-used development could have the option of 1 000, 2 000 or 4 000 housing units. Each of these scale alternatives may have different impacts. However, the proposed chemical plant cannot be broken down into smaller units. **For this reason, scale alternatives will not be discussed in this report.**
Design alternatives.	This entails the consideration of different designs for aesthetic purposes or different construction materials to optimise local benefits and sustainability would constitute design alternatives. Appropriate applications of design alternatives are communication towers. In such cases, all designs are assumed to have different impacts. Generally, the design alternatives could be incorporated into the project proposal and so be part of the project description and need not be evaluated as separate alternatives. **Based on project description and background information, no reasonable design alternatives were identified and will therefore not be discussed in this SR**.
Operational alternatives	The Operational Alternative is where you can specify controls on the operational aspects of the project such as pressure pipes, pumps, as well as valves. In the case of the proposed chemical plant, **feasible operational alternatives were not identified and are not discussed in this report.**

4.1. Process Alternatives

Process alternatives are also known as technological and equipment alternatives that can be implemented to achieve the desired goal of a project. The process alternatives can be either mechanical (physical), chemical or biological and must be suitable to the specific type of development. The proposed chemical plant will specialise in the manufacture of sodium hydroxide (NaOH), chlorine (Cl_{l2}) and hydrogen (H_2) through the chlor-alkali process. The term chlor-alkali refers to the two chemicals (chlorine and an alkali) which are simultaneously produced as a result of the electrolysis of a saltwater. The most common chlor-alkali chemicals are chlorine and sodium hydroxide (caustic soda) but can include potassium hydroxide and muriatic acid. There are 3 types of electrolytic processes used in the production of chlorine and caustic soda: the diaphragm cell process, the mercury cell process, and the membrane cell process which are discussed below as obtained from Lakshmanan et al., 2013, Lakshmanan et al., 2014 and María et al., 2017.

4.1.1. Diaphragm Cell Process

According to Lakshmanan et al., (2014), in the Diaphragm Cell Process, concentrated sodium chloride solution is entered into the cell at the titanium anode. Chlorine ions from solution lose electrons and are oxidised to form chlorine gas, which can be collected and removed at the steel mesh cathode. Water molecules are reduced to form hydroxide ions and hydrogen gas, which can also be removed. The sodium ions in NaCl solution react with the hydroxide ions to produce sodium hydroxide (some contamination by NaCl) which is then collected by evaporation. The advantages and disadvantages of the Diaphragm Cell Process are indicated in **Table 17**.

Table 17: Advantages and disadvantages of the Diaphragm Cell Process (Adapted from Lakshmanan et al., 2014).

Advantages	Disadvantages
Diaphragm cells use a simple and economical brine system	The low concentration of the caustic soda solution, which requires several concentrative operations to achieve the purity needed for industrial use.
Low electric energy consumption	Exposure to airborne asbestos fibres forms from the process used to help the diaphragm prevent the caustic soda also being produced in the process from reacting with the chlorine could lead to mesothelioma and asbestosis
The brine feedstock can also be less pure than that required by mercury or membrane cells	Leakage inside the diaphragm would cause the hydrogen to react explosively with chlorine or oxygen
	Contact between hydroxide ion and chlorine ion in solution would lead to unwanted hypochlorite formation.
	Large amounts of electric currents could create heat and magnetic effects.

4.1.2. Mercury Cell Process

According to Lakshmanan et al., (2013 & 2014), in the Mercury Cell Process, brine is flowed slowly through the tank. Sodium ions are reduced at the cathode and the sodium metal produced dissolves in the mercury to produce an amalgam. An amalgam flows through the cell until arrival at the decomposer where it reacts with water to produce sodium hydroxide: $\mathbf{2Na/Hg_{(l)} + 2H_2O_{(l)} \rightarrow 2NaOH_{(aq)} + H_{2\,(g)} + 2Hg_{(l)}}$. Hydrogen is collected and stored and is a valuable by-product of the reaction. Hg is recycled and is reused as the cathode because it does not react with water, and the chlorine gas, which is produced at the anode, is also removed. The advantages and disadvantages of the Mercury Cell Process are indicated in **Table 18**.

Table 18: Advantages and disadvantages of the Mercury Cell Process (Adapted from Lakshmanan et al., 2014).

Advantages	Disadvantages
Low quality requirements for brine raw material.	There are environmental consequences to the use of mercury. Through contaminated effluents it can enter the food chain via plankton and accumulate in the adipose tissue of fish.
No further evaporation or salt separation is needed to produce the finished product.	Large amounts of electric currents create heat and magnetic effects.
	Mercury cells require higher voltage than both diaphragm and membrane cells and use more energy.
	The process requires as input a very pure brine solution without metal contaminants.

4.1.3. Membrane Cells Process

The Membrane Cells Process is the widely used method to produce sodium hydroxide. Brine is entered into the anode compartment of the cell and water is entered into cathode compartment of cell at the anode. Chlorine ions from the brine are oxidized to form chlorine gas which is collected and removed at the cathode. Water molecules are reduced to form hydroxide ions and hydrogen gas, which is collected and removed. Membrane allows sodium ions to pass through to cathode compartment to react with the hydroxide ions to produce sodium hydroxide, which is then removed and further purified. The membrane is made from a polymer which allows positive ions to pass through it. The ion-selective, impermeable membrane prevents the interaction of chloride ions with hydroxide ions which can lead to hypochlorite formation. The sodium chloride solution must be pure to prevent other positively charged impurities from passing through the membrane and contaminating the NaOH solution (Lakshmanan et al., 2013 & Lakshmanan et al., 2014). The advantages and disadvantages of the Membrane Cells Process are indicated in **Table 19**.

Table 19: Advantages and disadvantages of the Membrane Cells Process (Adapted from Lakshmanan et al., 2014).

Advantages	Disadvantages
Relatively pure sodium hydroxide solution produced	The need for processing of the chlorine gas to remove oxygen and water vapor, and for moderate evaporation to increase the concentration of the caustic solution.
Lower electricity requirements than either diaphragm or mercury cells.	The brine entering a membrane cell must be of very high purity to prevent contamination of the membrane, which requires costly purification of the brine prior to electrolysis.
Membrane cells do not require the use of toxic materials (e.g., asbestos, mercury)	The membrane separator in these cells is expensive and easily damaged, and has a shorter lifetime than diaphragm and mercury separators.

Based on the indicated advantages and disadvantages of the three types of electrolytic processes used in the production of chlorine and caustic soda (specifically the lower electricity input requirements, and the avoidance of Hg and Asbestos), the Membrane Cells Process is the most preferred method followed by the Diaphragm Cell Process and last the Mercury Cell Process as the least preferred alternative.

4.2. Input Alternatives

Input alternatives are most applicable to industrial applications that may use different raw materials or energy sources in their processes. The overall input alternatives for the chlor-alkali process are energy, materials and water as indicated in **Figure 8** (María et al., 2017).

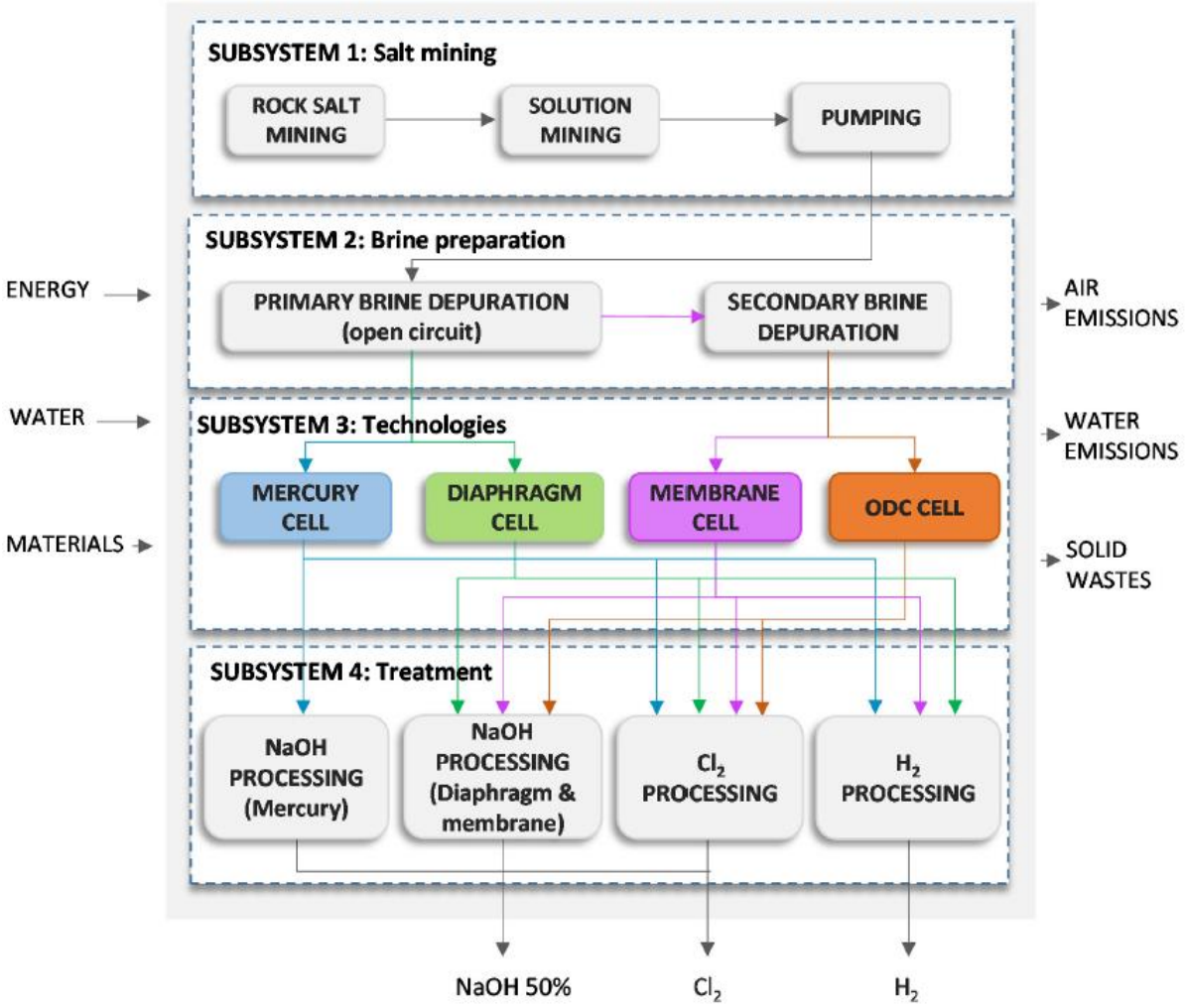


Figure 8: System boundaries for the chlor-alkali process (María et al., 2017)

4.2.1. Energy Sources

According to María et al., (2017), energy in the context of the chemical plant refers to the consumption of electricity, steam, diesel and natural gas, etc. For the purposes of this study, the assessment of energy will be based on the two main types of energy, namely, renewable energy and non-renewable energy. Renewable energy sources refer to all those limitless energy sources present in nature i.e., the Sun, the wind, the force of water, or the inner heat of the earth are all examples of renewable energy sources. These energy sources are present in nature and are naturally replenished in nature. Because of this reason they never get exhausted or never run out. Non-renewable energy on the other hand refers to sources of energy are those which cannot be renewed or replenished in nature, which means once it is used up or exhausted, it cannot be generated back. Coal, petroleum, natural gas, and uranium are all examples of non-renewable energy. These sources are often in use to generate electricity, fuel vehicles, and manufacture products. Most of these sources are fossil fuels.

Based on the preliminary information, the proposed chemical plant processes will use solar energy from a nearby solar plant by Symtech Solar under a wheeling agreement. It is understood that Symtech Solar is currently developing a 70 Megawatt (MW) solar plant close to the proposed Nuvest chemical plant site. As per the initial agreement between the applicant and Symtech Solar, it is proposed that the chemical plant will receive an initial 5 MW of energy from the solar plant and will be increased to 10MW by 2025.The advantages and disadvantages of energy types for the chemical plant processes are indicated in **Table 20**.

Table 20: Advantages and disadvantages different energy inputs for chemical plant process (*María et al., 2017).*

Advantages	Disadvantages
Renewable Energy	
Energy sources are environmentally friendly.	In the case of the proposed chemical plant, the use of renewable energy would be limited solar energy due to geographical and spatial constraints. Due to design constraints, installation of solar panels would be reduced due to the plant designs which could lead to insufficient production.
Energy source will not run out as the Symtech Solar plan will have a capacity of 70MW.	Establishing the 70MW plant by Symtech Solar will be expensive and may have high maintenance costs.
Safer for human health as solar plants don't generate toxic residues which are harmful to people.	
Non-Renewable Energy	
Electricity from coal is relatively cheap and readily available.	It is non-renewable and will eventually run out.
There will be sufficient supply for the plant processes.	It produces pollution, adding to the additional chemical plant emissions.

Based on the table above, the preferred renewable energy approach is much preferable as it is more environmental friendly and contributes towards cleaner energy.

4.2.2. Water Sources

The electrolysis process can use different water sources to produce hydrogen. Industrial water, which can include municipal water or groundwater, is the most common source of water used in electrolysis. Different from drinking water, industrial water is used in many different industries including smelting facilities, petroleum refineries, and industries producing food, paper, and chemicals. The water consumption rate for electrolysis is ~9kgH_2O/kgH_2, which may be expressed as 0.27t/MWh (LHV). However, irrespective of the source, the input water to an electrolyser stack must first be cleaned and deionised. Water use due to electrolysis should, however, not be viewed as a major water use process, because when green hydrogen is oxidised (by combustion or via a fuel cell) it yields the same amount of water as was originally electrolysed (María et al., 2017). Which may enter the atmosphere as water vapour or be condensed at the point of use and recovered as liquid water. It is the understanding of the EAP that NuVest will follow the common electrolysis process of using municipal water which may be recycled and reused as far as possible as the preferred method instead of abstracting freshwater from watercourses and release back into the atmosphere after a single use.

4.2.3. Input Materials

The proposed chemical plant will utilize salt, water and energy as raw materials as shown in (**Section 2.2**). Usually, the process is conducted on a brine (an aqueous solution of NaCl), in which case sodium hydroxide (NaOH), hydrogen, and chlorine result. When using calcium chloride or potassium chloride, the products contain calcium or potassium instead of sodium. Based on the preliminary project information, the proposed chemical plant will specialise in the manufacture of sodium hydroxide (NaOH), chlorine (Cl_2) and hydrogen (H_2) through the chlor-alkali process. Instead of the process concluding at the first phase with the production of NaOH, Cl_2 and H_2, these three (3) intermediate products will then be processed further to produce hydrochloric (HCl) acid, bleach (12 – 13% sodium hypochlorite solution) and caustic lye (47% solution in water). The is considered a waste reduction process and preferable as it generates a byproduct from a waste stream. The input materials will be fixed as there are no alternative chemical reactions (input materials) to produce the desired products. Therefore, input materials are fixed variables in the process.

4.3. No-Go Alternative

The “No Go” or “No Action” alternative refers to the alternative of not embarking on the proposed project at all. This alternative would imply that the current status quo without the proposed chemical plant. It is important to note that the No Go alternative is the baseline against which all other alternatives and the development proposal are assessed. When considering the No Go alternative, the impacts (both positive and negative) associated with any other specific alternative, or the current project proposal would not occur and in effect the impacts of the No Go alternative are therefore inadvertently assessed by assessing the other alternatives. In addition to the direct implications of retaining the status quo there are certain other indirect impacts, which may occur should the No Go alternative be followed. The No Go alternative as a specific alternative is not considered feasible for the reasons stated in **Table 21** below.

Table 21: Advantages and disadvantages of the No-Go alternative.

