Environmental Impact Assessment

Draft Environmental Impact Assessment Report

setala

Head Office
44 Melrose Boulevard
Melrose Arch, Johannesburg

Regional Offices
Modimolle - Limpopo
Somerset West - Western Cape

Email: ria@setalaenvironmental.co.za
Contact: +27 82 568 6344
Website: www.setalaenvironmental.com

Level 2 B-BBEE Contributor
Reg No: 2014/017865/07

PROPOSED GA-RANKUWA ERF 1719 UNIT 23 AND ERF 1427 UNIT 25 RESIDENTIAL DEVELOPMENT AND ASSOCIATED INFRASTRUCTURE

CITY OF TSHWANE METROPOLITAN MUNICIPALITY

GAUTENG PROVINCE

GAUT: 002/22-23/E3452

Applicant: CITY OF TSHWANE METROPOLITAN MUNICIPALITY

Contact person: Francois Swanepoel

Tel: 012 358 4198 Email: FrancoisS@TSHWANE.GOV.ZA

Submitted By: SETALA ENVIRONMENTAL (PTY) LTD

44 Melrose Blvd, Melrose Arch, Johannesburg

Contact Person: Mientjie Coetzee

Tel: 083 253 2246 Email: mientjie@setalaenvironmental.co.za

July 2023

setala

Table of Contents

FIGURES

TABLES

APPENDICES

ACRONYMS

CBA	Critical Biodiversity Area
CTMM	City of Tshwane Metropolitan Municipality
DWS	Department of Water and Sanitation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, 1989 (Act No. 73 of 1989)
EIA	Environmental Impact Assessment
EIAR	Environmental Impact Assessment Report
EMPr	Environmental Management Programme
ESA	Ecological Support Area
FSR	Final Scoping Report
GDARD	Gauteng Department of Agriculture and Rural Development
IDP	Integrated Development Plan
HIA	Heritage Impact Assessment
I&APs	Interested and Affected Parties
IEM	Integrated Environmental Management
LUDS	Land Use Development Support
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)

NEMWA	National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008)
NEMAQA	National Environment Management: Air Quality Act (No.39 of 2004)
NEMPAA	National Environmental Management: Protected Areas Act (Act No. 57 of 2003)
NPAES	National Protected Areas Expansion Strategy
NWA	National Water Act (Act 36 of 1998)
SWSA	Strategic water source areas of South Africa
VU	Vulnerable
WMA	Water Management Areas
WWTW	Waste Water Treatment Works
PES	Present Ecological State
PIA	Palaeontological Impact Assessment
PPP	Public Participation Process
PoS	EIA Plan of Study for Environmental Impact Assessment
SDF	Spatial Development Framework
SR	Scoping Report
SAHRA	South African Heritage Resources Agency

GLOSSARY OF TERMS

Activity (Development) – an action either planned or existing that may result in environmental impacts through pollution or resource use.

Alternative – a possible course of action, in place of another, of achieving the same desired goal of the proposed project. Alternatives can refer to any of the following but are not limited to: site alternatives, site layout alternatives, design or technology alternatives, process alternatives or a no-go alternative. All reasonable alternatives must be rigorously explored and objectively evaluated.

Applicant – the project proponent or developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.

Biodiversity – the diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.

Construction – means the building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.

Cumulative Impacts – impacts that result from the incremental impact of the proposed activity on a common resource when added to the impacts of other past, present or reasonably foreseeable future activities to produce a greater impact or different impacts.

Direct impacts – impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

Ecosystem – a dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.

Environment – In terms of the National Environmental Management Act (NEMA) (Act No 107 of 1998) (as amended), "Environment" means the surroundings within which humans exist and that are made up of:

a) the land, water and atmosphere of the earth;
b) micro-organisms, plants and animal life;
c) any part or combination of (i) of (ii) and the interrelationships among and between them; and
d) the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.

Environmental Assessment (EA) – the generic term for all forms of environmental assessment for projects, plans, programmes or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.

Environmental Authorisation – an authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.

Environmental Assessment Practitioner – the individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.

Environmental Impact – a change to the environment (biophysical, social and/ or economic), whether adverse or beneficial, wholly or partially, resulting from an organisations, activities, products or services.

Environmental Impact Assessment (EIA) – the process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made.

Environmental Issue – a concern raised by a stakeholder, interested or affected parties about an existing or perceived environmental impact of an activity.

Environmental Management - ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.

Environmental Management Programme - A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. This EMPr focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.

Expansion - means the modification, extension, alteration or upgrading of a facility, structure or infrastructure at which an activity takes place in such a manner that the capacity of the facility or the footprint of the activity is increased.

Fatal Flaw – issue or conflict (real or perceived) that could result in developments being rejected or stopped.

General Waste – household water, construction rubble, garden waste and certain dry industrial and commercial waste which does not pose an immediate threat to man or the environment.

Hazardous Waste – waste that may cause ill health or increase mortality in humans, flora and fauna.

Indirect impacts – indirect or induced changes that may occur as a result of the activity. These types if impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Integrated Environmental Management – a philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity – at local, national and international level - that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental

assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).

Mitigate – the implementation of practical measures designed to avoid, reduce or remedy adverse impacts or enhance beneficial impacts of an action.

No-Go Option – in this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.

Open Space – environmentally sensitive areas which are not suitable for development and consist of watercourses, buffers, floodplains, steep slopes, sensitive biodiversity and/or areas of cultural or heritage significance.

Registered interested and affected party – in relation to an application, means an interested and affected party whose name is recorded in the register opened for that application in terms of regulation 42 of the 2014 EIA Regulations.

Rehabilitation – a measure aimed at reinstating an ecosystem to its original function and state (or as close as possible to its original function and state) following activities that have disrupted those functions.

Scoping – the process of determining the spatial and temporal boundaries (i.e. extent) and key issues to be addresses in an environmental assessment. The main purpose of scoping is to focus the environmental assessment on a manageable number of important questions. Scoping should also ensure that only significant issues and reasonable alternatives are examined.

Sensitive environment – any environment identified as being sensitive to the impacts of the development.

Significance – significance can be differentiated into impact magnitude and impact significance. Impact magnitude is the measurable change (i.e. magnitude, intensity, duration and likelihood). Impact significance is the value placed on the change by different affected parties (i.e. level of significance and acceptability). It is an anthropocentric concept, which makes use of value judgments and science-based criteria (i.e. biophysical, social and economic).

Stakeholder engagement – the process of engagement between stakeholders (the proponent, authorities and I&APs) during the planning, assessment, implementation and/or management of proposals or activities.

Sustainable Development – development which meets the needs of current generations without hindering future generations from meeting their own needs.

Watercourse – means:
a) a river or spring;
b) a natural channel or depression in which water flows regularly or intermittently;
c) a wetland, lake or dam into which, or from which, water flows; and
d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

Wetland – means land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

1 INTRODUCTION

1.1 Background

Setala Environmental (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment (EIA) for the proposed residential development and associated infrastructure on Stand 1719 Unit 23 and Stand 1427 Unit 25 Ga-Rankuwa (herein after referred to as "the site"), City of Tshwane Metropolitan Municipality, Gauteng Province. The residential development site is 21.9803 hectares in extent and is situated approximately 13 km west of Soshanguve and the R80, and 8km to the north of the N4 towards Brits. The site is in close proximity to the border between Gauteng and North West Province.

The proposed development is a City of Tshwane Metropolitan Municipality (CTMM) Human Settlements Housing Project.

The comments from GDARD on the Scoping Report and Plan of Study for EIA in correspondence dated 10/05/2023 are noted. With regards to the request for a Relocation Plan please note that the informal settlers are not being relocated and will be accommodated in the proposed development.

1.2 Approach to the Environmental Impact Assessment Process

Application for authorisation of the above project is to be submitted to the Gauteng Department of Agriculture and Rural Development (GDARD), in terms of the National Environmental Management, 1998 (Act 107 of 1998), and the 2014 NEMA Environmental Impact Assessment (EIA) Regulations (as amended on 7 April 2017) promulgated in Government Gazette 40772 and Government Notice (GN) R327, R326, R325 and R324.

The proposed project is a listed activity in terms of Sections 24(2) and 24(d) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) (as amended). The Environmental Impact Assessment (EIA) Regulations, 2017 promulgated in terms of Chapter 5 of the NEMA provide for the control of certain activities that are listed in Government Notice Regulation (GN R.) No. 327, 325 and 324. Activities listed in these notices must comply with the regulatory requirements listed in GN R. 326, which prohibits such activities until written Authorisation is obtained from the Competent Authority. Such Environmental Authorisation (EA), which may be granted subject to conditions, will only be considered once there has been compliance with the EIA Regulations of 2017. GN R. No. 326 sets out the procedure and documentation that need to be compiled with undertaking a Basic Assessment Process.

The required environmental process to be followed is being undertaken in two phases:

- Phase 1: Scoping Phase (Completed)
  Scoping Report (SR) including Plan of Study for EIA
- Phase 2: EIA Phase
  Environmental Impact Assessment Report (EIAR) and Environmental Management Programme (EMPr)

1.2.1 Scoping Phase (Completed)

The SR provided a description of the receiving environment and how the environment may be affected by the proposed development. Desktop studies making use of existing information were used to highlight and assist in the identification of potential significant impacts (both biophysical and social) associated with the proposed project.

Additional issues for consideration were extracted from feedback from the public participation process, which commenced at the beginning of the Scoping Phase, and will continue throughout the duration of the project. All issues identified during this phase of the study were documented within the SR. Thus, the SR provided a record of all issues identified as well as any fatal flaws, in order to make recommendations regarding the project and further studies required to be undertaken within the EIA phase of the proposed project.