Advantages	Disadvantages
There will be lesser contribution air pollution in the area.	There will be no improvement to the local economy which is not aligning with the Midvaal IDP.
There will lesser contribution to environmental and health implications.	There will be no further job opportunities for the local community.
	The demand from industries and mines for more chemical products will not be met which may have indirect consequences on local and regional economy.
	The suppliers of raw materials will not be able to grow their business which would assist in job creation.
	The land will remain undeveloped which would be vulnerable to land grabbing as its common in the province.

5 STAKEHOLDER ENGAGEMENT

The Public Participation Process (PPP) is a requirement of several pieces of South African legislation and aims to ensure that all relevant Interested and Affected Parties (I&APs) are consulted, involved and their comments are considered, and a record included in the reports submitted to the Authorities. The process ensures that all stakeholders are provided this opportunity as part of a transparent process which allows for a robust and comprehensive environmental study. The PPP for the proposed project needs to be managed sensitively and according to best practises to ensure and promote:

- Compliance with international best practice options;
- Compliance with national legislation;
- Establishment and management of relationships with key stakeholder groups; and
- Involvement and participation in the environmental study and authorisation/approval process.

As such, the purpose of the PPP and stakeholder engagement process is to:

- Introduce the proposed project;
- Explain the authorisations required;
- Explain the environmental studies already completed and yet to be undertaken (where applicable);
- Solicit and record any issues, concerns, suggestions, and objections to the project;
- Provide opportunity for input and gathering of local knowledge;
- Establish and formalise lines of communication between the I&APs and the project team;
- Identify all significant issues for the project; and
- Identify possible mitigation measures or environmental management plans to minimise and/or prevent negative environmental impacts and maximize and/or promote positive environmental impacts associated with the project.

5.1. Pre-Consultation with the Competent Authority

A pre-application meeting with the competent authority (GDARD) was requested by the EAP on the 18th of August 2023. The competent authority confirmed on the 25th of August 2023 that a pre-application meeting is not necessary, and the application process can proceed to the Scoping Phase on. The purpose of the pre-consultation was to provide the authorities with background information of the proposed project, confirm NEMA EIA triggered listed activities, the process to be followed and plan of study for the EIA such as specialist studies.

5.2. General Approach to Public Participation

The PPP for the proposed project has been undertaken in accordance with the requirements of the NEMA EIA Regulations (2014), and in line with the principles of Integrated Environmental Management (IEM). IEM implies an open and transparent participatory process, whereby stakeholders and other I&APs are afforded an opportunity to comment on the project and have their views considered and included as part of project planning.

At the start of the application process, an initial I&AP database was compiled based on known key I&AP's (affected landowners, Organs of State, etc.), Windeed searches and other stakeholder databases. The I&AP database includes amongst others, landowners, communities, regulatory authorities and other special interest groups. The database will be continually updated as and when new I&AP's show interest in the application.

5.3. List of Pre-Identified Organs of State/ Key Stakeholders Identified and Notified

National, Provincial and Local Government Authorities as well as State Owned Entities (SOE's) were notified of the proposed project and include:

- Department of Forestry, Fisheries and the Environment;
- Gauteng Provincial Government;
- Gauteng Department of Agriculture and Rural Development;
- Midvaal Local Municipality;
- Sedibeng District Municipality;
- Department of Rural Development and Land Reform;
- Air Traffic Navigation Services;
- South African Civil Aviation Authority;
- South African National Road Agency;
- Chief Air Pollution Control Officer;
- South African Resource Heritage Agency;
- Gauteng Provincial Heritage Resources Agency; and
- Transnet SOC.

5.4. Initial Notification

The PPP commenced on 20 July 2023 with an initial notification and call to register for a period of 30 days. The initial notification was undertaken in accordance with the Chapter 6 of the NEMA EIA Regulations and was given in the following manner:

5.4.1. Registered Letters, Faxes and Emails

Notification letters, faxes, and emails were distributed to all pre-identified I&APs including government organisations, NGOs, relevant municipalities, ward councillors, landowners and other organisations that might be interested or affected.

The notification letters included the following information to I&APs:

- The purpose of the proposed project;
- High level list of anticipated activities to be authorised;
- Scale and extent of activities to be authorised;
- Information on the intended production operation to enable I&APs to assess/surmise what impact the activities will have on them or on the use of their land;
- Details of the affected properties (including details of where a locality map and other information could be obtained including a Background Information Document (BID) in the 3 languages);
- Summary of the relevant legislation pertaining to the application process;
- Initial registration period timeframes; and

- Contact details of the EAP.

5.4.2. Newspaper Advertisements / Government Gazette

Advertisements describing the proposed project and EIA process was published in The Ster North Newspaper with circulation in the vicinity of the study area. The advertisement was placed in the Newspaper in English on the 29th of August 2023. The newspaper advert included the following information:

- Project name;
- Applicant name;
- Project location;
- Nature of the activity and application;
- Where additional information could be obtained; and
- Relevant EIMS contact person and contact details for the project.

5.4.3. Site Notice Placement

A1 Correx board site notices in English, Afrikaans and Sesotho and were placed at four (4) locations within and around the application area on the 20 July 2023. The on-site notices included the following information:

- Project name;
- Applicant name;
- Project location and alternatives;
- Map of proposed project area;
- Project description;
- Legislative requirements; and
- Relevant EIMS contact person and contact details for the project.

5.4.4. Poster Placement

A3 posters in English, Afrikaans and Sesotho were placed at local public gathering places in Meyerton (Midvaal Local Municipality) and Daleside (Randvaal Public Library). The notices and posters afforded I&APs who may be interested in the project with the opportunity to register for the project as well as to submit any issues/queries/concerns and indicate the contact details of any other potential I&APs that should be contacted. The contact person at EIMS and contact details were stated on the posters. Comments/concerns and queries were encouraged to be submitted in either of the following manners:

- Electronically (fax, email);
- Telephonically; and/or
- Written letters (postal).

5.5. Availability of Scoping Report

Notification regarding the availability of this Scoping Report for public review will be given in the following manner to all registered I&APs:

- Registered letters with details on where the scoping report can be obtained and/or reviewed, public meeting date and time, EIMS contact details as well as the public review comment period;
- Facsimile notifications with information similar to that in the registered letter described above; and/or
- Email notifications with a letter attachment containing the information described above.

The scoping report will be available for public review from 08 September 2023 to 09 October 2023 for a period of at least 30 days.

5.6. Public Participation Progress

Comments raised to date have been addressed in a transparent manner and included in the Public Participation Report (**Appendix 4**). To date, summary of comments received are as follows:

- Requests to register as I&AP;
- Requests for title deed of the property;
- Inquiry of potential impacts on state structures;
- Request for locality maps and coordinates; and
- Confirmation from stakeholders that they are not affected by the proposed project.

All comments that will be received during the review of the Draft Scoping Report will be captured and responded to through a Comments and Response Report that will be included in the report. Comments received to date have been included in this report. All I&APs registered on the Project database will be informed of the availability of the Draft Scoping Report for public review. I&APs will be provided with another opportunity to submit their comments during the Environmental Impact Assessment (EIA) Phase of the project. Refer to see **Appendix 5** for all Public Participation related documents**.**

5.7. Review of the Scoping Report by Competent Authorities

GDARD as the competent Authority for the listed activity must, within 43 days of receipt of the Final Scoping Report that has been subjected to 30 days of public review as a Draft Report, accept the Final Scoping Report and Plan of Study for EIA in writing should no amendments be required, or shortcomings be identified therein. Upon acceptance of the Scoping Report, the Environmental Assessment Practitioner (EAP) may then proceed with the tasks contemplated in the Plan of Study for EIA.

The authority can also reject the Scoping Report for not following legislative procedure if any of the required steps were not undertaken. In terms of Regulation 22 (b) of Government Notice R. 982, the Scoping Report may be amended and resubmitted by the EAP should it be rejected. On receipt of the amended Scoping Report and Plan of Study for EIA, the competent authority will then reconsider the application. Should the Scoping Report be approved, the amended Scoping Report will then be made available for public review and comment prior to submission to the Competent Authority.

The authority may also advise the EAP of matters that may hinder the success of the EIA application or matters that may prejudice the success of the application.

5.8. Public Participation Process for EIA Phase

The Public Participation Process (PPP) will be documented and included in the Environmental Impact Report (EIR). The PPP will be undertaken in accordance with the Plan of Study for EIA. The project I&APs will be updated on all project developments throughout the EIA Phase. A summary of comments received from the registered I&APs, the date of their receipt and responses of the EAP to those comments will be provided in the Comments and Response Report that will be updated during all project phases. All copies of any representations, objections and comments received will also be submitted to the competent authority together with the EIR.

5.9. Appeal Period

After a decision has been reached by GDARD, Chapter 2 of the National Appeal Regulations 2014 makes provision for any affected person to appeal against the decision. Within 20 days of being notified of the decision by the competent authority, the appellant must submit the appeal to the appeal administrator. An appeal panel may

be appointed at the discretion of the delegated or organ of state to handle the case and it would then submit its recommendations to that organ of state for a final decision on the appeal to be reached. EIMS will communicate the decision of the Provincial Authority and the way appeals should be submitted to the Minister and to all I&APs as soon as reasonably possible after the final decision has been received.

6 ENVIRONMENTAL ATTRIBUTES AND BASELINE ENVIRONMENT

A baseline assessment of the receiving environment upon which an activity or development is proposed is an important aspect of the EIA process as it provides a description of the current status and trends in environmental factors of a proposed project against which predicted changes can be compared and evaluated, as well as baseline information against which the potential impacts can be monitored. The baseline environmental attributes include biophysical, socio economic, and cultural aspects of a project area, which are presented below for the proposed study area.

6.1. General Site Conditions

The proposed chemical plant development is situated in Meyerton within an area consisting mainly of built-up areas (urban residential, urban informal and urban industrial), cultivated land and grassland. Waterbodies, wetlands, mines and quarries and forested land are also located in the extended surrounding areas. The larger area surrounding the proposed plant is classified as rural in nature. The site has been transformed with vegetation reduced to a few Eucalyptus trees and Wattle trees noted along border of property which the developer proposes to remove and pave a road along the site boundary (**Figure 9**). There are few dilapidated remnants of building structures which the developer (NuVest) is intending to demolish (**Figure 10**). Some of the active activities within the proposed development area include a newly administration building (under construction) for NuVest Chemicals (**Figure 11**). The site also consists of bunded warehouses with various chemical of finished products i.e., bleach stored in chemical containers and stacked on wooden pallets (**Figure 12**).

Figure 9: Disturbed vegetation on site

Figure 10: Dilapidated buildings to be demolished

Figure 11: Administration building under construction

Figure 12: Bunded warehouse with chemicals stored in containers

6.2. Topography

The topography surrounding the proposed chemical plant is shown in **Figure 13** below. Surrounding elevations range from approximately 1 416 – 1 912m above sea level. The project site is situated approximately 1 512 m above sea level with increasing elevation towards the north-west and south-east.

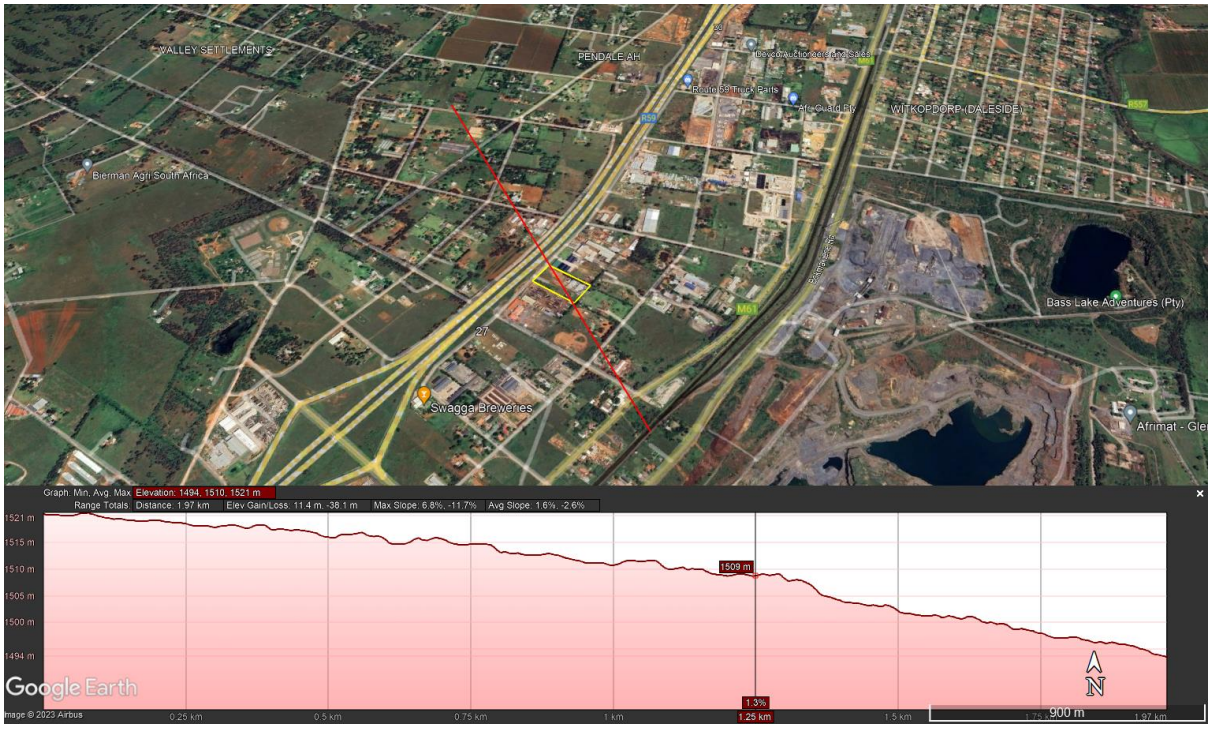


Figure 13: General topography of the study area

6.3. Surface Water Conditions

The South Africa is divided into nineteen (19) Water Management Areas (WMAs). The delegation of water resource management from central government to catchment level is achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA progressively develops a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA. This is to ensure that on a regional scale, water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The main instrument that guides and governs the activities of a WMA is the CMS which, while conforming to relevant legislation and national strategies, provides detailed arrangements for the protection, use, development, conservation, management and control of the region's water resources. According to the DWS water management areas delineations, the proposed NuVest chemical plant is situated in the quaternary catchment C22E, primary catchment (C, Vaal) and the resource management falls under the Breede-Gouritz catchment area (WMA8) which spans large portions of the Gauteng.

The SSV found that the study area is not located within the 100m nor 500m regulated areas for a rivers and wetlands respectively. The watercourse is Bass Lake located approximately 1.2km east of the site and the closest river is the Klipriver which is located approximately 2km east of the proposed development. In addition, the study area does not fall within a strategic water source area. Furthermore, study area is not located within The National Freshwater Ecosystem Priority Areas nor the South African Inventory of Inland Aquatic Ecosystems. It is there anticipated that there will be low negative impacts on surface water.

6.4. Groundwater Conditions

Groundwater refers to subsurface water that fills all the pore spaces of soils and geologic formations below the surface through a process whereby the precipitation or surface water gradually infiltrates the ground. Groundwater plays a substantial role in water supply, in ecosystem functioning and human well-being. Worldwide, 2.5 billion people depend solely on groundwater resources to satisfy their basic daily water needs, and hundreds of millions of farmers rely on groundwater to sustain their livelihoods and contribute to the food security of others (Kemper, 2004). Based on the Midvaal Spatial Development Framework 2022-2027, groundwater within the municipality is mainly used for irrigation purposes. There are large quantities of groundwater present in the north but concerns about the development of sinkholes in the dolomite areas place constraints on its utilisation. The main rivers in the region – most notably the Klip, Riet and Suikerbos rivers– flow into the Vaal River but are polluted and used mainly for crop irrigation. The main risk on groundwater from the proposed development would be in the case of a large spill entering the groundwater system and contaminating the water. This would largely impact the agricultural fields near the site as there is little indication of groundwater being used for household purposes. The risk of groundwater pollution can be easily mitigated through the establishment of fully bunded production and storage chemical facilities.