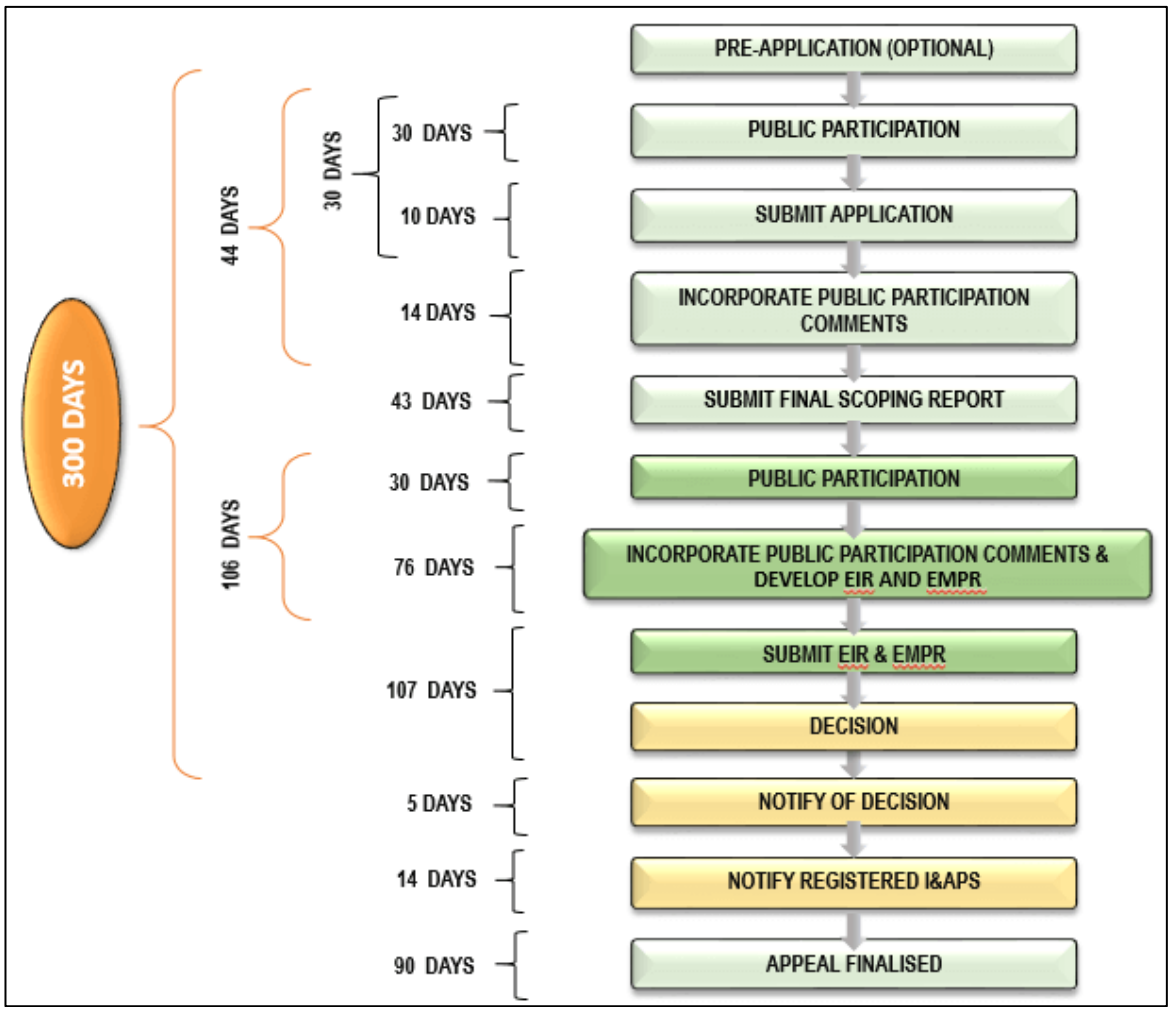
The Final Scoping Report (FSR) was accepted by GDARD on 10 May 2023. The letter of acceptance authorised the applicant to proceed with undertaking the EIA for the proposed Stand 1719 Unit 23 and Stand 1427 Unit 25 Ga-Rankuwa development, in accordance with the tasks outlined in the Plan of Study for Environmental Impact Assessment.

1.2.2 Environmental Impact Assessment Phase

The EIAR has aimed to achieve the following:

- to provide an overall assessment of the biophysical and social environments of the affected area;
- to undertake a detailed assessment of the preferred site/alternatives in terms of environmental criteria including the rating of significant impacts;
- to identify and recommend appropriate mitigation measures (to be included in an EMPr) for potentially significant environmental impacts; and
- to undertake a fully inclusive public participation process to ensure that I&AP issues and concerns are recorded and commented on and addressed in the EIA process.

The EIA process is represented diagrammatically in the Schedule below:



1.3 Content and Structure of the EIA Report

This report represents the Final EIAR and was compiled in accordance with Government Notice No. R. 326 of 7 April 2017, Appendix 2(1). In terms of Government Notice No. R. 326 of 7 April 2017, Appendix 2(1) an EIAR must contain the information that is necessary for the competent authority to consider and come to a decision on the application, and must include—

(a) details of—
- the EAP who prepared the report; and
- the expertise of the EAP, including a curriculum vitae;

(b) the location of the development footprint of the activity on the approved site as contemplated in the accepted scoping report, including:
- the 21 digit Surveyor General code of each cadastral land parcel;
- where available, the physical address and farm name; and
- where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties;

(c) a plan which locates the proposed activity or activities applied for as well as the associated structures and infrastructure at an appropriate scale, or, if it is—
- a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken;
- on land where the property has not been defined, the coordinates within which the activity is to be undertaken;

(d) a description of the scope of the proposed activity, including—

- all listed and specified activities triggered and being applied for; and
- a description of the associated structures and infrastructure related to the development;

(e) a description of the policy and legislative context within which the development is located and an explanation of how the proposed development complies with and responds to the legislation and policy context;

(f) a motivation for the need and desirability for the proposed development, including the need and desirability of the activity in the context of the preferred development footprint within the approved site as contemplated in the accepted scoping report;

(g) a motivation for the preferred development footprint within the approved site as contemplated in the accepted scoping report;

(h) a full description of the process followed to reach the proposed development footprint within the approved site as contemplated in the accepted scoping report, including:

- details of the development footprint alternatives considered;
- details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;
- a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them;
- the environmental attributes associated with the development footprint alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;
- the impacts and risks identified including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts—
  - can be reversed;
  - may cause irreplaceable loss of resources; and
  - can be avoided, managed or mitigated;
- the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks;
- 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;
- the possible mitigation measures that could be applied and level of residual risk;
- if no alternative development footprints for the activity were investigated, the motivation for not considering such; and
- a concluding statement indicating the location of the preferred alternative development footprint within the approved site as contemplated in the accepted scoping report;

(i) a full description of the process undertaken to identify, assess and rank the impacts the activity and associated structures and infrastructure will impose on the preferred development footprint on the approved site as contemplated in the accepted scoping report through the life of the activity, including—

- a description of all environmental issues and risks that were identified during the environmental impact assessment process; and
- an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures;

(j) an assessment of each identified potentially significant impact and risk, including—

- cumulative impacts;
- the nature, significance and consequences of the impact and risk;
- the extent and duration of the impact and risk;
- the 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 mitigated;

(k) where applicable, a summary of the findings and recommendations of any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final assessment report;
(l)an environmental impact statement which contains—

- a summary of the key findings of the environmental impact assessment:
- a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred development footprint on the approved site as contemplated in the accepted scoping report indicating any areas that should be avoided, including buffers; and
- a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives;

(m) based on the assessment, and where applicable, recommendations from specialist reports, the recording of proposed impact management outcomes for the development for inclusion in the EMPr as well as for inclusion as conditions of authorisation;
(n) the final proposed alternatives which respond to the impact management measures, avoidance, and mitigation measures identified through the assessment;
(o) any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of authorisation;
(p) a description of any assumptions, uncertainties and gaps in knowledge which relate to the assessment and mitigation measures proposed;
(q) a reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation;
(r) where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required and the date on which the activity will be concluded and the post construction monitoring requirements finalised;
(s) an undertaking under oath or affirmation by the EAP in relation to

- the correctness of the information provided in the reports;
- the inclusion of comments and inputs from stakeholders and I&APs;
- the inclusion of inputs and recommendations from the specialist reports where relevant; and
- any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested or affected parties;

(t) where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts;
(u) an indication of any deviation from the approved scoping report, including the plan of study, including–

- any deviation from the methodology used in determining the significance of potential environmental impacts and risks; and
- a motivation for the deviation;

(v) any specific information that may be required by the competent authority; and
(w) any other matters required in terms of section 24(4)(a) and (b) of the Act.

This report has been structured to comply with the format required by the NEMA. The contents are as follows:

TABLE 1: REPORT STRUCTURE

SECTION	CONTENT
SECTION 1 Introduction	Introduction and background to the project.
SECTION 2 Details of EAP	Presents information regarding the EAP involved in the proposed project.

SECTION 3 Locality and nature of the project	Provides detailed information regarding the proposed project and associated required infrastructure.
SECTION 4 Project motivation	Presents the need and desirability of the proposed project.
SECTION 5 Legal framework	Includes an explanation on all applicable legislation.
SECTION 6 Receiving environment	Provides the baseline information of the biophysical and social environments being impacted by the development proposal. Key findings of the specialist studies conducted.
SECTION 7 Project Alternatives	Consideration of alternatives (locality, land use, layout, designs, energy uses and No-Go) for the project.
SECTION 8 Public participation process	Provides an overview of the Public Participation Process conducted to date.
SECTION 9 Environmental Impact Assessment	The impacts identified are rated by significance.
SECTION 10 Environmental Impact Statement	Conclusions and recommendations of the Environmental Impact Assessment.

2 DETAILS OF ENVIRONMENTAL ASSESSMENT PRACTITIONER

2.1 Legislative requirements for environmental assessment practitioners

Section 13 of Government Notice No. R. 326 of 7 April 2017 provides the following requirements for environmental assessment practitioners (EAPs):

- An EAP must be independent;
- An EAP must have expertise in conducting environmental impact assessments or undertake specialist work as required, including knowledge of the Act, these Regulations and any guidelines that have relevance to the activity.
- An EAP must ensure compliance with these Regulations;
- An EAP must perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- An EAP must take into account, to the extent possible, the matters referred to in regulation 18 of Government Notice No. R. 326 of 7 April 2017 when preparing the application and any report, plan or document relating to the application; and
- An EAP must disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in the possession of the EAP and, where applicable, the specialist, that reasonably has or may have the potential of influencing –
    - any decision to be taken with respect to the application by the competent authority in terms of these Regulations; or
    - the objectivity of any report, plan or document to be prepared by the EAP or specialist in terms of these Regulations for submission to the competent authority.

2.2 Details of the expertise of relevant Environmental Assessment Practitioner

The members of Setala have combined expertise and a proven track record of initiating and completing major projects. We have experience of more than 15 years in EIA applications.

In order for the company to meet the emerging environmental challenges, Setala has assembled a team of professionals, consisting of a core of environmental experts with extensive experience in environmental assessments. The team includes environmentalists, various specialists, and public participation experts. A range of township development as well as linear projects including water pipelines and power lines,

agricultural development, including dams have been successfully completed over the years as indicated in our Experience Record.

The team is especially proficient in assisting the Client in understanding and determining environmental responsibility, potential impacts and giving guidance as to alternative approaches or identifying unforeseen environmental impacts.

Areas of expertise:

- Environmental Impact Assessment (EIA)
- Strategic Environmental Assessments (SEA)
- Environmental Compliance (incl. ECO)
- Public participation
- Specialist studies (Fauna, Flora, Avifauna, Wetland)
- Water related expertise and services i.e. Water Use Licence Applications, Integrated Water and Waste Management Plans, water use, and water quality assessments.

Refer to Table 2 and Appendix A for EAP details and experience.

TABLE 2: EAP DETAILS AND EXPERIENCE

Company	Setala Environmental (Pty) Ltd
Contact Persons	Mientjie Coetzee
Postal Address	44 Melrose Blvd Melrose Arch Johannesburg 2196
Telephone	083 253 2246
Facsimile	086 689 1515
E-mail	mientjie@peopletexture.co.za
Qualification	Master of Science
Professional Registrations	EAPASA Registration number 2019/1774 IAIAsa Membership number 3359
Experience	Mientjie Coetzee has 18 years' experience in the Environmental Sector and has gained experience as Environmental Assessment Practitioner and Project Manager working on a wide range of projects including residential, mixed land-use, industrial, roads and filling stations. Her primary skills include Environmental Screening Assessments, Environmental Impact Assessments (EIAs), Waste Management License Applications, Public Participation and Environmental Management Programmes (EMPrs).

Setala Environmental has no vested interest in the proposed development and hereby declares its independence as required by the EIA Regulations.

3 LOCALITY AND NATURE OF ACTIVITY

3.1 Project Locality and Extent

The proposed project is located on Stand 1719 Unit 23 and Stand 1427 Unit 25 Ga-Rankuwa, City of Tshwane Metropolitan Municipality, Gauteng Province. The residential development site is situated approximately 13 km west of Soshanguve and the R80, and 8km to the north of the N4 towards Brits. The site is in close proximity to the border between Gauteng and North West province.

The Property Co-ordinates for the center of the site are 25°34'37.28" S, 27°58'31.36" E. The Surveyor-general reference numbers for these stands are T0JR06030000171900000 and T0JR06040000142700000.

Unit 23 Erf 1719 Ga-Rankuwa (384 erven) is 11,1743 ha in extent and Unit 25 Erf 1427 Ga-Rankuwa (368 erven) is 10,8060 ha in extent. The total site is approximately 21.9803 ha in extent.

The proposed development is indicated on the Locality Maps below.