6.5. Climate

In Meyerton, the summers are long, warm, and partly cloudy and the winters are short, cold, dry, and clear. Over the course of the year, the temperature typically varies from 1°C to 28°C and is rarely below -3°C or above 31°C. The warm season lasts for 5.4 months, from October 4th to March 15th, with an average daily high temperature above 26°C. The hottest month of the year in Meyerton is January, with an average high of 27°C and low of 16°C. The cool season lasts for 2.2 months, from May 28th to August 3rd, with an average daily high temperature below 20°C. The coldest month of the year in Meyerton is July, with an average low of 1°C and high of 18°C. The general temperatures in Meyerton are indicated in **Figure 14**. It can be assumed that the development of the chemical plant will add to the local climate change conditions. The extent and impact on climate change based on the proposed process is anticipated to be low negative.

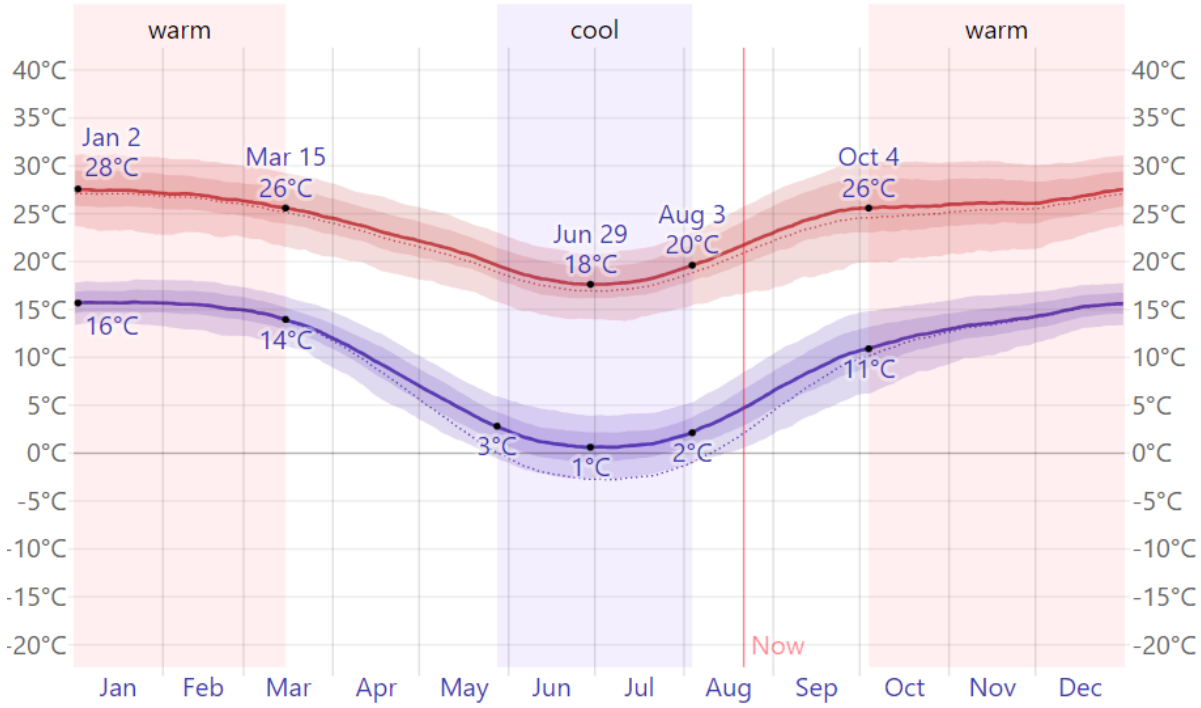


Figure 14: Average High and Low Temperature in Meyerton (Weatherspark, 2023)

A wet day is one with at least 1 mm of liquid or liquid-equivalent precipitation. The chance of wet days in Meyerton varies very significantly throughout the year. The wetter season lasts 5.5 months, from October 15th to March 29th, with a greater than 27% chance of a given day being a wet day. The month with the most wet days in Meyerton is December, with an average of 15.7 days with at least 1 mm of precipitation. The drier season lasts 6.5 months, from March 29th to October 15th. The month with the fewest wet days in Meyerton is July, with an average of 0.5 days with at least 1 mm of precipitation. The rainy period of the year lasts for 8.3 months, from September 6th to May 16th, with a sliding 31-day rainfall of at least 13 mm. The month with the most rain in Meyerton is January, with an average rainfall of 92 mm. The rainless period of the year lasts for 3.7 months, from May 16th to September 6th. The month with the least rain in Meyerton is July, with an average rainfall of 2 mm as indicated in **Figure 15**.

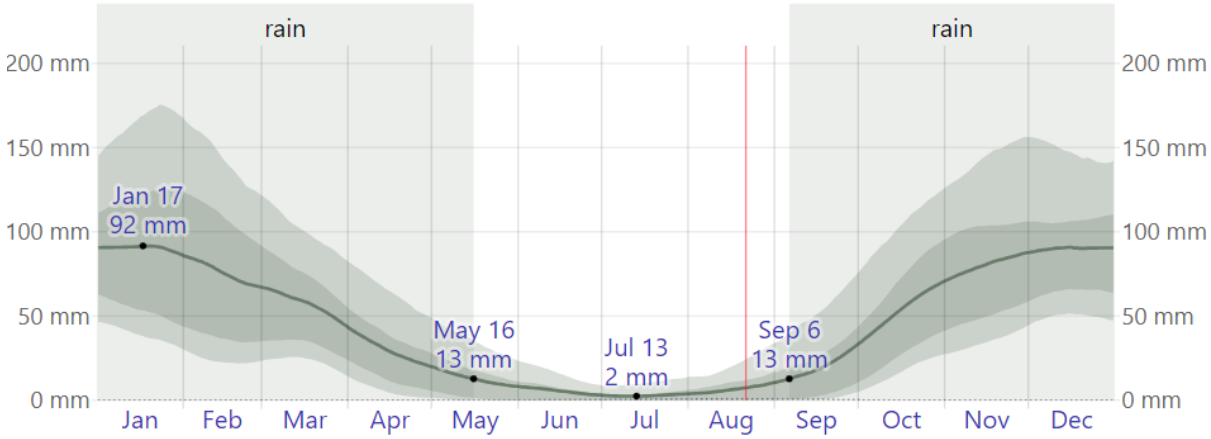


Figure 15: Average Monthly Rainfall in Meyerton (Weatherspark, 2023)

6.6. Socio-Economic Environment

According to the National Environmental Management Act (NEMA, 1998) environment refers to the surroundings in which humans exist. When viewing the environment from a socio-economic perspective the question can be asked what exactly the social environment is. Different definitions for social environment exist, but a clear and comprehensive definition that is widely accepted remains elusive. Barnett & Casper (2001) offers the following definition of human social environment:

"Human social environments encompass the immediate physical surroundings, social relationships, and cultural milieus within which defined groups of people function and interact. Components of the social environment include built infrastructure; industrial and occupational structure; labour markets; social and economic processes; wealth; social, human, and health services; power relations; government; race relations; social inequality; cultural practices; the arts; religious institutions and practices; and beliefs about place and community. The social environment subsumes many aspects of the physical environment, given that contemporary landscapes, water resources, and other natural resources have been at least partially configured by human social processes. Embedded within contemporary social environments are historical social and power relations that have become institutionalized over time. Social environments can be experienced at multiple scales, often simultaneously, including households, kin networks, neighbourhoods, towns and cities, and regions. Social environments are dynamic and change over time as the result of both internal and external forces. There are relationships of dependency among the social environments of different local areas, because these areas are connected through larger regional, national, and international social and economic processes and power relations."

Environment-behaviour relationships are interrelationships (Bell, Fisher, Baum & Greene, 1996). The environment influences and constrains the behaviour of people, but behaviour also leads to changes in the environment. The impacts of a project on people can only be truly understood if their environmental context is understood. The baseline description of the social environment will include a description of the area within a

provincial, district and local context that will focus on the identity and history of the area as well as a description of the population of the area based on a number of demographic, social and economic variables.

6.6.1. Description of the Area

The proposed chemical plant is located on 110 Batoliet Road in Meyerton, Gauteng Province. Meyerton is a small town lying 18 km north of Vereeniging in Gauteng. It is situated in the Midvaal Local Municipality in the Sedibeng District Municipality. Essentially a rural area, Meyerton is a little town that lies south of Johannesburg falling into an area known as the Vaal Triangle - a roughly triangular locale bounded by Vereeniging, Vanderbijlpark and Sasolburg - although Meyerton, which lies just north of Vereeniging, is included in this area. Together they form a substantial urban region that straddles the Vaal River and is home to some major industry - Sasol and ISCOR's. The proposed chemical plant is situated within Midvaal Ward 5 which has an area of roughly 110.7 km^2. Refer to **Figure 1** for the site's relative locality map.

6.6.2. Sedibeng District Municipality

The Sedibeng District Municipality is a Category C municipality situated on the southern tip of the Gauteng Province and strategically located on the border of three other provinces, namely Free State, North West and Mpumalanga. The municipality is the only area in the province that is situated on the banks of the Vaal River and Vaal Dam, covering the area formerly known as the Vaal Triangle. The municipality is a stone's throw from Johannesburg along the scenic Vaal, Klip and Suikerbos Rivers. It is comprised of the Emfuleni, Lesedi and Midvaal Local Municipalities, and includes the historic townships of Evaton, Sebokeng, Boipatong, Bophelong, Sharpeville and Ratanda, which have a rich political history and heritage.

It has a variety of attractions offering a vast cultural heritage and historical experience including, among others, the political breakthroughs that led to the country's political turnabout. The Sedibeng region boasts several Heritage Sites related to the South African War of 1899-1902 and the two World Wars that followed. The Sharpeville Memorial Precinct stands as a reminder of the Sharpeville Massacre of 21 March 1960, when 69 people lost their lives while protesting the pass laws of the then apartheid South Africa.

Sedibeng is the fourth-largest contributor to the Gauteng economy. The predominant economic sector in the district is the manufacturing of fabricated metal and chemicals. In the metal sector, the Arcelor-Mittal Steel plant, the Cape Gate Davsteel Wire and Steel plant, and the Ferromanganese plant of Samancor are the three main large baseline plants in the district, while DCD Dorbyl Heavy Engineering is the biggest manufacturer of engineered products in Southern Africa. The well-developed national road network that cuts across the district to all the provinces ensures that the region remains the industrial centre of the Gauteng Province. The municipality is 40km away from Johannesburg and 80km away from Pretoria, without the high traffic volumes.

6.6.3. Midvaal Local Municipality

The Midvaal Local Municipality is a Category B municipality situated within the Sedibeng District in the south of the Gauteng Province. The City of Ekurhuleni and City of Johannesburg Metropolitan Municipalities are situated to the north. It is bordered by the Free State Province to the south and the Mpumalanga Province to the east. It is the biggest municipality of three in the district, making up almost half of its geographical area, covering an area of approximately 1 723 km².

The spatial structure of the Midvaal municipal area is predominantly that of a rural area, with extensive farming. There are two significant natural features impacting on the physical structure, namely the Suikerbosrand Nature Reserve and the Vaal River, which form the southern boundary of the municipality and the Gauteng Province. Secondary natural features that play a significant role in the development dynamics of the area are the Klip River, Suikerbosrand River and the Vaal Dam.

Based on the latest Census data (Municipal Elections 2016), Midvaal had only a small population size of a little over 6 000 people. The main economic sectors within the municipality are; Manufacturing (25.1%), community

services (22.5%), finance (20.4%), trade (11.4%), transport (6.1%), electricity (5.7%), construction (5.7%), and agriculture (2.6%).

6.6.4. Description of Population

The baseline description of the population will take place on three levels, namely provincial, district and local. Impacts can only truly be comprehended by understanding the differences and similarities between the different levels. The baseline description will focus on the Midvaal Local Municipality in the Sedibeng District Municipality in the Gauteng Province (referred to in the text as the study area), as these are the areas that will be most affected by the proposed project. Where possible, the data will be reviewed on a ward 5 of the Midvaal Local Municipality. The data used for the socio-economic description was sourced from Census 2016. Census 2016 was a de facto census (a census in which people are enumerated according to where they stay on census night). The results should be viewed as indicative of the population characteristics in the area and should not be interpreted as absolute.

The following points regarding Census 2016 must be kept in mind (www.statssa.gov.za):

- Comparisons of the results of labour market indicators in the post-apartheid population censuses over time have been a cause for concern. Improvements to key questions over the years mean that the labour market outcomes based on the post-apartheid censuses must be analysed with caution. The differences in the results over the years may be partly attributable to improvements in the questionnaire since 1996 rather than to actual developments in the labour market. The numbers published for the 1996, 2001, 2007, 2011 and 2016 censuses are therefore not comparable over time and are different from those published by Statistics South Africa in the surveys designed specifically for capturing official labour market results.
- For purposes of comparison over the period 1996–2016, certain categories of answers to questions in the censuses of 1996, 2001, 2007, 2011 and 2016 have either been merged or separated.
- The tenure status question for 1996 has been dropped since the question asked was totally unrelated to that asked thereafter. Comparisons for 2001 and 2011 do however remain.
- All household variables are controlled for housing units only and hence exclude all collective living arrangements as well as transient populations.
- When making comparisons of any indicator it must be considered that the time period between the censuses is five years. Although Census captures information at one given point in time, the period available for an indicator to change is different.

6.6.5. Population and Household Sizes

According to the Community Survey 2016, the population of South Africa was approximately 55,7 million and has shown an increase of about 7.5% since 2011. The household density for the country is estimated on approximately 3.29 people per household, indicating an average household size of 3-4 people (leaning towards 3) for most households, which is down from the 2011 average household size of 3.58 people per household. Smaller household sizes are in general associated with higher levels of urbanisation.

The greatest increase in population since 2011 has been on local level (**Table 22**), but still lower than the national average. Population density refers to the number of people per square kilometre and the population density on a national level has increased from 42.45 people per km^2 in 2011 to 45.63 people per km^2 in 2016. In the study area the population density has increased since 2011 with the highest density in the Midvaal Local Municipality.

Table 22: Population density and growth estimates (sources: Census 2011, Community Survey 2016)

Area	Size in km^2	Population 2011	Population 2016	Population density 2011	Population density 2016	Growth in population (%)

Gauteng Province	18 182.5	12 272 263	13 399 724	674.9	737.0	8.4
Sedibeng DM	4 206.5	916 483	957 529	217.9	227.6	4.3
Midvaal LM	1 725.6	95 300	111 612	55.2	1 725.6	14.6

The number of households in the study area has increased on levels (**Table 23**). The proportionate increase in households were greater than the increase in population on all levels and exceeded the growth in households of 12.3% on a national level. The average household size has shown a slight decreaseon, which means there are more households, but with less members.

Table 23: Household sizes and growth estimates (sources: Census 2011, Community Survey 2016)

Area	Households 2011	Households 2016	Average household size 2011	Average household size 2016	Growth in households (%)
Gauteng Province	4 162 491	4 951 135	3.1	2.9	15.9
Sedibeng DM	288 436	330 826	3.1	2.9	12.8
Midvaal LM	30 934	38 046	3.0	2.9	18.7

The total dependency ratio is used to measure the pressure on the productive population and refer to the proportion of dependents per 100 working-age population. As the ratio increases, there may be an increased burden on the productive part of the population to maintain the upbringing and pensions of the economically dependent. A high dependency ratio can cause serious problems for a country as the largest proportion of a government's expenditure is on health, social grants and education that are most used by the old and young population.

The total dependency ratio in the Midvaal LM (44%) is lower than district (47%) and provincial level (49%) as indicated in **Table 24**. Employed dependency ratio refers to the proportion of people dependent on the people who are employed, and not only those of working age. The employed dependency ratio for the Midvaal LM is higher than on district level, but lower than provincial level. This suggests intermediate levels of poverty in the Midvaal Local Municipality area.

Table 24: Total dependency ratio estimates (sources: Census 2011, Community Survey 2016)

Area	Total dependency	Youth dependency	Aged dependency	Employed dependency
Gauteng Province	49%	30.1%	5.6%	64.3%
Sedibeng DM	47%	31.8%	6.3%	61.8%
Midvaal LM	44%	29.1%	8.1%	62.8%

Poverty is a complex issue that manifests itself in economic, social and political ways and to define poverty by a unidimensional measure such as income or expenditure would be an oversimplification of the matter. Poor people themselves describe their experience of poverty as multidimensional. The South African Multidimensional Poverty Index (SAMPI) (Statistics South Africa, 2014) assess poverty on the dimensions of health, education, standard of living and economic activity using the indicators child mortality, years of schooling, school attendance, fuel for heating, lighting and cooking, water access, sanitation, dwelling type, asset ownership and unemployment.

The poverty headcount refers to the proportion of households that can be defined as multi-dimensionally poor by using the SAMPI's poverty cut-offs (Statistics South Africa, 2014). The poverty headcount has decreased on all levels since 2011 (**Table 25**), indicating a decreased in the number of multi-dimensionally poor households. The intensity of poverty experienced refers to the average proportion of indicators in which poor households are deprived (Statistics South Africa, 2014). The intensity of poverty has decreased only on local municipality level.

Table 25: Poverty and SAMPI scores (sources: Census 2011 and Community Survey 2016)

Area	Poverty headcount 2011 (%)	Poverty intensity 2011 (%)	Poverty headcount 2016 (%)	Poverty intensity 2016 (%)
Gauteng Province	4.8	43.8	4.6	44.1
Sedibeng DM	3.9	42.5	3.5	42.9
Midvaal LM	6.5	44.1	5.1	42.2

6.6.6. Population Composition, Age, Gender and Home Language

In all the areas under investigation, the majority of the population belongs to the Black population group, but the proportions differ. Based on the population characteristics of the area, the Black – African group is the dominant group in all four spheres of analysis as indicated in **Table 26**. The White population group also shares a significant amount of the population structure, followed by the Coloured and lastly the Indian / Asian groups.

Table 26: Population groups of the area (sources: Census 2011 and Community Survey 2016)

Area	Black African	Coloured	Indian or Asian	White	Other
Gauteng Province	10,770,177	443,289	357,409	1,828,849	84,527
Sedibeng DM	773,736	12,389	9,651	161,753	4,236
Midvaal LM	59,781	2,063	1,385	48,383	-
Ward 5	3,200	155	42	2,862	54

Within the Midvaal Ward 5 area, the median age is 33 years which slightly higher than the Midvaal Local Municipality (31 years) as indicated in **Figure 16**. This is about 25 percent higher than the figure in Sedibeng District Municipality (27 years) and about 20 percent higher than the figure in Gauteng (28 years). Majority of the population within the ward is made up of the working class (18 – 64 years) contributing just under 70% of the entire population. Therefore, the ward could be considered as an economically active / driven population.

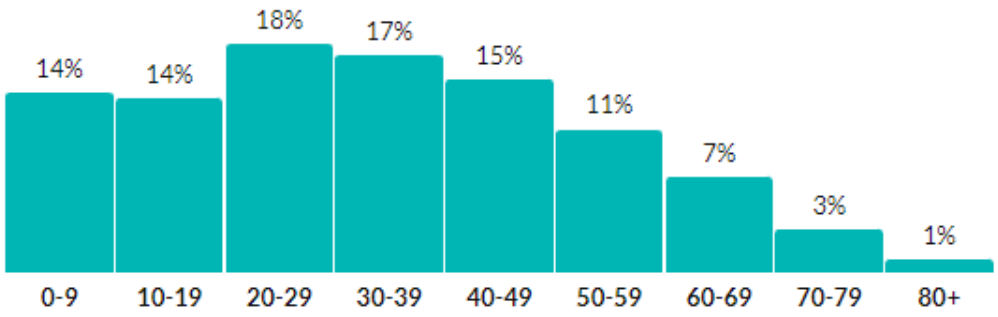


Figure 16: Age distribution in Midvaal ward 5 (Source: Census 2011)

6.6.7. Gender

The gender distribution on provincial, district and local level is balanced (**Figure 17**). Even at ward level (55% male and 45% female), there is no significant imbalance of gender distribution.

Figure 17: Gender distribution in Local Municipal (A), District (B) and Provincial (C) levels (Source: Community Survey 2016)

6.6.8. Language

The three most common languages in the study area in Sesotho, Afrikaans and English as indicated in **Figure 18**. Home language should be taken into consideration when communicating with the local communities and based on the profile of the area communication should take place in Sesotho, Afrikaans and English. As such, the public participation documents were made available in the abovementioned languages.

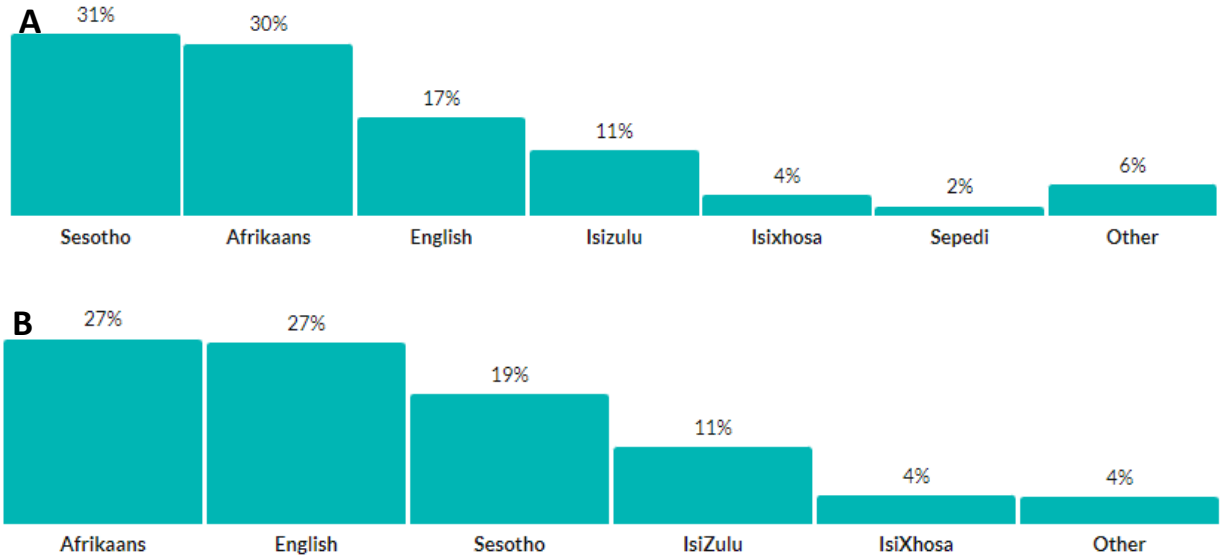


Figure 18: Population by language most spoken at home at Local Municipality (A) and Ward (B) levels (Source: Community Survey 2016)

6.6.9. Education

Figure 19 shows the education profiles for the areas under investigation for those aged 20 years or older. 79% Completed Grade 9 or higher a little higher than the rate in Sedibeng (75.51%) about the same as the rate in Gauteng (78.66%). Over 52% completed Matric or higher, about 10 percent higher than the rate in Sedibeng (47.27%) and about the same as the rate in Gauteng: 52.43%. It can be concluded that the general population within the region is educated which could also be linked to the general good employment rate in the area.

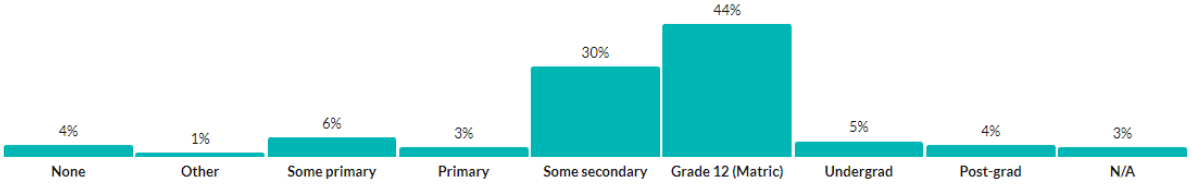


Figure 19: Population by education levels within Midvaal Local Municipality (Source: Community Survey 2016)

6.6.10. Employment

Employment Rate in South Africa averaged 42.28 percent from 2000 until 2023, reaching an all-time high of 46.17% in the fourth quarter of 2008 and a record low of 35.93% in the third quarter of 2021. Based on Community Survey Data (2016), the Midvaal Local Municipality had an employment rate of 55.6% (**Table 27**), about 1.3 times the rate in Sedibeng (42.59%) and about 10 percent higher than the rate in Gauteng (50.59%). In Midvaal Ward 5, 62% of the population was employed, which about 1.5 times the rate in Sedibeng and about 25 percent higher than the rate in Gauteng. The additional job opportunities which will emanate from the development of the proposed chemical plant will further add to the overall acceptable employment rate at local and regional levels.

Table 27: Population by Employment Rate (source: Community Survey 2016)

	Midvaal		Sedibeng		Gauteng	
	%	Number	%	Number	%	Number
Discouraged work-seeker	2.9%	1,939	3.9%	24,972	3.4%	296,450
Employed	55.6%	37,336	42.6%	271,398	50.6%	4,467,370
Other not economically active	28.7%	19,287	33.5%	213,634	28%	2,468,859
Unemployed	12.8%	8,620	20%	127,217	18.1%	1,598,044
Unspecified	0%	0	0%	0	0%	0

Most of the employed people in the areas under investigation work in the formal sector with only 10% recorded to be working within the informal sector.

6.6.11. Household Income

Household income is a measure of the combined incomes of all people sharing a particular household or place of residence. It includes every form of income, e.g., salaries and wages, retirement income, near cash government transfers like food stamps, and investment gains. In 2016, there were 38 046 households within Midvaal Local Municipality which is about 10% of the figure in Sedibeng (330 826) and less than 10% of the figure in Gauteng (4 951 135) as indicated in **Figure 20**. A little over 70% of the households were formal houses with only 17% recorded as informal dwelling structures. The average household income was just under R 30 000 which is about the same as the amount in Sedibeng and Gauteng (R29 400).

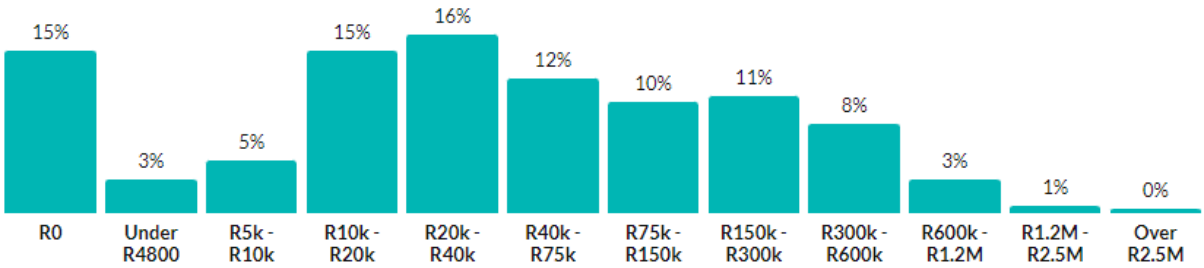


Figure 20: Distribution of household income within Midvaal Local Municipality (Source: Community Survey 2016)

6.6.12. Service Delivery

Effective and reliable service delivery is one of the biggest challenges South Africa faces. This is largely due to the municipalities across the country not having the required resources to fulfil the delivery of basic services to communities within which they operate. By lacking in resources, it derails economic development and growth

opportunities in poor communities. Access to piped water, electricity and sanitation relate to the domain of Living Environment Deprivation as identified by Noble et al., (2006).

As South Africa is a water scarce country, water supply is a significant factor to consider in any development for the construction as well as the operational phase of the project. Based on the Community Survey data (2016), 76% of the Midvaal residents were obtaining water from a regional or local service provider (**Figure 21**). In comparison, it was about 80% of the rate in Sedibeng (94.67%) and Gauteng (96.8%). The main water source was via a piped water supply inside house with 67% and the least was from a public or communal tap.

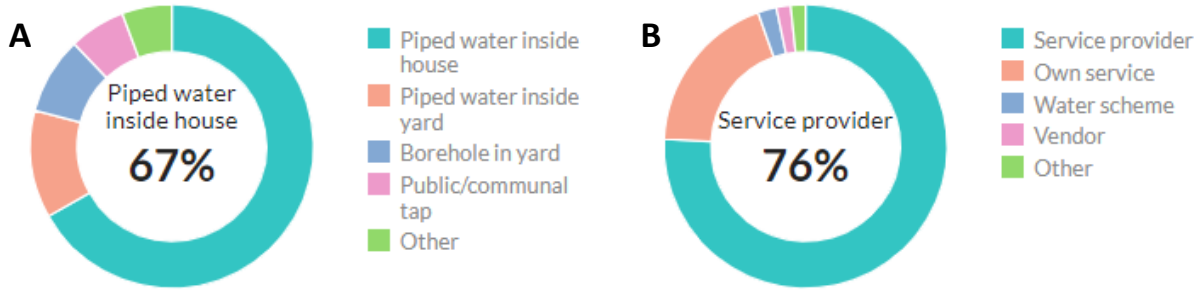


Figure 21: Population by water source (A) and Population by water supplier (B) within Midvaal Local Municipality (Source: Community Survey 2016)

The proposed chemical plant will largely rely on electricity for the electrolysis process. In South Africa, approximately 85% or 42,000MW, of the nation's electricity is generated via coal-fired power station which is mainly transmitted to municipalities and distributed to various locations. According to the Community Survey data (2016), 12.6% of the Midvaal Local Municipality population had no access to electricity which is more than double the rate in Sedibeng (4.39%) and more than 1.5 times the rate in Gauteng (7.36%). Only 44% of the Midvaal region had access to standard in-house pre-paid electrical supply as indicated in **Table 28**.

Table 28: Population by electricity access (source: Community Survey 2016)

	Midvaal		Sedibeng		Gauteng	
	%	Number	%	Number	%	Number
In-house prepaid meter	43.7%	48,719	71.9%	688,574	61.3%	8,218,956
In-house conventional meter	38.2%	42,609	20.3%	193,906	27.6%	3,700,356
No access to electricity	12.6%	14,096	4.4%	42,068	7.4%	986,533
Other source (not paying for)	4%	4,457	1.5%	13,883	2%	261,604
Other	1.6%	1,731	2%	19,097	1.7%	232,274

Access to proper sanitation is a battle South Africa faces daily, with disadvantaged and impoverished areas being affected the most. Water and sanitation are basic human rights but may feel like luxuries to those who need them most, and the great inequality regarding accessing water cannot be ignored. Besides the obvious yet important reasons such as good health, clean water and sanitation can also help in improving the economy. To promote socio-economic development, especially in rural areas, the government is required to effectively provide and manage water and sanitation. According to the Community Survey (2016), within Midvaal Local Municipality, 88% (98 244) of the population had access to flush or chemical toilets (**Figure 22**). In comparison, the Midvaal Local Municipality figures were a little less than the rate in Sedibeng (93%) and about the same as the rate in Gauteng (88%). The proposed chemical plant will have toilet facilities for the employees and can easily connect to the existing municipal sewage facilities.