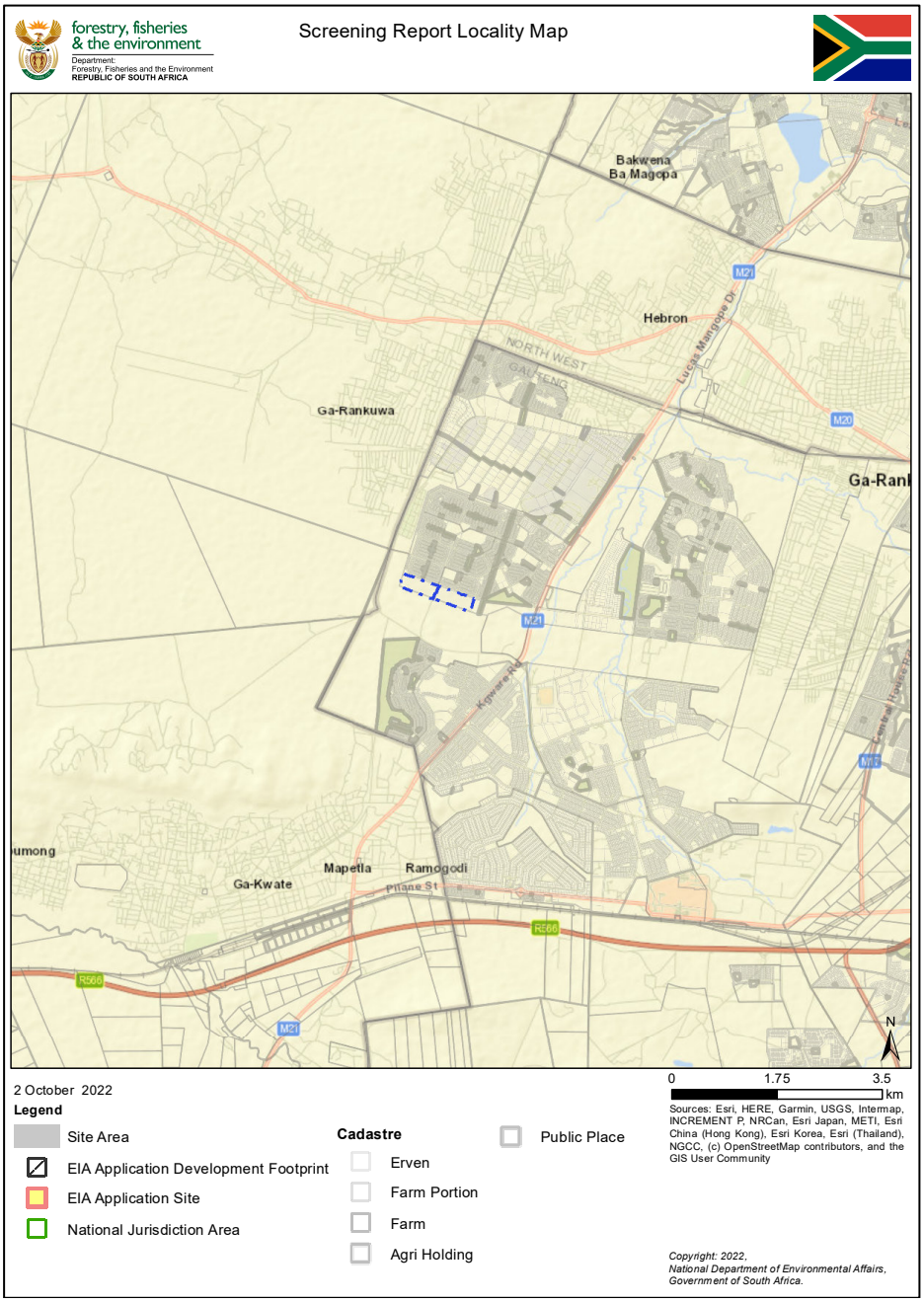


Figure 1: Locality Map

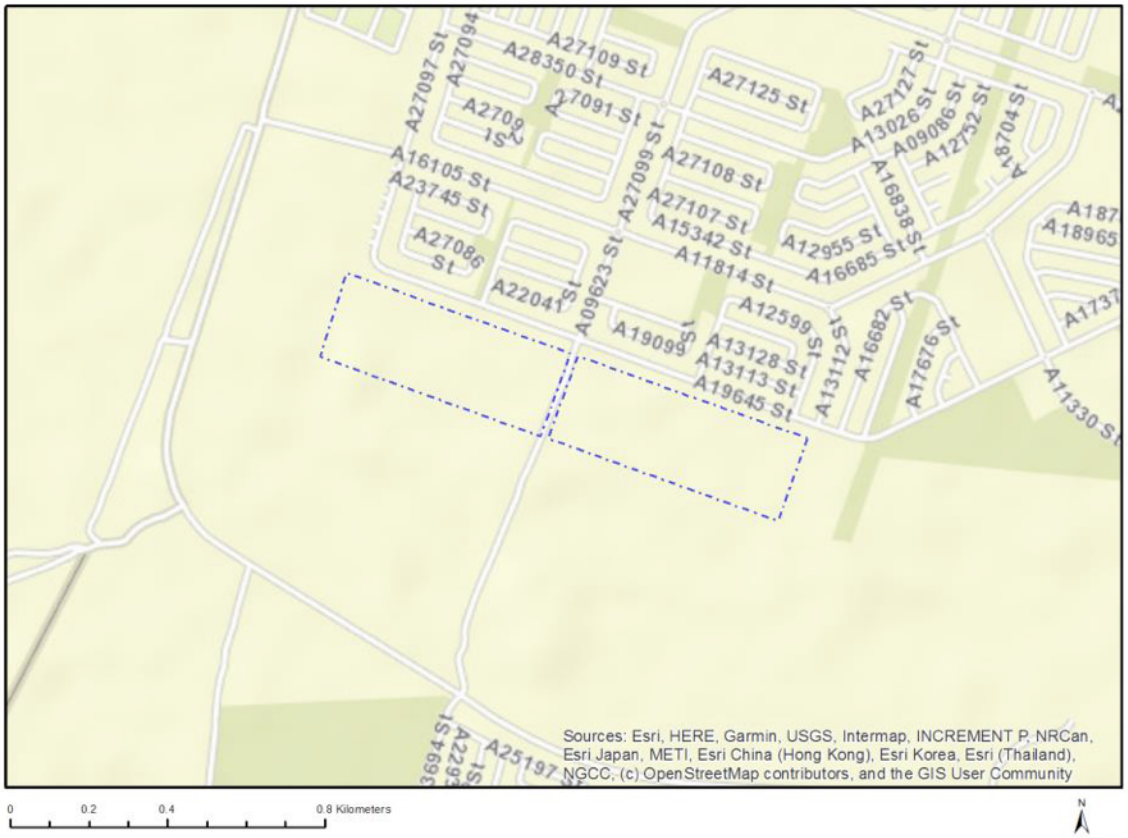


Figure 2: Locality Map

Figure 3: Locality Map (Google Earth)

3.2 Site Description

The subject properties are currently zoned "Undetermined" in terms of the Tshwane Town Planning Scheme, 2008 (Revised 2014). Surrounding zonings are mostly "Residential 1", "Residential 5" and "Undetermined".

The site is mostly vacant with some informal settlements as can be seen in Figure 3 above. The informal settlers will be accommodated in the proposed development. The surrounding land uses are mainly single dwelling houses to the north and vacant agricultural land to the south.

3.3 Project Description

Ga-Rankuwa Unit 23 & 25 is a City of Tshwane Metropolitan Municipality Human Settlements housing project. Durapi Consulting submitted a subdivision and rezoning application on Erven 1427 and 1719 Ga-Rankuwa for the expansion of the Ga-Rankuwa Township to provide additional single-dwelling house opportunities for the informal settlement that is currently on site.

Erven 1427 and 1719 Ga-Rankuwa to be rezoned from "Undetermined" to "Residential 1" and "Proposed Streets and Widening" in terms of Section 16(1)(a)(i) of the City of Tshwane Land Use Management By-Law, 2016.

Erven 1719 and 1427 Ga-Rankuwa will consist of 384 erven and 368 erven respectively with a total of 752 erven.

Refer to Appendix B and Figure 4: Subdivision/Layout Plan. The Site Layout Plan is also included in Appendix B.

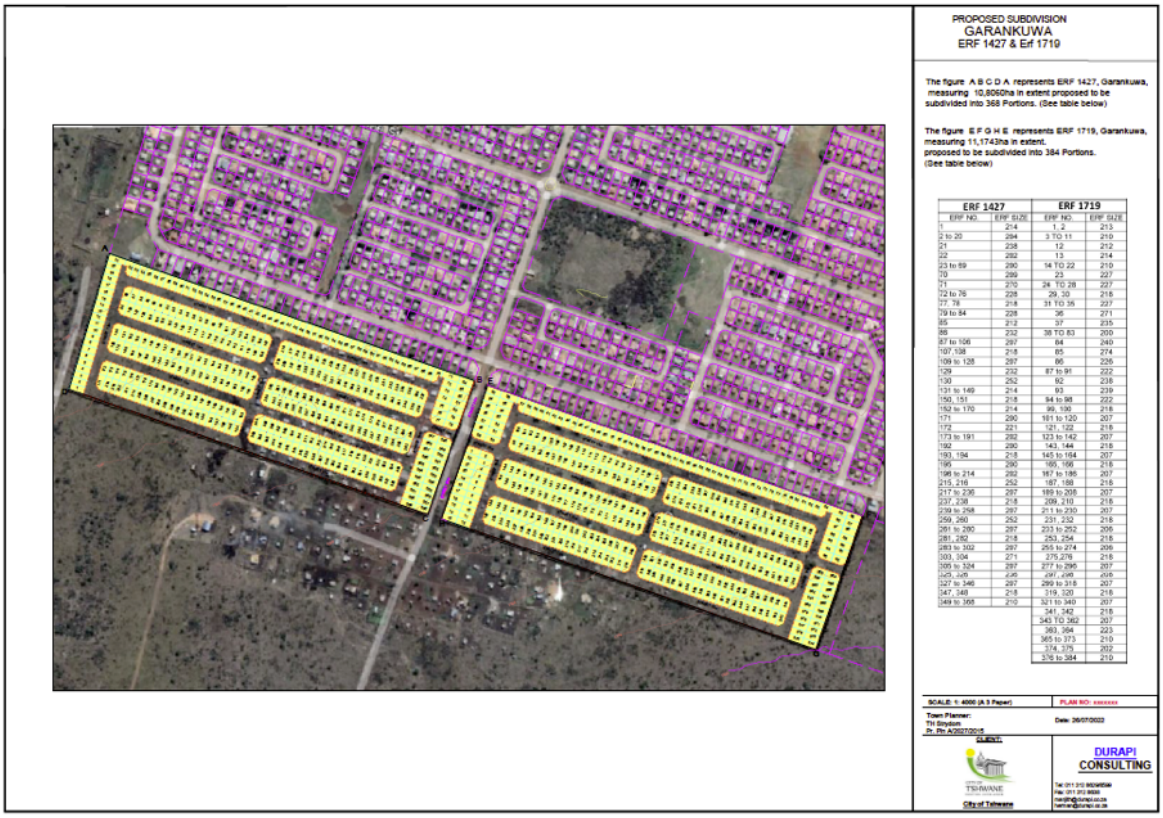


Figure 4: Layout Plan

3.4 Civil Services and Electrical Services

The subject properties are a proclaimed erf within a proclaimed township, and it is therefore accepted that the necessary engineering services are available to service the proposed development.

It is further accepted that with the approval of this application certain bulk service contributions will be payable to the City of Tshwane for any necessary upgrades to the existing municipal services infrastructure.

A Civil Services Report was compiled by CED Civil Engineering Project Management to investigate the availability of civil engineering services with regard to the proposed development. The Civil Engineering Report is included as *Appendix C (i)* and the Roads and Stormwater Services Impact Assessment is included as *Appendix C (ii).*

The Civil Engineering Report contained the following findings and recommendations:

3.4.1 Bulk Civil Services

3.4.1.1 Roads

Access to the site will be obtained through the existing road (from north to south) terminating on the northern boundary of the proposed development. As per the City of Tshwane (CoT) GIS extract image a road reserve for this road extension is identified along the eastern boundary of erf 1427 and western boundary of erf 1719. The internal road network for the proposed development would gain access from this road extension.

Figure 5: Existing Roads Layout

As per the proposed subdivision plan, all internal road reserve widths will be 13m wide with 5m wide roads.

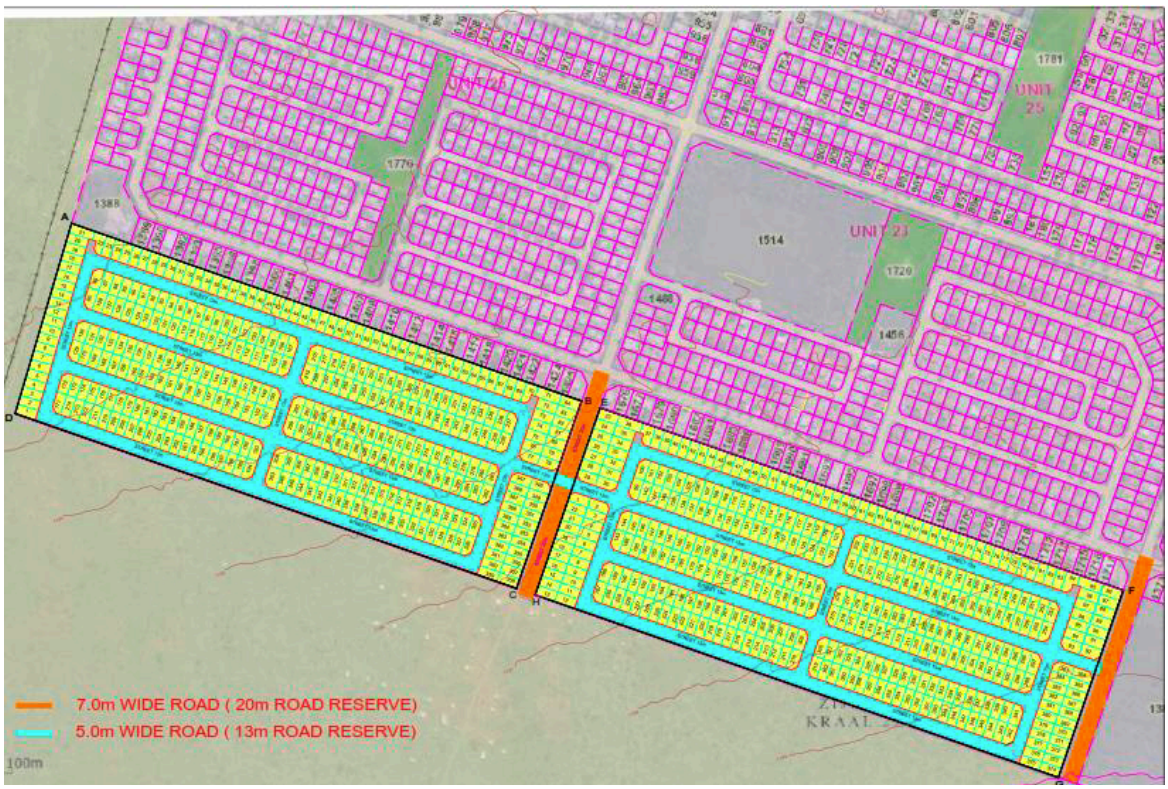


Figure 6: Internal Roads Layout

3.4.1.2 Stormwater

As per the CoT Sewer as-built drawing extract there are no available stormwater connection points available for the proposed development *(refer to Figure 7).* The site drains naturally towards the northwestern corner of the development. The internal stormwater network, consisting of a pipes and kerb inlets would discharge in the northwestern corner. A stormwater cut off system would be installed along the northern boundary to prevent stormwater runoff from the development to flow into the established lower lying erven along the northern boundary.