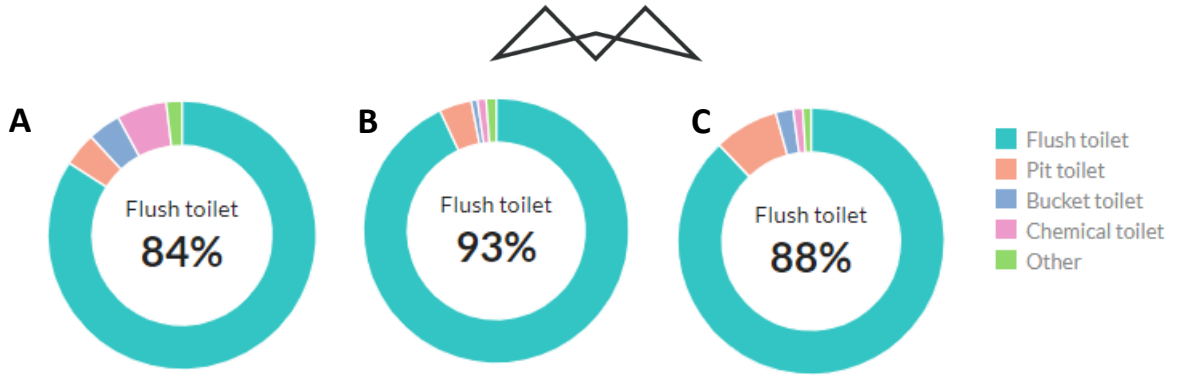


Figure 22: Population by toilet facilities in Midvaal Local Municipality (A) Sedibeng District Municipality (B) and Gauteng province (C) (Source: Community Survey 2016)

Waste as per the NEMWA Act refers to any substance, material or object, that is unwanted, rejected, abandoned, discarded or disposed of, or that is intended or required to be discarded or disposed of, by the holder of that substance, material or object, whether or not such substance, material or object can be re-used, recycled or recovered. According to the Community Survey (2016), within Midvaal Local Municipality, 84.1% (93 903) of the population were receiving refuse disposal from a local authority, private company or community members which is about 90% of the rate in Sedibeng (90.14%) or 863,154 and a little less than the rate in Gauteng (88.07%) or 11,801,665. Refer to **Table 29** for the access to refuse services within the area.

Table 29: Population by refuse disposal (source: Community Survey 2016)

	Midvaal		Sedibeng		Gauteng	
	%	Number	%	Number	%	Number
Service provider (regularly)	82.5%	92,081	87.9%	841,712	85.2%	11,413,499
Communal dump	8.9%	9,944	2.1%	20,275	3%	405,783
Own dump	5.9%	6,589	4.9%	47,106	4.1%	550,438
Service provider (not regularly)	1.6%	1,822	2.2%	21,442	2.9%	388,166
Other	1.1%	1,175	2.8%	26,994	4.8%	641,839

General waste in South Africa is usually managed by municipalities. In the case of developments, the developer is expected to appoint registered service providers to manage the Waste Management Service - collection, transportation and safe disposal of all waste streams associated with the development. It is anticipated that the proposed development of the chemical plant will not produce excessive waste and the generation of waste will largely be during the construction phase. The waste generated on site and associated with the development must be managed accordingly and disposed at a registered facility.

6.7. Cultural and Heritage Resources

The objective of the National Heritage Resources Act, 1999 (Act No. 25 of 1999) is to introduce an integrated system for the management of national heritage resources. The Act defines a 'heritage resource' as any place or object of cultural significance (aesthetic, architectural, historical, scientific, social, spiritual, linguistic, or technological value or significance). The identification, evaluation and assessment of any cultural heritage site, artefact or find in South Africa is required by this Act. This section of the report presents the heritage status of the proposed NuVest chemical plant in the Meyerton area. During the Site Sensitivity Verification (SSV), no potential heritage resources and/or places of cultural significance were noted within the study area. These would be heritage resources governed under Sections such as Section 34 (for resources such as buildings older than 60 years old) and Section 36 (for cemeteries and graves).

According to the DFFE Screening Tool Report, the project area has a *Low* Relative Archaeological and Cultural Heritage Theme Sensitivity. The SSV found that there are no archaeological or physical cultural features within the proposed development footprint. There are no anticipated conflicts between archaeological or physical cultural features during the construction of the proposed chemical plant and that considering the very low

archaeological and cultural heritage sensitivity of the area, no further archaeological and cultural heritage studies, ground truthing and/or permits (Phase II) are required pending the discovery of any archaeological or cultural heritage features during the construction phase.

6.8. Geological Conditions

The area north of Meyerton is dominated by rocks of the Transvaal Quartzites (Nieuwoudt and De Villiers, 1988) and Transvaal Carbonates (Eriksson and Altermann, 1998) with large areas of dolomite occurring as lenses (such as at Glen Douglas Mine) or rafts within the competent quartzites. According to the Council for Geoscience, (Keyser, Botha and Groenwald, 1986) the area south of Daleside has a lens of dolomitic limestone, situated as a raft of which to the west is the ferruginous shales of the Timeball Hill Formation, of the Pretoria Subgroup. To the east of this lens is the dolomite of the Malmani dolomites of the Chuniespoort Subgroup, occurring as a thin lens beyond which is more extensions of the Timeball Hill Formation.

From a local context, the suburb of Highbury is not geologically described, but the Sedibeng Spatial Development Plan Draft (2014-2017) provides some indication of risk in the Highbury suburb. Page and DuPlessis, (1986) provides more detail of the local geology at and around the Glen Douglas Mine. The target rocks at the mine are from the Lyttleton Formation of the Malmani dolomite. The Lyttleton Formation is situated between the Monte Christo Formation beneath it, a chert-rich dolomite and the Eccles Formation above it, also a chert rich dolomite.

Based on the Council of Geoscience data, the study area is underlain by the Vryheid Formation and is adjacent to the Malmani Subgroup (**Figure 23**). The Vryheid Formation has been subdivided into three different lithofacies arrangements. They are dominated by fine-grained mudstone, carbonaceous shale with alternating layers of bituminous coal seams, and coarse-grained, bioturbated immature sandstones respectively.

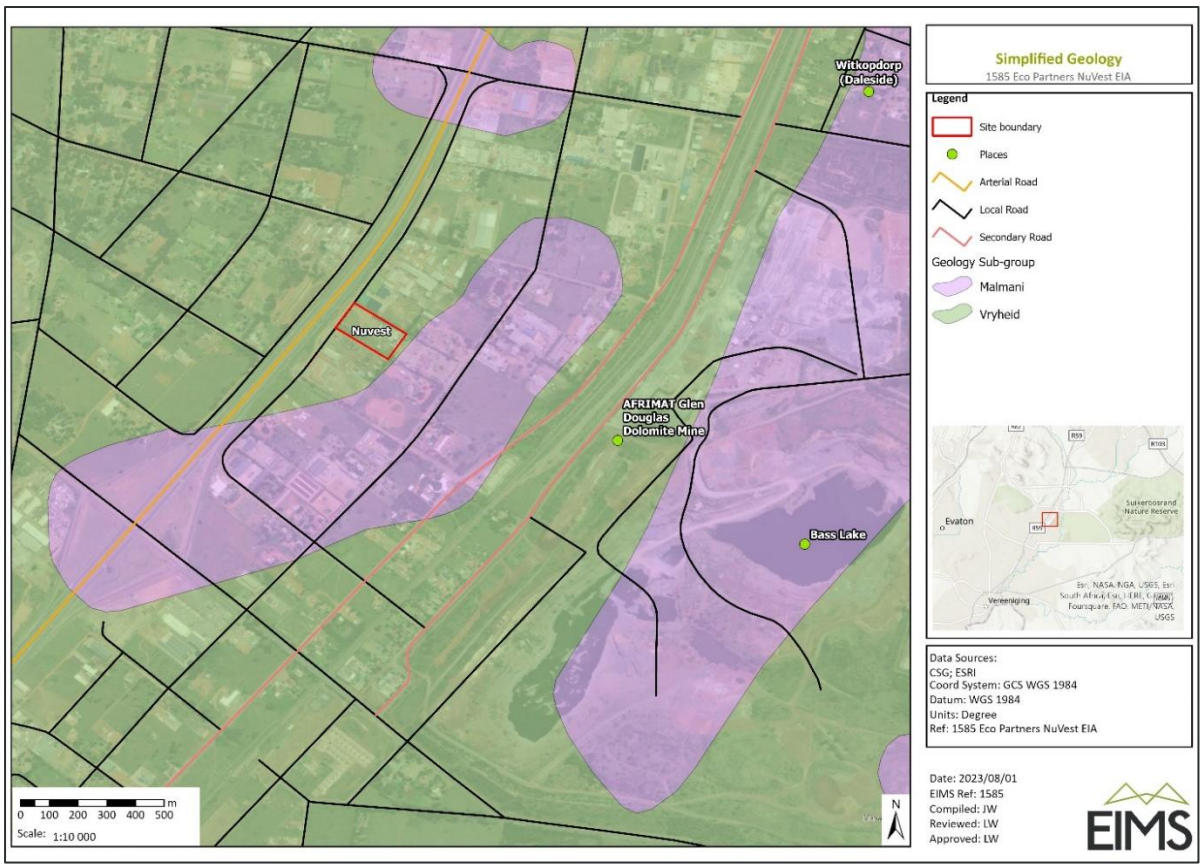


Figure 23: Site Geological Map

No excavations were observed in the immediate area of the property and in the area close by. This limits a definitive view on the dolomitic risk at depth and no information of overburden or topsoil thickness can be made. This overburden, also called the blanket by Buttrick et al., (2001) is a combination of Karoo and

Quaternary soil, chert rubble, wad, and dolomite. Risks for surface disturbances is related to dewatering such as described in the West Rand and Ekurhuleni, but no dewatering is seen to be actively taking place in the Meyerton north area. No permanent water features are observed within 1,000m of the property. There is acknowledged risks from development on dolomitic terrain and Oosthuizen and Richardson, (2011) indicated that the town on Meyerton, 8km south of the site, is partly or fully underlain by dolomite. However, the proposed development site does not appear to be located directly on dolomitic bedrock. The recommendations below are precautionary due to the visible risk located approximately 1km east of the property where dolomitic terrain is observed. It is advisable that the developer should consider undertaking Geotechnical investigations to cater for any potential risks.

6.9. Soil and Land Capability

Healthy soils act as a foundation for plants by supporting plant roots and keeping plants upright for growth. Soils act as a pantry for plants, storing and cycling essential nutrients and minerals that plants need to grow. As such, the type of soils can influence the agricultural potential of the area. The proposed development is located within red, yellow and greyish soils with low to medium base status (**Figure 24**). According to Agriculture Victoria (2022), the red, yellow and greyish soils are associated with the weathering of clay minerals releasing aluminium and iron oxides, which affect the soil colour. The red colour is due to the presence of iron in crystalline and metamorphic rocks. The soil appears yellow when it is in hydrated form. The fine-grained red and yellow soil is usually fertile while the coarse-grained soil is less fertile. This type of soil is generally deficient in nitrogen, phosphorus and humus. Whereas grey soils are associated with very poor drainage or waterlogging. The lack of air in these soils provides conditions for iron and manganese to form compounds that give these soils their colour (Agriculture Victoria, 2022).

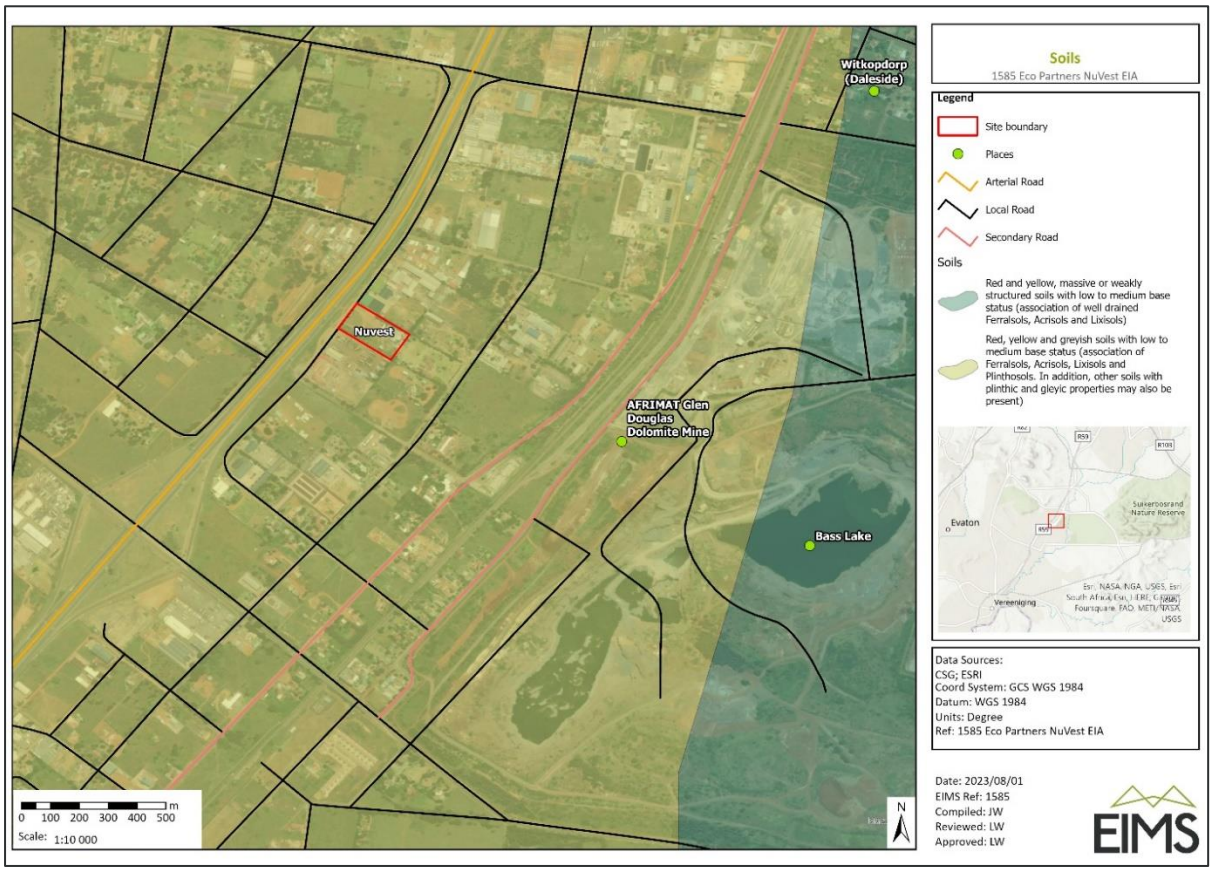


Figure 24: Site Soils Map

According to the National Web-Based Environmental Screening Tool, the proposed chemical plant site is situated on a high relative agricultural theme sensitivity (**Figure 25**). The area is determined to have a land capability of 09 (Moderate-High) and/or 10 (High).

Figure 25: Map of Relative Agriculture Theme Sensitivity

The SSV found that there are agricultural activities within the extended area, with the closest agricultural field located approximately 2km east of the proposed site. However, the proposed development site is located within an industrial area and there are no agricultural activities within the immediate adjacent properties. In addition, the proposed development site is zoned for industrial use and the process are not likely to directly impact on the overall agricultural potential and/or production. Subsequently, an Agricultural Impact Assessment is not recommended for the proposed development.

6.10. Terrestrial Biodiversity

Terrestrial biodiversity is the variety of life forms on the land surface of the Earth. High biodiversity is an indicator of a healthy ecosystem, which is directly linked to human health. Animals and plants are responsible for many vital services our lives depend on, including:

- oxygen production;
- water regulation;
- soil retaining; and
- providing flood protection.

Biodiversity is both a part of nature and affected by it. Some biodiversity loss is because of events such as seasonal changes or ecological disturbances (wildfires, floods, etc.), but these effects are usually temporary, and ecosystems have managed to adapt to these threats. Human-driven biodiversity loss, in contrast, tends to be

more severe and long-lasting. The human-made climate crisis is leading to environmental destruction, habitat loss, and species extinction. Terrestrial biodiversity is decreasing rapidly through habitat loss: a process where a natural habitat becomes incapable of supporting its native species, which are consequently displaced or killed. In the recent past, there have Increased efforts implemented to prevent further loss of terrestrial biodiversity and the ecosystem services they provide. The characteristics and implications of the terrestrial biodiversity within the Meyerton site are discussed below.

6.10.1. Ecologically Important Landscape Features

The following features describe the general area and habitat, this assessment is based on spatial data that are provided by various sources such as the provincial environmental authority and SANBI.

Table 30: Desktop spatial features examined.

Desktop Information Considered	Relevant/Irrelevant
Critical Biodiversity Area	Irrelevant. The study area does not transect CBAs.
Ecosystem Threat Status	Relevant. The study area is located within the vulnerable Soweto Highveld Grassland vegetation.
Ecosystem Protection Level	Irrelevant. The Soweto Highveld Grassland is not a protected ecosystem.
Protected Areas	Irrelevant. The study area does not transect any Protected Areas or is within close proximity of any Protected Area.
National Protected Area Expansion Strategy	Irrelevant. The study area does not transect nor is within close proximity of National Protected Area Expansion Strategy area.
Important Bird and Biodiversity Areas	Irrelevant. The study area does not transect any nor is within close proximity of Important Bird and Biodiversity Areas.
South African Inventory of Inland Aquatic Ecosystems	Irrelevant. The study area does not transect any nor is within close proximity of South African Inventory of Inland Aquatic Ecosystems.
National Freshwater Ecosystem Priority Areas	Irrelevant. The study area does not transect any nor is within close proximity of National Freshwater Ecosystem Priority Areas.
Strategic Water Source Areas	Irrelevant. The study area does not transect any nor is within close proximity of Strategic Water Source Areas

6.10.2. Biodiversity Spatial Plan (BSP)

Due to the continual development and loss of biodiversity, Biodiversity Conservation Plans have become vital for conservation of flora and fauna habitats and ecosystems. The purpose of a Biodiversity Conservation Plan is to inform land use planning, environmental assessments, land and water use authorisations, as well as natural resource management, undertaken by a range of sectors whose policies and decisions impact on biodiversity. This is done by providing a map of biodiversity priority areas, referred to as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs). According to the Gauteng Province Biodiversity Conservation Plan, the proposed site does not fall within of biodiversity priority area (**Figure 26**).

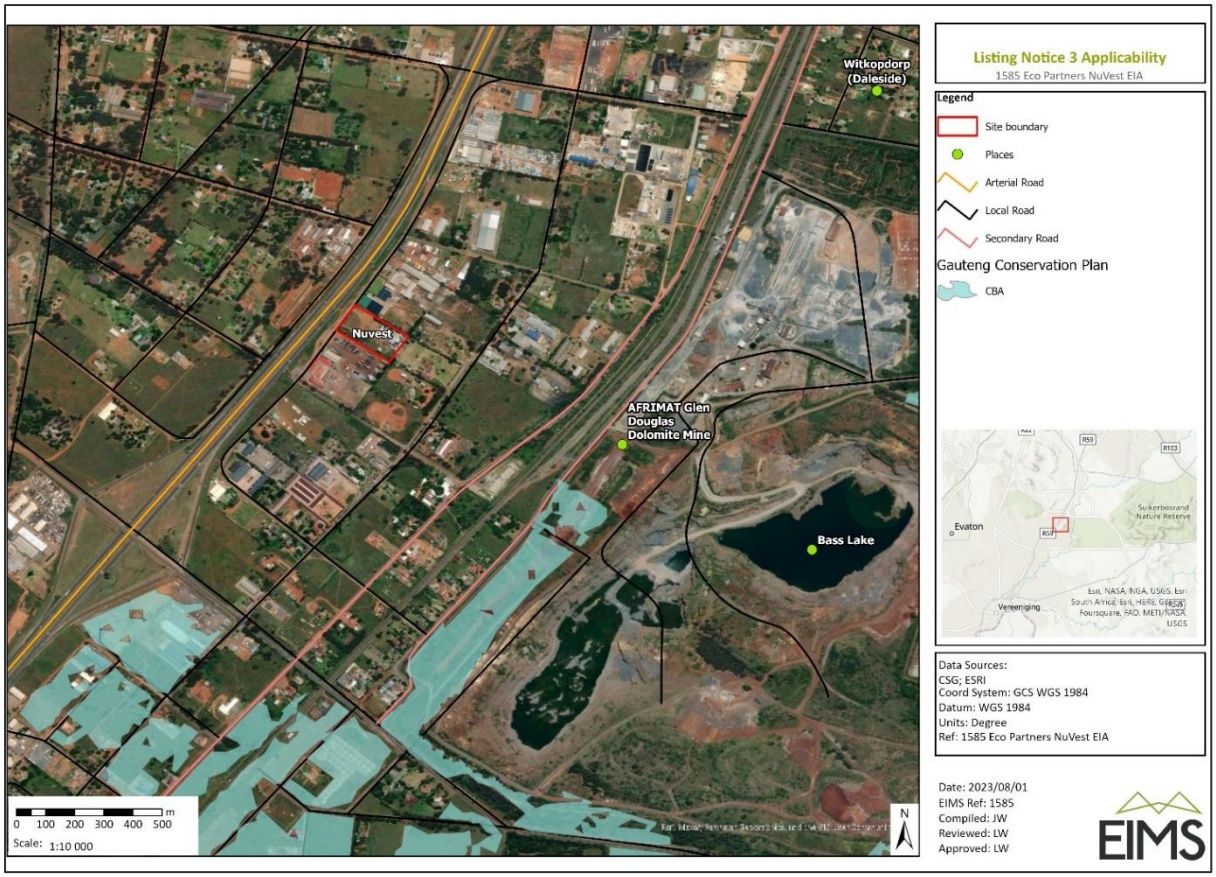


Figure 26: Site Conservation Plan Map

As already indicated in **Section 6.1**, the site has been significantly transformed with limited disturbed vegetation present within the site. Although the National Web-Based Screening Tool Report found that the Relative Terrestrial Biodiversity Impact Assessment Theme Sensitivity is *Very High-Sensitive*, the site has been significantly transformed. As such, a Terrestrial Biodiversity Compliance Assessment will be undertaken to confirm if there are no Flora or Fauna SCC, or protected species within the development site as per the protocols.

6.10.3. The National Biodiversity Assessment

The National Biodiversity Assessment (NBA) was completed as a collaboration between the SANBI, the DEA and other stakeholders, including scientists and biodiversity management experts throughout the country over a three-year period. The purpose of the NBA is to assess the state of South Africa's biodiversity with a view to understanding trends over time and informing policy and decision-making across a range of sectors.

The two headline indicators assessed in the NBA are ecosystem threat status and ecosystem protection level which are discussed in more detail in the sub-sections below.

6.10.3.1. Ecosystem Threat Status

Ecosystem threat status outlines the degree to which ecosystems are still intact or alternatively losing vital aspects of their structure, function and composition, on which their ability to provide ecosystem services ultimately depends. Ecosystem types are categorised as Critically Endangered (CR), Endangered (EN), Vulnerable (VU) or Least Threatened (LT), based on the proportion of each ecosystem type that remains in good ecological condition. According to the National Vegetation Data (2018) obtained from SANBI, the proposed development site is located within the Soweto Highveld Grassland (**Figure 27**). The Soweto Highveld Grassland vegetation is characterised by gently to moderately undulating landscape on the Highveld plateau supporting short to medium-high, dense, tufted grasslands that are considered 'vulnerable'. Considering that the proposed site is approximately 2ha, located within the vulnerable Soweto Highveld Grassland vegetation. The clearance that would ideally be required to allow for the proposed development would trigger Activity 27 of Listing Notices 1

and Activity 12 of Listing Notices 3 of if site was within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or in CBA or ESA NEMA EIA Regulations (2014). However, as previously discussed, the proposed development site has been significantly transformed with minimal (less than 300m^2) of indigenous vegetation noted on site meaning the abovementioned activities are not applicable to the project.

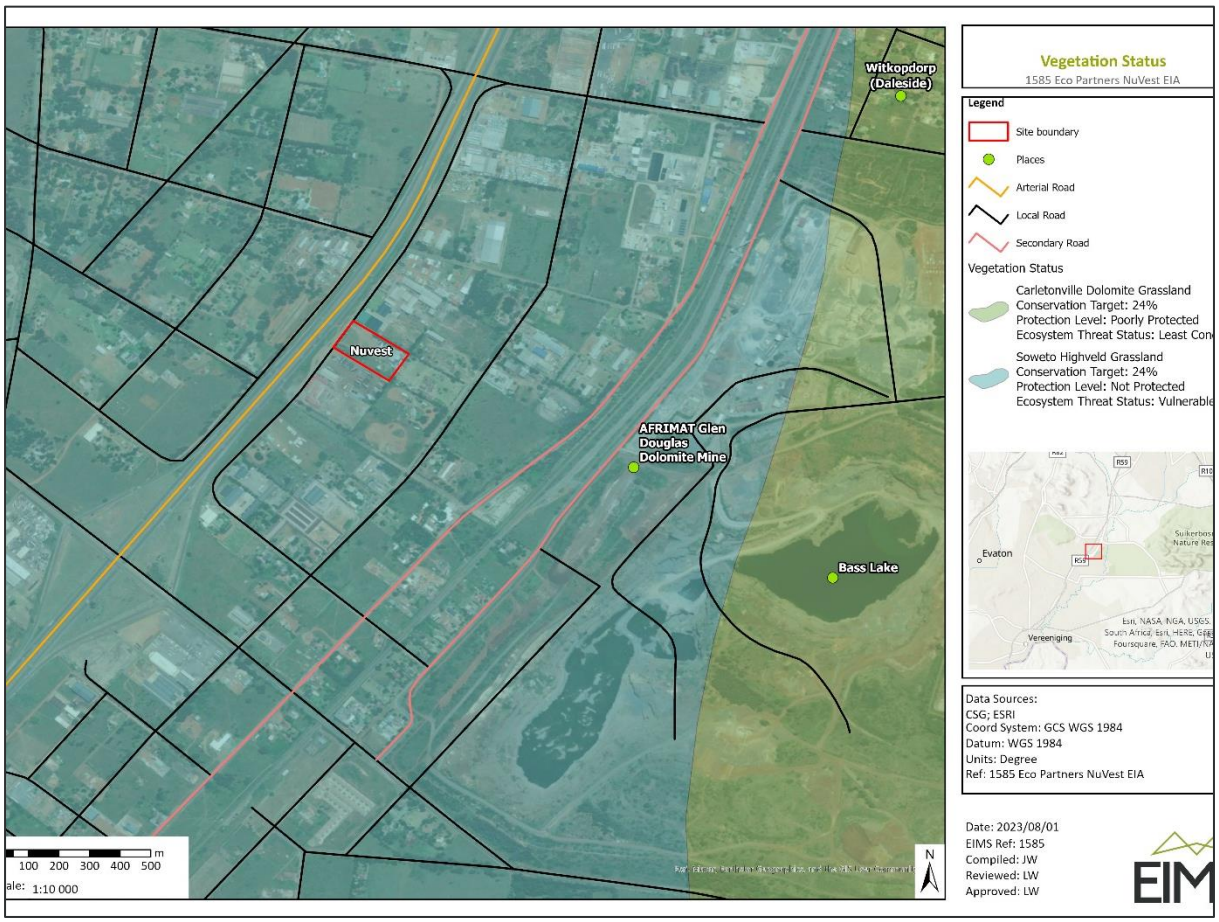


Figure 27: Site Vegetation Status Map

6.10.3.2. Ecosystem Protection Level

Ecosystem protection level tells us whether ecosystems are adequately protected or under-protected. Ecosystem types are categorised as not protected (NP), poorly protected (PP), moderately protected (MP) or well protected (WP), based on the proportion of each ecosystem type that occurs within a protected area recognised in the Protected Areas Act. The project area was superimposed on the ecosystem protection level map to assess the protection status of terrestrial ecosystems associated with the development (**Figure 27**). The proposed development overlaps with NP ecosystems.

7 DESCRIPTION OF ENVIRONMENTAL ISSUES, ASPECT AND IMPACTS

The scope of an environmental assessment is defined by the range of issues and alternatives it considers, and the approach towards the assessment that will follow. Scoping is a critical stage in the Integrated Environmental Management procedure, as it is an important tool for involving the public in the assessment process, and for structuring assessment studies (DEAT, 2002).

A Scoping Report must contain all the information that is necessary for a proper understanding of the nature of issues identified during the scoping phase of the project and must include a description of environmental issues and potential impacts, including cumulative impacts that have been identified. This chapter describes the environmental issues and impacts as identified during the scoping phase. Potential impacts identified and elaborated on in this chapter has been presented as follows:

- Impact 1: Impacts on Flora;
- Impact 2: Impacts on Fauna;
- Impact 3: Impacts on Air Quality;
- Impact 4: Impacts on Surface Water;
- Impact 5: Impacts on Groundwater;
- Impact 6: Impacts on Soil;
- Impact 7: Impacts on Dust Pollution;
- Impact 8: Impacts on Noise and Vibration;
- Impact 9: Impacts on Waste Pollution;
- Impact 10: Impacts on Traffic;
- Impact 11: Impacts on Heritage and Palaeontological Features; and
- Impact 12: Impacts on Public Safety; and
- Impact 11: Impacts on Socio-economic;

In all potential impacts, an attempt has been made to outline potential impacts for all construction, and operational phases of the projects. These impacts will be assessed and presented in detail during the Impact Assessment Phase.

7.1. Impacts on Flora

The study area has been significantly transformed with minimal vegetation remaining on site. The study area does not fall within any priority biodiversity area and the National Web-Based Environmental Screening Tool indicated that the site is located within a low relative terrestrial biodiversity sensitivity theme. The anticipated clearance which will be required is not expected to surpass 100m^2 and there is no anticipated loss of floral habitat due to the clearance of vegetation to cater for the proposed development. It is anticipated that impacts on vegetation during the construction and operational phase will be low negative without mitigation and insignificant with mitigation. A floral compliance statement will be undertaken during the EIA phase. All recommendations and mitigation measures provided by the specialist will be incorporated into the EMPr that will form part of the EIA Report.

7.2. Impacts on Fauna

The study area has been significantly transformed with minimal vegetation remaining on site to provide habitat for fauna. There was no fauna spotted during the SSV. The study area does not fall within any priority biodiversity

area and the National Web-Based Environmental Screening Tool indicated that the site is located within a low relative terrestrial biodiversity sensitivity theme. There are no foreseen habitats that will be affected by the proposed development due to current site conditions. It is anticipated that impacts on fauna during the construction and operational phase will be low negative without mitigation and insignificant with mitigation. A fauna compliance statement will be undertaken during the EIA phase. All recommendations and mitigation measures provided by the specialist will be incorporated into the EMPr that will form part of the EIA Report.