Figure 7: Existing Stormwater Layout

As per the proposed subdivision plan the internal stormwater network, consisting of pipes and kerb inlets would discharge in the northwestern corner. *Refer to Figure 8: Proposed Stormwater Layout.*

Figure 8: Proposed Stormwater Layout

3.4.1.3 Water

An existing 110mm diameter water line runs inside the access road reserve along the eastern boundary of erf 1427 and western boundary of erf 1719 terminating at the northern boundary of the proposed development. The internal water network for the proposed development would be connected unto this waterline.

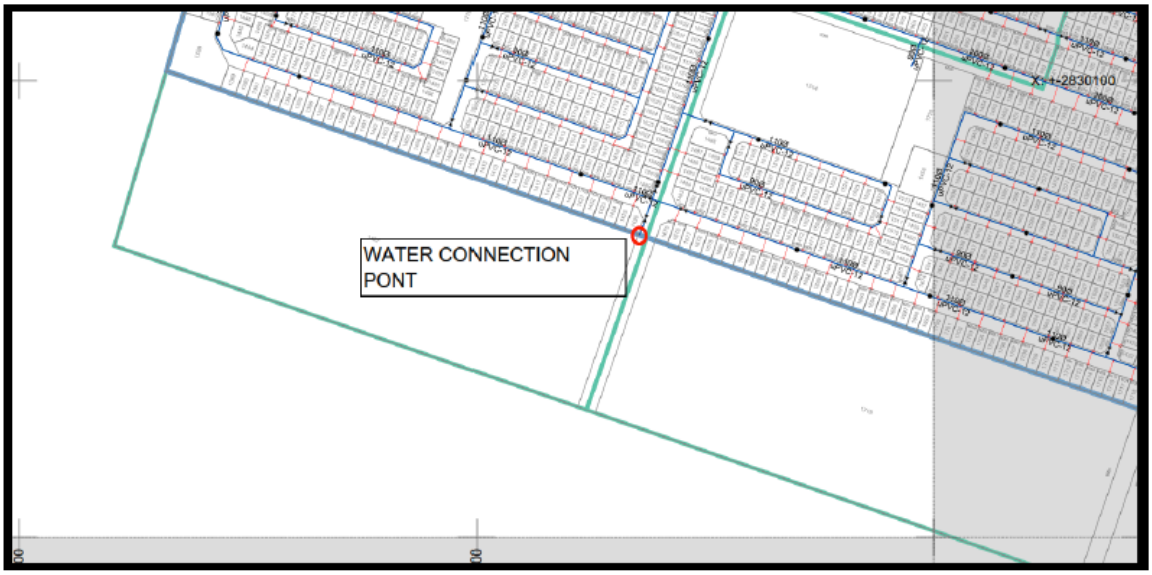


Figure 9: Existing Water Layout

The calculated average daily water demand is:

Erf 1427: 368 erven X 0.7 kℓ / day = 257.6 kℓ / day
Erf 1719: 384 erven X 0.7 kℓ / day = 268.8 kℓ / day

No GLS assessment has been conducted. It is assumed that the development will be able to obtain a water connection from the existing 110mm diameter waterline.

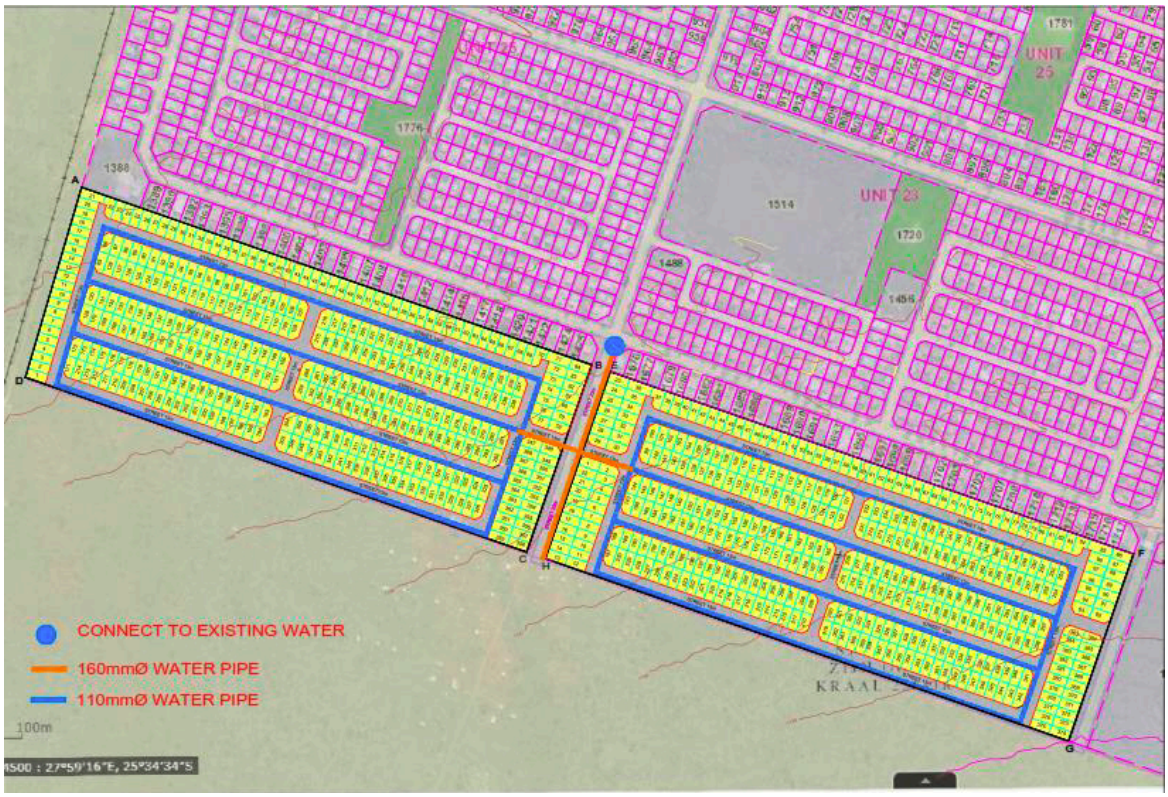


Figure 10: Proposed Internal Water Layout

3.4.1.4 Sewer

As per the CoT Sewer as-built drawing extract, an existing 250mm diameter sewer line runs along the western boundary of the proposed development. The internal sewer network would be connected unto this sewer line via a new 160mm diameter sewer connection line.

Figure 11: Existing Sewer Layout

The calculated average daily sewer demand is:

Erf 1427: 368 erven X 0.6 kℓ / day = 220.8 kℓ / day
Erf 1719: 384 erven X 0.6 kℓ / day = 230.4 kℓ day

No GLS assessment has been conducted. It is assumed that the development will be able to obtain a sewer connection on the existing 250mm diameter.