7.3. Impacts on Air Quality

Most air pollution is created by people, taking the form of emissions from factories, cars, planes, or aerosol cans. Both short-term and long-term exposure to air pollutants can cause a variety of health problems. The proposed development is a chemical plant which will likely emit air pollutants namely; dustfall (TSP), particulate matter (PM_{10} and $PM_{2.5}$), chlorine (Cl_2), and hydrogen chloride (HCl) in the area and add to the overall atmospheric pollution from the industrial activities in the area. The most negative impact associated with the proposed development is expected to be impacts on air quality. It is anticipated that impacts on air quality during the construction and operational phase will be high negative without mitigation and medium-low negative with mitigation respectively. It should be noted that the main air quality impacts from the proposed plant will be from the operational phase. A dust control plan can be implemented to mitigate the impacts for the construction phase. An air quality impact assessment will be undertaken during the EIA phase. All recommendations and mitigation measures provided by the specialist will be incorporated into the EMPr that will form part of the EIA Report.

7.4. Impacts on Surface Water

When surface water becomes polluted by contaminants, it puts strains on local and regional drinking water supplies and aquatic ecosystems that rely on surface water environments. Because of their geographical location, surface waters easily become polluted, and some leading causes of water pollution come from contaminated rainwater runoff, from fertilizers and other harmful chemicals that are used on farms, in homes, industries, and on infrastructure such as roads. Surface water pollution can also come from sewage leaks and waste products that leach into the environment. One of the largest risks for the chemical plant would be in the case of a catastrophic failure of the tanks and the containment, resulting in significant pollutant released into the environment and the local water ways. In addition, during the operational phase, there is likely to be localised spills which could enter the local stormwater systems. Although the scenarios would have high negative impact, the likelihood of a catastrophic failure is arguably low and chemical spills can be easily managed through a spill reaction plan and a stormwater management plan. Therefore, it is anticipated that impacts on surface water during the construction phase will be low negative while during the operational phase, it will likely be high negative without mitigation and medium negative with mitigation respectively.

7.5. Impacts on Groundwater

Stressors that affect ground water condition include application of pesticides and fertilizers to the land, waste from livestock and other animals, landfills, mining operations, and unintentional releases such as chemical spills or leaks from storage tanks. Although the chemical plant process involves the storing of chemicals in secured containers within a bunded warehouse, there is always a risk of spills occurring during the operational phase such as the containers leaking/bursting or falling over and spilling. The spill can then infiltrate into the groundwater and contaminate the water resource. It is anticipated that impacts on groundwater during the construction phase will be low negative while during the operational phase, it will likely be medium negative without mitigation and low negative with mitigation respectively.

7.6. Impacts on Soil

Land Development projects can contribute to soil erosion and sedimentation both during and after the actual construction activity. Clearing, grading, and other activities disturb the soil surface, remove existing vegetation,

and alter topography, thereby increasing erosion risk and adding to soil compaction. If chemical spills contaminate the soil, it can leach toxic chemicals into nearby ground or surface waters, where these materials can be taken up by plants and animals, contaminate a human drinking water supply, or volatilize and contaminate the indoor air in overlying buildings. Although the chemical plant process involves the storing of chemicals in secured containers within a bunded warehouse, there is always a risk of spills occurring during the operational phase such as the containers leaking/bursting or falling over and spilling onto the soil. If the spill is not cleaned immediately, it can lead to soil contamination, the spill can then infiltrate into the groundwater and contaminate the water resource and agricultural activities. It is anticipated that impacts on soil contamination during the construction phase will be low negative while during the operational phase, it will likely be medium negative without mitigation and low negative with mitigation respectively.

7.7. Impacts on Dust Pollution

Dust pollution, primarily caused by construction activities, poses severe health risks to both workers and nearby residents (Al-Dousari et al., 2023). Prolonged exposure to high levels of dust can lead to respiratory issues, heart disease, and even cancer. Based on the relatively small footprint of 2ha and the nature of the proposed activities, it is anticipated that dust pollution will be limited to the construction phase during excavations and backfilling. The dust likely to be produced will minimal and can be easily managed and/or prevented using dust suppressions and other dust control methods. Therefore, impacts on dust pollution during the construction phase will likely be medium-low negative while during the operational phase, it will likely be insignificant without mitigation and with mitigation respectively.

7.8. Impacts on Noise and Vibration

Construction sites are synonymous with noise and vibration impacts. High noise levels can have an adverse impact on both site labourers as well as the public, tenants, including occupiers of adjacent land. According to Petric (2020), exposure to prolonged or excessive noise and vibrations has been shown to cause a range of health problems ranging from stress, poor concentration, productivity losses in the workplace, and communication difficulties and fatigue from lack of sleep to more serious issues such as cardiovascular disease, cognitive impairment, tinnitus and hearing loss. Construction noise and vibration can structurally harm surrounding buildings. Construction works, whether they are residential or commercial, have a set standard for noise and vibration that is acceptable during construction and operation. Most of the noise and vibration is anticipated during the construction phase, however given the proposed shallow excavations and lack of plans for blasting activities, the development can be associated with low impacts on noise and vibration. Therefore, impacts on noise and vibration during the construction phase will likely be medium-low negative while during the operational phase, it will likely be low without mitigation and with mitigation respectively.

7.9. Impacts on Waste Pollution

Waste affects the water, air, and soil around us. In many cases, it will affect its cleanliness and stop at that. But as the nature of the waste becomes more severe, it will have adverse reactions that can make the material dangerous for the public. Certain factories and chemical plants can be associated with hazardous waste which can emit methane and hazardous leachate, thus, contributing to climate change. These impacts impose significant environmental and public health costs on residents with marginalized social groups mostly affected (Rushton, 2003). General waste and rubble from the development will largely be generated during the construction phase and can easily be managed and disposed at a registered landfill such as Henley / Midvaal Dumping Site. During the operational phase, in addition to general waste, hazardous waste may be generated from the chemical plant processes and can be addressed through the development of a waste management plan or EMPr for the development. Therefore, impacts on waste management during the construction and operational phases will likely be medium negative without mitigation and low with mitigation.

7.10. Impacts on Traffic

All developments despite being major or minor generate traffic. Factors such as type of development, functions carried out by the development, location, size of development and number of persons expected to use the development will govern the vehicular traffic that will be generated due to the proposed development. This additional vehicular traffic generated due to the new development surely affects the surrounding developments and the adjacent transport network. Unless this effect complies with the current classification and functions of the adjoining network, the existing road network may go out of balance overburdening some major links forcing them to carry out the functions of higher classified roads. It is anticipated that the proposed development of a chemical plant will not largely increase the traffic congestion as minimal construction vehicles will be used during the construction phase and during the operational phase, the delivery and collection trucks will operate using a scheduled approach and use the existing road network which is not currently overloaded. Based on the proposed capacity of the plant and load capacity of a 14-wheeler truck, it is anticipated that no more than five (5) 14-wheeler trucks will be using the road network on a given day. Therefore, impacts on traffic during the construction and operational phases will likely be low negative without mitigation and insignificant with mitigation.

7.11. Impacts on Heritage and Palaeontological Features

Construction activities such as clearing, excavations and grading could expose or damage features of heritage and cultural value beneath the surface. Although no heritage resources such as graves or buildings older than 60 years were observed during the site visits, the PalaeoMap on SAHRIS and the National Web-Based Environmental Screening Tool has shown a High Palaeontological Sensitivity. However, the proposed development of the chemical plant will mainly have small excavations for the foundations, hence it is likely to have major impacts on local palaeontological heritage. Therefore, impacts on Heritage and Palaeontological Features during the construction phase will likely be medium negative without mitigation and low with mitigation. During the operation phase, there are no anticipated excavations and subsequently minor chances of chance finds. Therefore, impacts on Heritage and Palaeontological Features during the operational phase will likely be low negative without mitigation and insignificant with mitigation.

7.12. Impacts on Public Safety

As the production and use of chemicals in workplaces around the world increases, workers are ever more at risk of hazardous chemical exposures which may be detrimental to their health. Aside from those employed by the chemical industry itself, workers from across almost all economic sectors are exposed to hazardous and toxic chemicals. Some hazardous chemicals, when mixed, may result in flammable, explosive or toxic effects. For instance, sodium hypochlorite could interact with hydrochloric acid to produce toxic gases which are harmful in large concentrations (Bhattacharjee, & Das, 2020). Domino impact within the site boundary is also a possibility. For example, the chlorine gas header from the electrolysis cell is likely to be within the impact zone for the hydrogen header if there were to be a rupture/leak and explosion. Therefore, if there is a hydrogen release in the cell room followed by an explosion, the domino impact may result in a secondary toxic release with offsite impacts. Therefore, it is vital that NuVest should ensure that there are physical measures as well as procedures in place to ensure that such events will not happen. The impacts on public safety and mitigation measures will be outlined by the Major Hazard Installation Risk Assessment which will be discussed in the EIA Phase. The impact on public safety during the construction phase is anticipated to low negative, while during the operational phase will likely be medium negative without mitigation and low negative with mitigation.

7.13. Impacts on Socio Economics

The proposed development will have a positive impact within the Midvaal Local Municipality as suppliers of construction materials will experience temporary economic growth during the construction phase. In addition, during the construction phase, skilled and semi-skilled jobs will be created. The use of local labour, as far as

possible, is recommended as this would have a positive impact on the local economy and would prevent influx of job seekers from outside region. The impact on socio-economics is considered to be positive.

7.14. Impact Assessment Ratings

Key issues and general potential environmental impacts likely to be associated with the proposed chemical plant are summarised in **Table 31**. It should be noted that the impacts identified in table overleaf are to be evaluated in the impact assessment phase of the project.

Table 31: Potential Impacts Associated with the Proposed NuVest Chemical Plant

Impact	Project Phase	Nature of Impact	Extent	Duration	Intensity	Probability	Reversibility	Irreplaceable loss of resources	Significance without mitigation	Significance with mitigation
Impacts on Flora	Construction	Negative	Local	Short	Low	Probable	Short term	Low	Low	No Significance
	Operation	Negative	Local	Long	Low	Improbable	Short Term	Low	Low	No Significance
Impacts on Fauna	Construction	Negative	Local	Short	Low	Probable	Short term	Low	Low	No Significance
	Operation	Negative	Local	Short	Low	Improbable	Short Term	Low	Low	No Significance
Impacts on Air Quality	Construction	Negative	Local	Long	Moderate	Probable	Short Term	Medium	Medium	Low
	Operation	Negative	Local	Long	High	Definite	Long Term	High	High	Medium
Impacts on Surface Water	Construction	Negative	Site	Short	Moderate	Improbable	Short Term	Medium	Low	No Significant
	Operation	Negative	Local	Short	Moderate	Probable	Short Term	High	High	Medium
Impacts on Groundwater	Construction	Negative	Local	Short	Moderate	Probable	Short Term	Medium	Medium	Low
	Operation	Negative	Local	Short	Moderate	Probable	Short Term	Medium	Medium	Low
Impacts on Soil	Construction	Negative	Site	Short	Moderate	Probable	Short Term	Medium	Medium	Low
	Operation	Negative	Site	Short	Moderate	Probable	Short Term	Medium	Medium	Low
Impacts on Dust Pollution	Construction	Negative	Site	Short	Moderate	Definite	Short term	Low	Medium	Low
	Operation	Negative	Site	Short	Low	Probable	Short term	Low	Low	No significance
Impacts on Noise and Vibration	Construction	Negative	Local	Short	Moderate	Probable	Short term	Low	Medium	Low
	Operation	Negative	Local	Long	Moderate	Probable	Short term	Low	Medium	Low
Impacts on Waste Pollution	Construction	Negative	Site	Short	Moderate	Probable	Short term	Low	Medium	Low
	Operation	Negative	Site	Long	Moderate	Probable	Short term	Low	Medium	Low
Impacts on Traffic	Construction	Negative	Local	Short	Medium	Highly Probable	Short term	Low	Medium	Low
	Operation	Negative	Local	Short	Low	Probable	Short term	Low	Low	Low
Impacts on Heritage and Palaeontological Features	Construction	Negative	Site	Short	Medium	Probable	Short term	Medium	Medium	Low
	Operation	Negative	Site	Short	Medium	Improbable	Short term	Medium	Medium-Low	Low

Impact	Project Phase	Nature of Impact	Extent	Duration	Intensity	Probability	Reversibility	Irreplaceable loss of resources	Significance without mitigation	Significance with mitigation
Impacts on Public Safety	Operation	Negative	Site	Short	Moderate	Probable	Short Term	Medium	Low	No significance
	Construction	Negative	Local	Short	Moderate	Probable	Short Term	Medium	Medium	Low
Impacts on Socioeconomics	Construction	Positive	Local	Medium	Medium	Probable	Short term	Medium	Positive Impact	No Significance
	Operation	Positive	Local	Short	Low	Probable	Short term	Low	Positive Impact	No Significance

It can be noted from the table above that most of the potential impacts area are low to no significance provided that mitigation measures are implemented. The potential impacts (negative and positive) of the proposed chemical plant will be addressed in the impact assessment phase of the EIA. The identified specialist studies required (refer to **Section 8.3**) will be commissioned during the impact assessment phase to assess potential environmental issues.

7.15. Cumulative Impacts

The NEMA EIA Regulations (2014) defines a “cumulative impact” in relation to an activity, as the past, current, and reasonably foreseeable future impact of an activity, considered together with the impact of activities associated with that activity, that may not be significant, but may become significant when added to the existing and reasonably foreseeable impacts eventuating from similar or diverse activities. This is required on the basis that the impact of an activity that may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area. The environmental impacts that will emanate from the activities associated with the construction and operation of the proposed NuVest chemical plant have already been discussed in this Scoping report. The impacts on cumulative impact on air quality is the most impact of concern associated with the proposed development. Mitigation measures to ameliorate these impacts during the construction, operational phases of the project have been discussed in some sections of this chapter. The overall potential cumulative impacts and mitigation measures will be discussed in detail in the EIA phase of the project.

8 PLAN OF STUDY FOR THE ENVIRONMENTAL IMPACT ASSESSMENT

The proposed NuVest chemical plant requires the undertaking of an EIA in accordance with the NEMA EIA Regulations, 2014, as amended. The EIA follows the preparation of the Scoping Report with a purpose of identifying the range of environmental impacts that are associated with the proposed development, alternatives, and the focus of the EIA. This chapter will present the proposed approach to the EIA and will address all requirements as stipulated in Appendix 2 of the NEMA EIA Regulations, 2014, as amended.

A key requirement within these regulations is the compilation of the Plan of Study for undertaking an EIA. The aim of the EIA Phase is to address the significant issues highlighted in the Scoping Phase through specialist investigation and detailed assessment. The Plan of Study details the proposed approach to the Environmental Impact Assessment, which will be in line with the EIA Regulations. The regulations stipulate that the Plan of Study for undertaking an EIA process should include the following:

a) A description of the alternatives to be considered and assessed within the preferred site; including the option of not proceeding with the activity;

b) a description of the aspects to be assessed as part of the environmental impact assessment process;

c) aspects to be assessed by specialists;

d) 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;

e) a description of the proposed method of assessing duration and significance;

f) an indication of the stages at which the competent authority will be consulted;

g) particulars of the public participation process that will be conducted during the environmental impact assessment process;

h) a description of the tasks that will be undertaken as part of the environmental impact assessment process; and

i) 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.

Each of these are discussed as follows:

8.1. Alternatives

Alternatives that have been pre-identified were discussed in **Section 4**. The alternatives discussed in this DSR are as follows:

- The No-Go Option;
- Process alternatives; and
- Input alternative

Detailed assessment of these alternatives will be included in the EIR.