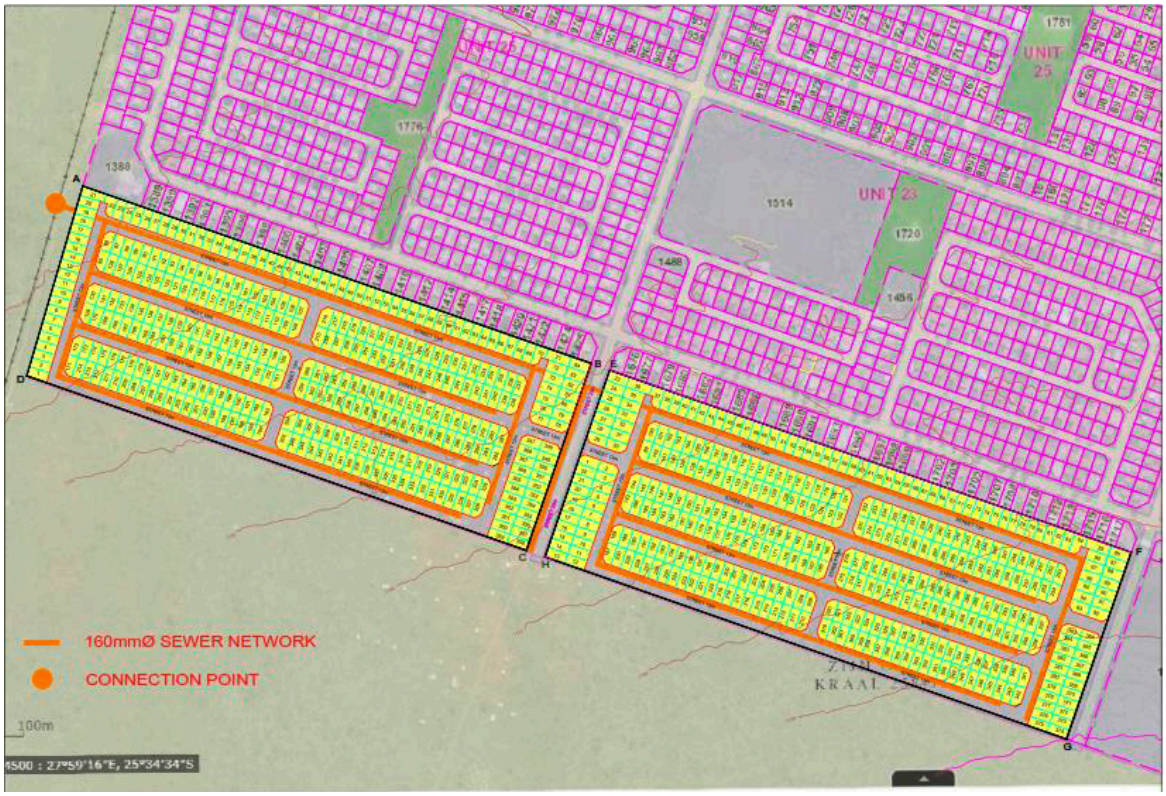


Figure 12: Proposed Sewer Layout

3.4.2 Electrical Services

The CTMM will be responsible for providing bulk electricity to the township, as well as internal reticulation. The SDF does not indicate whether there are any constraints in the network, although the national shortage should be considered and environmentally friendly measures, such as solar power should be considered.

3.4.3 Traffic Impact Assessment

A Traffic Impact Assessment was conducted by Gary Edwards Traffic Engineering. Report attached as Appendix C (iii).

The following 6 intersections were included in the investigation. Owing to a lack of street names, reference is made to Road A, Road B, Road C and Road D – see Figure 14:

- Intersection 1 – Road A / Road B – 2 Way Stop
- Intersection 2 – Road B / Road C – 1 Way Stop
- Intersection 3 – Road B / Road D – Roundabout
- Intersection 4 – Road D / M21 / Lucas Mangope Drive – 4 Way Stop
- Intersection 5 – Rahube Street / Road B – 4 Way Stop
- Intersection 6 – Rahube Street / Main Street – 1 Way Stop

Figure 13: Traffic Impact Assessment - Locality

3.4.3.1 Existing Traffic Volumes

The recorded weekday AM (06H30 to 07h30) and PM (16h30 to 17h30) peak hour traffic volumes are shown in Figure 2 of the attached TIA. During the traffic surveys, it was noted that no capacity constraints occurred on the roads near the site (Roads A to D) and low peak hour volumes prevailed.

3.4.3.2 Expected Future Volumes

The expected future background traffic volumes were calculated by considering the recommended growth rates as contained in the TMH 17 document

- Low growth areas - 0 – 3%
- Average growth areas - 3 – 4%
- Above average growth areas - 4 – 6%
- Fast growing areas - 6 – 8%
- Exceptionally high growth areas - > 8%

A growth rate of 3% was considered appropriate for this study. The expected future (2027) background volumes are shown in Figure 3 of the attached TIA.

3.4.3.3 Road Planning

The road planning of the City of Tshwane Metropolitan Municipality (CTMM) for the area surrounding the site is shown below:

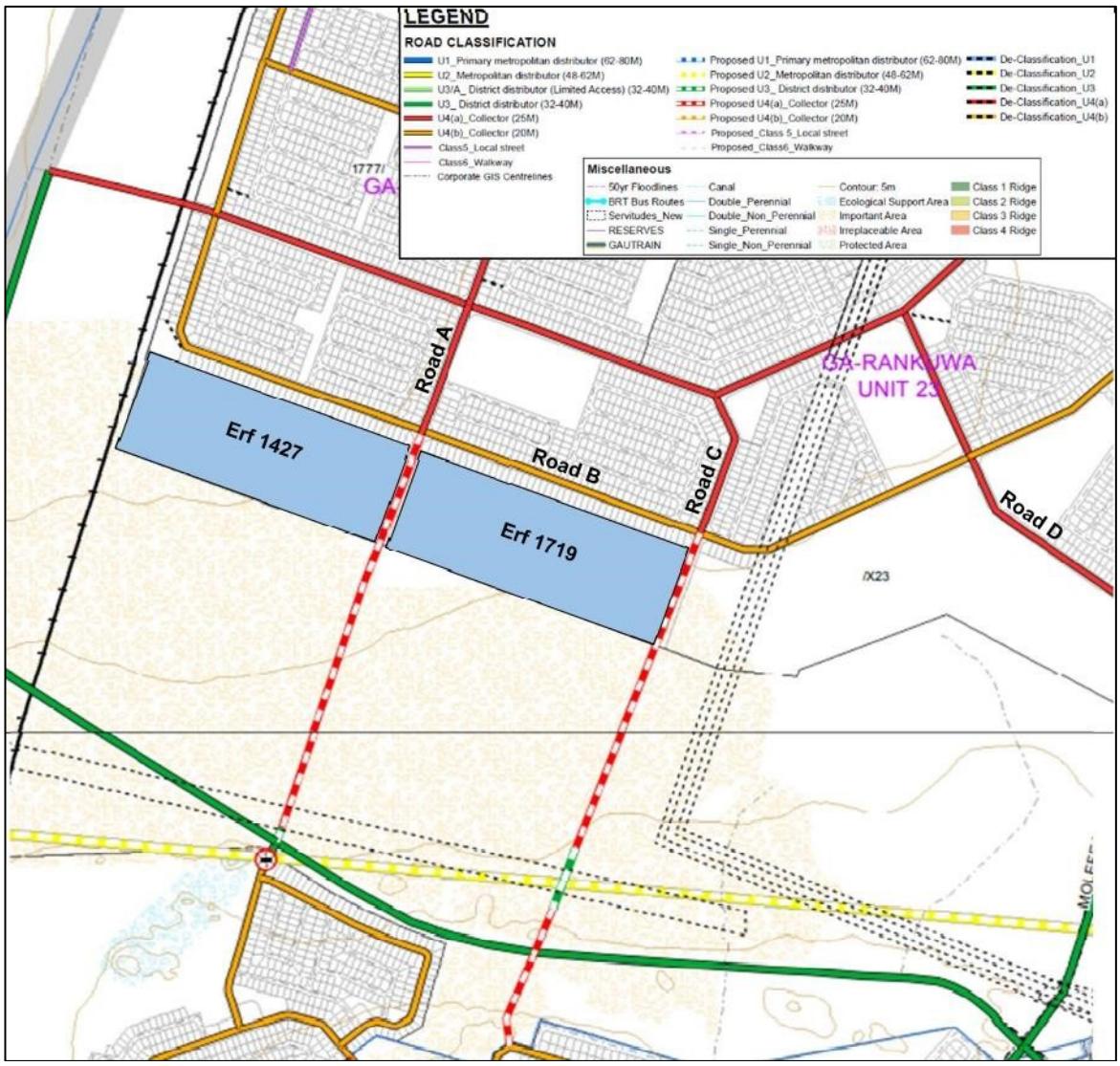


Figure 14: CTMM Road Planning

3.4.3.4 Trip generation, Distribution and Assignment

The expected peak hour trip generation of the planned township was calculated using the rates provided in the TMH17 document compiled by the Committee of Transport Officials. As recommended in the guideline document, reduction factors were applied to the trip generation rates to cater for the following:

- The planned erven are small (typically 210 m²) and will cater for the low-income group. It is also clear from the traffic counts that low vehicle ownership prevails in the area.
- Residents are expected to depend heavily on public transport and a high percentage of minibus taxis travel on the surrounding road network.

The trip generation and reduction factors are summarised below.

Residential 1
Land Use Code: 210 – Single Dwelling Units
Weekday AM Rate: 1.0 trip per unit (25% inbound and 75% outbound)
Reduction factors: Low vehicle ownership 40%, Transit nodes 15%

Reduced AM Rate: 0.51 trips per unit

Weekday PM Rate: 1.0 trips per unit (70% inbound and 30% outbound)
Reduction factors: Low vehicle ownership 40%, Transit nodes 15%
Reduced PM Rate: 0.51 trips per unit

3.4.3.5 Intersection Improvements

Except for the intersection of Road D and Lucas Mangope Drive, the intersections provide sufficient capacity to cater for the existing as well as expected future background traffic volumes on the road network.

The high traffic volumes along Lucas Mangope Drive cause constraints at the intersection with Road D. It is recommended that the control of this intersection be changed from a 4-way stop to a signalised intersection. The following road construction will be required to provide adequate access to the development on Erf 1427 and Erf 1719.

- Extension of Road A from Road B to the southern boundary of Erf 1427
- Extension of Road C from Road B to the southern boundary of Erf 1719

The above roads should consist of 1 lane per direction, each lane at least 3m wide. As shown in the photo below, the road reserve catering for the extension of Road A is available.

Figure 15: Road Reserve for the Southern Extension of Road A (southbound view)

Figure 16: Aerial View (Road C Extension)

A residential dwelling has unfortunately been constructed along the alignment of the southern extension of Road C. This dwelling unit will need to be relocated.

3.4.3.6 Public Transport Facilities

The residents in Ga-Rankuwa depend heavily on public transport and it can be expected that taxi routes will expand into the township as development takes place. According to the COTO Manual public transport stops should be located within acceptable walking distances from generators, attractors, and modal transfer facilities. Walking distances to stops should preferably be within 400m but not more than 800m.

A formal lay-by facility is available along Road B, approximately 290m west of the intersection with Road A.

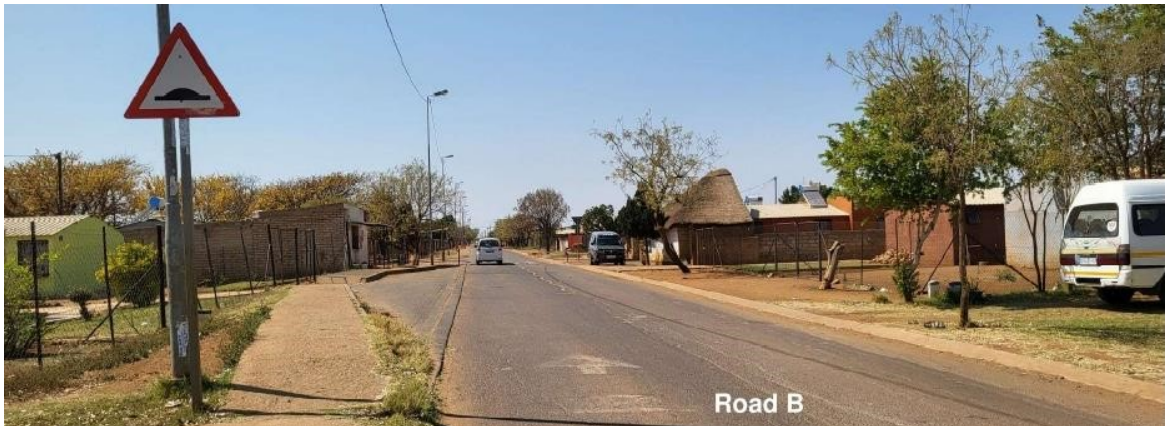


Figure 17: Existing Minibus-Taxi Layby along Road B

With the extension of Road A, additional lay-by facilities should be provided on either side of this road, downstream of the access to Erf 1427 and Erf 1719. It is also recommended that additional lay-bys be provided along the extension of Road C, at the access to Erf 1719.

3.4.3.7 Pedestrian Facilities

A 1.5m wide formal pedestrian walkway is currently available along the northern side of Road B. Speedhumps and pedestrian crossing facilities are also provided at various locations along Road B.

Figure 18: Existing Pedestrian Walkway along Road B (eastbound view along Road B)

With the southern extension of Road A and Road C, formal pedestrian walkways (at least 1.8m wide but preferably 2m wide) should be provided along the street front of Erf 1427 and Erf 1719.

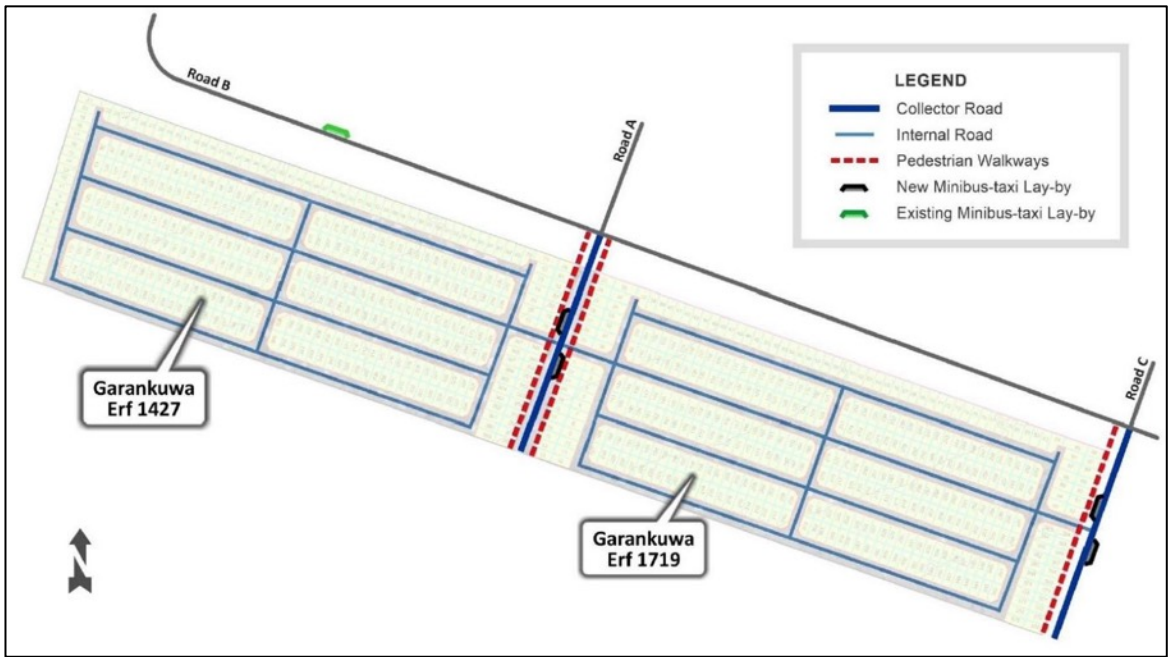


Figure 19: Required Road Construction including Public Transport and Pedestrian Facilities

3.4.3.8 Recommendations

It is recommended that:

The proposed subdivision of Erf 1427 and Erf 1719 to allow 752 residential 1 erven be supported from a traffic engineering point of view.

- The following road improvements should be implemented as part of the township:
- Installation of a traffic signal along Lucas Mangope Drive at the access to Ga-Rankuwa (Road D);
- Extension of Road A (U4(b) Collector road) from Road B to the southern boundary of Erf 1427;
- Extension of Road C (U4(b) Collector road) from Road B to the southern boundary of Erf 1719;
- Construction of public transport lay-by facilities along the U4(b) collector roads at the main intersections providing access to Erf 1427 and Erf 1719.
- Construction of the municipal road network within the township;
- Construction of formal pedestrian walkways (preferably 2m wide) along the U4(b) collector roads along the street front of Erf 1427 and Erf 1719.

4 NEED AND DESIRABILITY[1]

4.1 Need

Need refers to what is essential or a requirement rather than something being desirable. The provision of adequate housing is a basic human right that every South African is entitled to. There is an increasing need for the provision of adequate housing located close to transport, employment and other urban opportunities. This section of the report details the need for proposed development.

[1] Information obtained from Motivating Memorandum for Rezoning and Subdivision Application for Erf 1719 Ga-Rankuwa Unit 23 and Erf 1427 Ga-Rankuwa Unit 25 compiled by Durapi Consulting.

4.1.1 Inclusionary Housing

The proposed development is in fact a requirement of the City of Tshwane Metropolitan Municipality towards its "Inclusionary Housing" and is therefore implementing that requirement. The growing gap between income and the cost of housing does not affect only lower income households but also households with middle-range incomes that struggle to find affordable housing.

There are a growing number of South African households that are willing and able to buy or rent a nonsubsidized house or apartment. However, many of these families simply have nowhere to go as there is little suitable housing stock made available to them in good localities. Many of these families resort to subsidized housing as an alternative residential option thereby creating shortage of subsidized housing supply. A need exists to create inclusionary housing for middle income households who are willing to purchase or rent non-subsidized housing and thereby participate in the financed and bonded housing market.

The proposed development proposes to address the need to initiate an upward mobility trend "Gap Housing" which addresses the gap between what middle-income families earn and the affordability of housing offers.

"Gap Housing" is therefore aimed at widening the availability of housing stock for lower-income families. This proposed development commits itself to providing opportunities in the "gap housing" market – so named because it addresses the gap between what middle-income families earn and what houses they can afford. This will be achieved by bridging the gap between the high- and low-income housing types.

4.1.2 Infrastructure Development

Effective spatial planning requires increased strategic, socio-economic and bulk infrastructure investment that encourages infrastructure-led growth and increase the performance of the economy. To provide energy efficient and coordinated cities optimum utilisation of all resources including land, engineering services, transportation infrastructure, social infrastructure and ecological resources, is required. The proposed development was designed to be one which is compact and will take advantage of the above principles. The proposed development will also encourage infrastructure upgrades in the area as new bulk services will accompany the development and be integrated into the existing networks. The development of new infrastructure will also assist in maintenance of ageing infrastructure in surrounding neighbourhoods.

4.1.3 Better Utilisation of Land

The land is currently underutilised. The Breaking New Ground policy places emphasis on public owned land to be developed in a strategic manner which can enhance the location of new housing projects.

Thus, the application for a housing development will ensure optimum utilisation of the subject property without defeating any of the primary considerations in respect of conservation and environmental issues. The proposed development will contribute towards diversifying land use and economic activities in the sub-region catering for a diverse clientele and attracting investment into the area.

4.1.4 Impact of Development on Surrounding Neighbourhoods

Currently, the subject properties are mostly vacant and underutilised with some informal structures. The proposed development will make efficient use of the land by creating housing opportunities and taking advantage of existing major road linkages.

The Gauteng Province is one of the fastest growing metropolitan regions on the African continent and attracts large commercial and industrial developments which in turn increase the need for adequate housing. Gauteng Province faces a challenge of not only providing housing for the low income but the growing middle class, ensuring sustainable human settlements that offer educational, economic and social opportunities for all residents.

The generation of rates and taxes will contribute to Municipal income regeneration while mitigating challenges faced by the municipality such as job creation, upgrading of infrastructure, SMME growth and social/human development.