8.2. Tasks to be undertaken during the EIA Phase and aspects to be assessed.

To adequately assess and provide sufficient responses to the issues raised during the Scoping Phase, the following tasks are considered during the EIA Phase:

- Reviewing the approval for the Scoping and Plan of Study for EIA including the relevant conditions of approval;
- Continued public participation;
- Conducting specialist investigations on all the significant issues identified and raised in the Scoping Process;
- Evaluate and summarise the findings of the specialist reports;
- Undertaking a detailed impact assessment process, assessing alternatives, and providing potential mitigation measures;
- Documenting the findings of the Impact Assessment into an Environmental Impact Report (EIR); and
- Compiling a framework Environmental Management Programme.

8.3. Specialist Studies and aspects that will be assessed

To date, the following Specialist Studies have been identified as being necessary during the assessment phase:

- Terrestrial Biodiversity Compliance Statement;
- Aquatic Biodiversity Compliance Statement;
- Air Quality Impact Assessment; and
- Major Hazard Installation Risk Assessment.

Detailed assessment of these specialist studies, findings and recommendations will be included in the EIR.

8.4. Impact Assessment Methodology

In accordance with the NEMA EIA regulations (Government Notice R.982, promulgated in terms of Section 24 of the National Environmental Management Act, 1998 (Act 107 of 1998), as amended the Environmental Assessment Practitioner (EAP) is required to assess the significance of potential impacts in terms of the following criteria as outlined in Appendix 1:

- cumulative impacts;
- nature, significance and consequences of the impact and risk;
- extent and duration of the impact and risk;
- probability of the impact and risk occurring;
- the degree to which the impact and risk can be reversed;
- the degree to which the impact and risk may cause irreplaceable loss of resources; and
- the degree to which the impact and risk can be avoided, managed, or mitigated.

Activities within the framework of the proposed development and their respective construction and operational phases, give rise to certain impacts. For the purpose of assessing these impacts, the project has been divided into two phases from which impacting activities can be identified, namely:

Construction phase:

This phase refers to all the pre-construction and construction related activities on site, until the contractor leaves the site.

Operational phase:
This includes all post construction activities, including the operation and maintenance of the proposed development.

The assessment of the impacts will be conducted according to a synthesis of criteria required by the integrated environmental management procedure. The methodology that will be used comprises of the following four steps:

- Step 1: Identification of positive and negative impacts of the project;
- Step 2: Identification of the significance rating of the impact before mitigation;
- Step 3: Identification of the mitigation measure and the mitigation efficiency; and
- Step 4; Identification of the significance rating of the impact after mitigation;

Activities that will be undertaken to give effect to the proposed development gives rise to certain impacts. For the purpose of assessing these impacts, the project has been divided into the following phases discussed in **Table 32.**

Table 32: Project phases in a development

PHASES OF A PROJECT IN WHICH IMPACTS WILL OCCUR
Status Quo
The study area as it currently exists.
Pre-construction phase
All activities on site up to the start of construction, not including the transport of materials, but including the initial site preparations. This also includes the impacts that would be associated with planning.
Construction phase
All the construction and construction-related activities on site, until the contractor leaves the site.
Operational phase
All activities after construction, including the operation and maintenance of the proposed development.

The activities arising from each of the relevant phases have been included in the impacts assessment tables. The assessment endeavours to identify activities that would require environmental management actions to mitigate the impacts arising from them. The criteria against which the activities were assessed are given in the next section**.**

8.5. Assessment Criteria

The assessment of the impacts will be conducted according to a synthesis of criteria required by the guideline documents to the EIA regulations (2006) and integrated environmental management series published by the Department of Environmental Affairs and Tourism (DEAT) currently DFFE. In addition to this, it is a requirement of (NEMA 2014 Regulations (as amended), Appendices 1 and 2 that an Impact and Risk Assessment process be undertaken for Basic Assessments and Environmental Impact Reporting. The Assessment Criteria is based on the following:

- Nature of Impact,
- Extent;
- Duration;
- Intensity;

- Probability;
- Determination of significance; and
- Reversibility of impact.

The impact significance rating methodology, as presented herein and utilised for all EIMS Impact Assessment Projects, is guided by the requirements of the NEMA EIA Regulations 2014 (as amended). The broad approach to the significance rating methodology is to determine the environmental risk (ER) by considering the consequence (C) of each impact (comprising Nature, Extent, Duration, Magnitude, and Reversibility) and relate this to the probability/ likelihood (P) of the impact occurring. The ER is determined for the pre- and post-mitigation scenario. In addition, other factors, including cumulative impacts and potential for irreplaceable loss of resources, are used to determine a prioritisation factor (PF) which is applied to the ER to determine the overall significance (S). The impact assessment will be applied to all identified alternatives.

8.5.1. Determination of Environmental Risk

The significance (S) of an impact is determined by applying a prioritisation factor (PF) to the environmental risk (ER). The environmental risk is dependent on the consequence (C) of the particular impact and the probability (P) of the impact occurring. Consequence is determined through the consideration of the Nature (N), Extent (E), Duration (D), Magnitude (M), and Reversibility (R) applicable to the specific impact.

For the purpose of this methodology the consequence of the impact is represented by:

$$\boldsymbol{C = \frac{(E + D + M + R) * N}{4}}$$

Each individual aspect in the determination of the consequence is represented by a rating scale as defined in **Table 33** below.

Table 33: Criteria for Determining Impact Consequence

Aspect	Score	Definition
Nature	- 1	Likely to result in a negative/ detrimental impact
	+1	Likely to result in a positive/ beneficial impact
Extent	1	Activity (i.e. limited to the area applicable to the specific activity)
	2	Site (i.e. within the development property boundary)
	3	Local (i.e. the area within 5 km of the site)
	4	Regional (i.e. extends between 5 and 50 km from the site)
	5	Provincial / National (i.e. extends beyond 50 km from the site)
Duration	1	Immediate (<1 year)
	2	Short term (1-5 years)
	3	Medium term (6-15 years)
	4	Long term (15-65 years, the impact will cease after the operational life span of the project)

	5	Permanent (>65 years, no mitigation measure of natural process will reduce the impact after construction)
Magnitude/ Intensity	1	Minor (where the impact affects the environment in such a way that natural, cultural and social functions and processes are not affected)
	2	Low (where the impact affects the environment in such a way that natural, cultural and social functions and processes are slightly affected)
	3	Moderate (where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way, moderate improvement for +ve impacts)
	4	High (where natural, cultural or social functions or processes are altered to the extent that it will temporarily cease, high improvement for +ve impacts)
	5	Very high / don't know (where natural, cultural or social functions or processes are altered to the extent that it will permanently cease, substantial improvement for +ve impacts)
Reversibility	1	Impact is reversible without any time and cost.
	2	Impact is reversible without incurring significant time and cost.
	3	Impact is reversible only by incurring significant time and cost.
	4	Impact is reversible only by incurring prohibitively high time and cost.
	5	Irreversible Impact.

Once the C has been determined, the ER is determined in accordance with the standard risk assessment relationship by multiplying the C and the P. Probability is rated/ scored as per **Table 34**.

Table 34: Probability Scoring

Probability	1	Improbable (the possibility of the impact materialising is very low as a result of design, historic experience, or implementation of adequate corrective actions; <25%),
	2	Low probability (there is a possibility that the impact will occur; >25% and <50%),
	3	Medium probability (the impact may occur; >50% and <75%),
	4	High probability (it is most likely that the impact will occur- > 75% probability), or
	5	Definite (the impact will occur),

The result is a qualitative representation of relative ER associated with the impact. ER is therefore calculated as follows:

$$\boldsymbol{ER = C \; x \; P}$$

Table 35: Determination of Environmental Risk

Consequence	5	5	10	15	20	25
	4	4	8	12	16	20
	3	3	6	9	12	15
	2	2	4	6	8	10
	1	1	2	3	4	5
		1	2	3	4	5
	Probability					

The outcome of the environmental risk assessment will result in a range of scores, ranging from 1 through to 25. These ER scores are then grouped into respective classes as described in **Table 36**.

Table 36: Environmental Risk Scores

ER Score	Description
<9	Low (i.e. where this impact is unlikely to be a significant environmental risk/ reward).
≥9 ≤17	Medium (i.e. where the impact could have a significant environmental risk/ reward),
>17	High (i.e. where the impact will have a significant environmental risk/ reward).

The impact ER will be determined for each impact without relevant management and mitigation measures (pre-mitigation), as well as post implementation of relevant management and mitigation measures (post-mitigation). This allows for a prediction in the degree to which the impact can be managed/mitigated.

8.5.2. Impact Prioritization

Further to the assessment criteria presented in the section above, it is necessary to assess each potentially significant impact in terms of:

1. Cumulative impacts; and

2. The degree to which the impact may cause irreplaceable loss of resources.

To ensure that these factors are considered, an impact prioritisation factor (PF) will be applied to each impact ER (post-mitigation). This prioritisation factor does not aim to detract from the risk ratings but rather to focus the attention of the decision-making authority on the higher priority/significance issues and impacts. The PF will be applied to the ER score based on the assumption that relevant suggested management/mitigation impacts are implemented.

Table 37: Criteria for Determining Prioritisation

Cumulative Impact (CI)	Low (1)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is unlikely that the impact will result in spatial and temporal cumulative change.
	Medium (2)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is probable that the impact will result in spatial and temporal cumulative change.

	High (3)	Considering the potential incremental, interactive, sequential, and synergistic cumulative impacts, it is highly probable/ definite that the impact will result in spatial and temporal cumulative change.
Irreplaceable Loss of Resources (LR)	Low (1)	Where the impact is unlikely to result in irreplaceable loss of resources.
	Medium (2)	Where the impact may result in the irreplaceable loss (cannot be replaced or substituted) of resources but the value (services and/or functions) of these resources is limited.
	High (3)	Where the impact may result in the irreplaceable loss of resources of high value (services and/or functions).

The value for the final impact priority is represented as a single consolidated priority, determined as the sum of each individual criteria represented in Table 37. The impact priority is therefore determined as follows:

$$\boldsymbol{Priority = CI + LR}$$

The result is a priority score which ranges from 2 to 6 and a consequent PF ranging from 1 to 1.5 (Refer to **Table 38).**

Table 38: Determination of Prioritisation Factor

Priority	Prioritisation Factor
2	1
3	1.125
4	1.25
5	1.375
6	1.5

In order to determine the final impact significance, the PF is multiplied by the ER of the post mitigation scoring. The ultimate aim of the PF is an attempt to increase the post mitigation environmental risk rating by a factor of 0.5, if all the priority attributes are high (i.e. if an impact comes out with a high medium environmental risk after the conventional impact rating, but there is significant cumulative impact potential and significant potential for irreplaceable loss of resources, then the net result would be to upscale the impact to a high significance).

Table 39: Final Environmental Significance Rating

Significance Rating	Description
<-17	High negative (i.e. where the impact must have an influence on the decision process to develop in the area).
≥-17, ≤-9	Medium negative (i.e. where the impact could influence the decision to develop in the area).
>-9, < 0	Low negative (i.e. where this impact would not have a direct influence on the decision to develop in the area).

Significance Rating	Description
0	No impact
>0, <9	Low positive (i.e. where this impact would not have a direct influence on the decision to develop in the area).
≥9, ≤17	Medium positive (i.e. where the impact could influence the decision to develop in the area).
>17	High positive (i.e. where the impact must have an influence on the decision process to develop in the area).

The significance ratings and additional considerations applied to each impact will be used to provide a quantitative comparative assessment of the alternatives being considered. In addition, professional expertise and opinion of the specialists and the environmental consultants will be applied to provide a qualitative comparison of the alternatives under consideration. This process will identify the best alternative for the proposed project.

8.6. Environmental Impact Report

On completion of the Environmental Impact Assessment, the EAP will compile an Environmental Impact Report (EIR) for the Competent Authority's consideration and decision-making. The main purpose of this report is to gather and synthesise environmental information and evaluate the overall environmental impacts associated with the development, to consider mitigation measures and alternative options, and make recommendations in choosing the best development alternative. The EIR will also provide details on the steps taken to respond to the issues identified in the scoping phase and indicate the way these issues have either been responded to or addressed.

Furthermore, a draft Environmental Management Programme (EMPr) will be compiled during the EIA and will be submitted for approval as part of the final EIR. The EMPr provides guidelines to the project proponent and the technical team on how best to implement the mitigation measures and management recommendations outlined in the EIR during the construction and operational phase.

8.7. Public Participation process

Public participation during the EIA phase will continue similarly to the process undertaken for the Scoping Phase. The key tasks that will form part of the public participation process in the EIA phase include:

- Continued identification of I&APs;
- Placement of the Draft EIR for public comment;
- Continued consultation within key stakeholders and I&APs; and
- Continued recording of issues and responses.

8.7.1. Interested and Affected Parties (I&AP) Database

The database of Interested and Affected Parties will be regularly updated and expanded to include any I&APs who become interested or request to be included in the process and will act as a record of the communication/ involvement process. All I&AP information (including contact details), together with dates and details of consultations and a record of all issues raised will be recorded within the database of I&APs.

8.7.2. Public Review of the Environmental Impact Assessment Report

The Environmental Impact Assessment Report (EIR) will be made available for public reviewing for a period of 30 days. The information regarding the availability of the Draft EIR i.e., the dates of release and the respective venues, will be communicated to all I&APs.

8.7.3. Public or Focus Group Meetings

No public and/or focus group meetings have been held to date with I&APs. Based on the nature of the proposed development, the proposed site, the surrounding industrial community, and feedback received during the initial public participation, it is anticipated that a Public or Focus Group Meeting might not be required for this project. However, should a need arise for a public meeting during the Scoping and/or EIA Phase, such a meeting will be held with the affected parties.

8.7.4. Comments and Responses Report

Few comments have been received which has been captured in the Comments and Response report. It is anticipated that comments will be received from other Interested and Affected Parties after the review or either the Draft Scoping Report or the Draft Environmental Impact Report. The comments will be captured, and the EAP will provide a response to each comment received.

8.7.5. Authority Liaison

Consultation with the GDARD will be on-going and will continue from the communications established during the project initiation stages.

9 CONCLUSION

NuVest Recovery Solutions (Pty) Ltd specializes in the development and implementation of technologies and chemistries for the sustainable recovery of resources. NuVest Recovery Solutions' products and services help businesses to reduce their environmental impact, save money, and improve their returns (NuVest Recovery Solutions, 2019). NuVest Recovery Solutions proposes to develop a chemical plant located on 110 Batoliet Road in Meyerton, within the Sedibeng District Municipality, Gauteng Province. The proposed plant production capacity is based on producing 10t/day of chlorine. The plant will have a bulk storage capacity of approximately 17 473 tonnes with a maximum single storage capacity of 4 617 tonnes (13 074m^3) of chemicals within the facility. The chemical plant will specialize in the production of sodium hydroxide (NaOH), chlorine (Cl_2), and hydrogen (H_2) through the chlor-alkali process. These three intermediate products will then be further processed to produce hydrochloric (HCl) acid, bleach (12-13% sodium hypochlorite solution), and caustic lye (47% solution in water).

It is a conclusion of this report that the proposed chemical plant will have medium to low impacts on the bio-physical environment and positive socio-economic impact, provided that all mitigation measures to be detailed in the EIR are adhered to. The plan of study as provided in this report includes the following specialist assessment which will provide further potential impacts the proposed chemical plant could potentially have on the receiving environment:

- Terrestrial Biodiversity Compliance Statement;
- Aquatic Biodiversity Compliance Statement;
- Air Quality Impact Assessment; and
- Major Hazard Installation Risk Assessment.

To date, very few comments have been received from the Interested and Affected Parties. It must be noted that there have been no objections against the proposed development to date. No public and/or focus group meetings have been held to date with I&APs. Based on the nature of the proposed development, the proposed site, the surrounding industrial community, and feedback received during the initial public participation, it is anticipated that no Public Open day nor Public Meeting will be required for this project. However, should a need arise for a public meeting during the Scoping and/or EIA Phase, such a meeting will be held with the affected parties.

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