From the above it is evident that the proposed development will be demand driven and will meet the growing need/demand for sustainable human settlement, integrating housing with social, economic and environmental amenities.

4.2 Desirability

The application is desirable, in that it ties in to with the vision of the City of Tshwane Metropolitan Municipality. The shift in the planning paradigm is to provide in essence for a more compact effective and sustainable city.

The proposed development is in line with the guiding principles set out in the Spatial Planning and Land Use Management Act, 2013 (Act 16 of 2013), which is discussed below.

4.2.1 Legislative Framework

The legislative framework provides a developmental vision for the city which all new and existing developments should promote. The legislative framework will analyse policies and frameworks on national, provincial and local level supportive of inclusionary development. The policies influencing and affecting National development, Gauteng Province and the City of Tshwane are discussed below:

4.2.1.1 National Development Plan

The National Development Plan (NDP) 2030 offers a long-term perspective for the development of South Africa aimed at eliminating poverty and reducing inequality by 2030. The importance of creating sustainable human settlements is emphasised by the NDP. The key target for human settlements as described by the plan includes:

- More people living closer to their places of work.
- Better quality public transport.
- More jobs in or close to dense urban townships.
- Clear strategy for densification of cities through land use planning and focused strategy on the housing gap.

The road network within the development linked with the larger public transport route ensures an efficient public transport system benefiting local and surrounding residents.

It can be interpreted that the proposed development will assist in realising the vision of the National Development Plan by creating a development that is compact offering employment opportunities and quality public transport.

4.2.1.2 Breaking New Grounds: Comprehensive Plan for Development of Sustainable Settlements

The Breaking New Ground Plan (also referred to as BNG) was published by the National Department of Housing in 2004 to provide guidelines for the development of sustainable human settlements. The policy, BNG, takes a different approach of creating sustainable human settlements as compared to only providing houses. Sustainable human settlements envisioned by BNG is one where inhabitants have adequate access to economic opportunities, mix of safe and secure housing/tenure types, reliable basic services, educational, health, and social services.

The BNG guidelines, relevant to new development and how the proposed Ga-Rankuwa Unit 23 and Unit 25 development will incorporate these guidelines are discussed below:

Residents should live in a safe and secure environment, and have adequate access to economic opportunities, a mix of safe and secure housing, and tenure types, reliable and affordable basic services, educational, entertainment and cultural activities, and health, welfare and police services.

The proposed development will incorporate all of the above-mentioned amenities as the development will be an inclusionary development. The development will offer housing, sizes and prices to accommodate financial capability.

Ensure the development of compact, mixed land use, diverse, life-enhancing environments with maximum possibilities for pedestrian movement and transit via safe and efficient public transport in cases where motorised means of movement is imperative.

The road network within the proposed development is one that caters to both motorised and non-motorised movements.

Ensure that lower-income housing is provided in close proximity to areas of opportunity. The inclusionary development will provide all income groups in the development with economic opportunities in close proximity.

Integrate previously excluded groups into the city, and the benefits it offers, and to ensure the development of more integrated, functional and environmentally sustainable human settlements, towns and cities. The latter includes densification.

The proposed development aims to be inclusionary on all levels of urban life. The integration of socio economic, gender and racial predispositions lies at the heart of the intervention. The development will be integrated with the greater City of Tshwane and Gauteng Province making it a functioning sustainable human settlement.

4.2.2 Spatial Planning Policies

This section of the report contains a comprehensive analysis of the spatial planning policies that inform and support the Ga-Rankuwa Unit 23 and Unit 25 development. These policies are:

- Gauteng Spatial Development Framework 2030 (2016)
- Tshwane Regional Spatial Development Framework 2018
- Tshwane Metropolitan Spatial Development Framework 2030 (2021)

4.2.2.1 Gauteng Spatial Development Framework 2030

The Gauteng Spatial Development Framework (SDF) envisages Gauteng in 2030 as an integrated, connected space that provides for the needs of all.

The GSDF 2030 builds on the concept of the GMP and aspires to establish a balanced, polycentric spatial network, with strong and resilient nodes enabling mutually beneficial exchanges of goods and services, and movement of people. To support the establishment of this polycentric form, four spatial development strategies are to be followed:

- Capitalising on proximity, by directing higher densities closer to economic nodes and public transport networks, and improving conditions in areas closer to economic opportunities, to ensure even greater benefits for the people and economy of these areas.
- Managing new settlement development, to prioritise infill development and densification, rather than expanding residential development outwards, so new settlements are functional and integrated units of the polycentric provincial network and based not only on the availability of land.
- Building an economic network, through a system of high-order nodes and activity corridors, developing economic clusters that benefit from synergies and unlock the advantages of agglomeration.
- Creating a viable and productive hinterland, by protecting valuable resources and high potential agricultural land from harmful development and managing water resources fugally and effectively.

With regards to the proposed development, it can be said that the development proposal is in line with the spatial strategies of the Gauteng SDF.

The subject site is located just close to various public transport facilities and surrounded by various businesses in an already built-up area. The development proposal entails the upgrading of an underutilized parcel of land as opposed to urban sprawl.

4.2.2.2 Tshwane Regional Spatial Development Framework 2018

Tshwane, the administrative capital of South Africa, needs to be a leader in sustainable and innovative development. As a capital city, Tshwane should be among the most liveable of African nations, if not the world. A liveable city is convenient, efficient, safe, attractive and cost-effective for work, play and stay, meeting the needs and preferences of residents, taking into account broader social, environmental and economic interests.

In summary regarding the spatial directives given in the prior sections on the spatial directives of this MSDF, it can be said that spatial transformation is the objective of this MSDF. Spatial transformation is an all-encompassing strategic approach that will assist us to become a leading city. Spatial transformation is about improving quality of life. It is about maximising employment opportunities.
It is about not spending unnecessary hours in traffic – getting a mother who works 60 km away from home back to her children earlier in the day rather than late at night.

Spatial transformation is about providing a space for people across different income groups to interact with one another in the same communities. It is about breathing clean air, protecting limited natural resources and living healthier lives. Spatial transformation is the key to attracting investment in our cities by creating economies of scale through an efficient space economy by supplying the demand in an efficient, effective and sustainable manner. Spatial transformation is about good governance and advancing service delivery in a meaningful, impactful and more affordable manner.

The spatial vision, then, is to become a spatially efficient capital city that is liveable, sustainable, competitive and resilient.

Liveable city

A liveable city is a well-governed city. A liveable city can encourage economic activity by attracting a skilled workforce that brings their expertise to the city, ultimately contributing to the knowledge economy. Tshwane can become an attractive force by being one of the most successful cities by addressing matters that relate to the quality of life.

A liveable city further attracts tourists and investors who spend their money in the city. This tourism can either be for leisure, recreation or business, and a city that offers the required quality infrastructure that supports one or all of these will attract more tourists. An important factor determining why people choose to visit or invest in a particular place is the "atmosphere" or the "cultural identity". Tourists now look for the "local culture", wanting to visit a particular art gallery, monument or place of natural beauty. Also, a desirable location, good educational facilities, a friendly, caring community, a healthy and safe environment, good quality housing and a competitive, stimulating local atmosphere are essential for business development. Therefore, the "image of the local community" is becoming more significant in attracting investors and tourists to an area.

A liveable city that additionally runs on a comprehensive mobility and connectivity system for passengers and freight also reduces the cost of doing business, effectively stringing the city together, making it “smaller”, and providing equal access for all employees to all economic nodes and integrating labour markets. Such a connected city requires the support of an efficient and effective space economy where settlement and economic development opportunities should be channelled into activity corridors and nodes that are adjacent to or that link the main growth centres. Transport (and other) infrastructure investment should primarily support localities that will become major growth nodes.

Sustainability

Optimising the use of land through compaction, densification, infill and consolidation will result in a city with spatially integrated equal opportunities. This could correct spatial imbalances, create integrated sustainable settlements and advance social equity through inclusive development, leading to sustainable communities with a clean, healthy and safe environment, and integrated social services.

Competitiveness

Instilling investor confidence by ensuring a well-managed, quality-built environment through the enforcement of relevant legislation, maintenance and management of infrastructure and strategic investment in infrastructure-focused areas. Targeting broad-based economic growth leads to a productive city.

Resilience

Being innovative and adaptable while maximising spatial opportunities and, in turn, maximising economic growth opportunities through strategic investment decisions.

The spatial vision should deliver on these positive living conditions through tangible expression in the built and natural environment. The game-changers to be employed will include the following:

- Comprehensive safety through law enforcement, disaster risk management and effective delivery of emergency services in order to ensure order, physical safety and security

- Spatial re-engineering that will ensure easy access to the full range of social amenities and facilities, including housing, infrastructure and economic opportunities, for all residents
- Support of improved mobility and connectivity through TOD that creates the critical population threshold required to maintain an efficient and attractive public transport system that will address issues of poverty by reducing the cost of travel and ease access to economic opportunities
- Design and manage the quality of public environment, spaces and facilities, ensuring cleanliness, which will encourage residents to spend more time outside innovation in service delivery through urban design and architecture
- An engaging city through arts and culture

The BEPP indicator reporting framework identifies the following as key outcomes and it is important to identify how these relate to the City's spatial vision:

- Well-governed city
- Compact city
- Inclusive city
- Productive city
- Sustainable city

The MSDF, RSDF and precinct plans are not the sole mechanisms in determining the suitability of any potential change in land use but should be used in conjunction with requirements as may be determined by infrastructure and other relevant aspects that may not be contained in the RSDF.

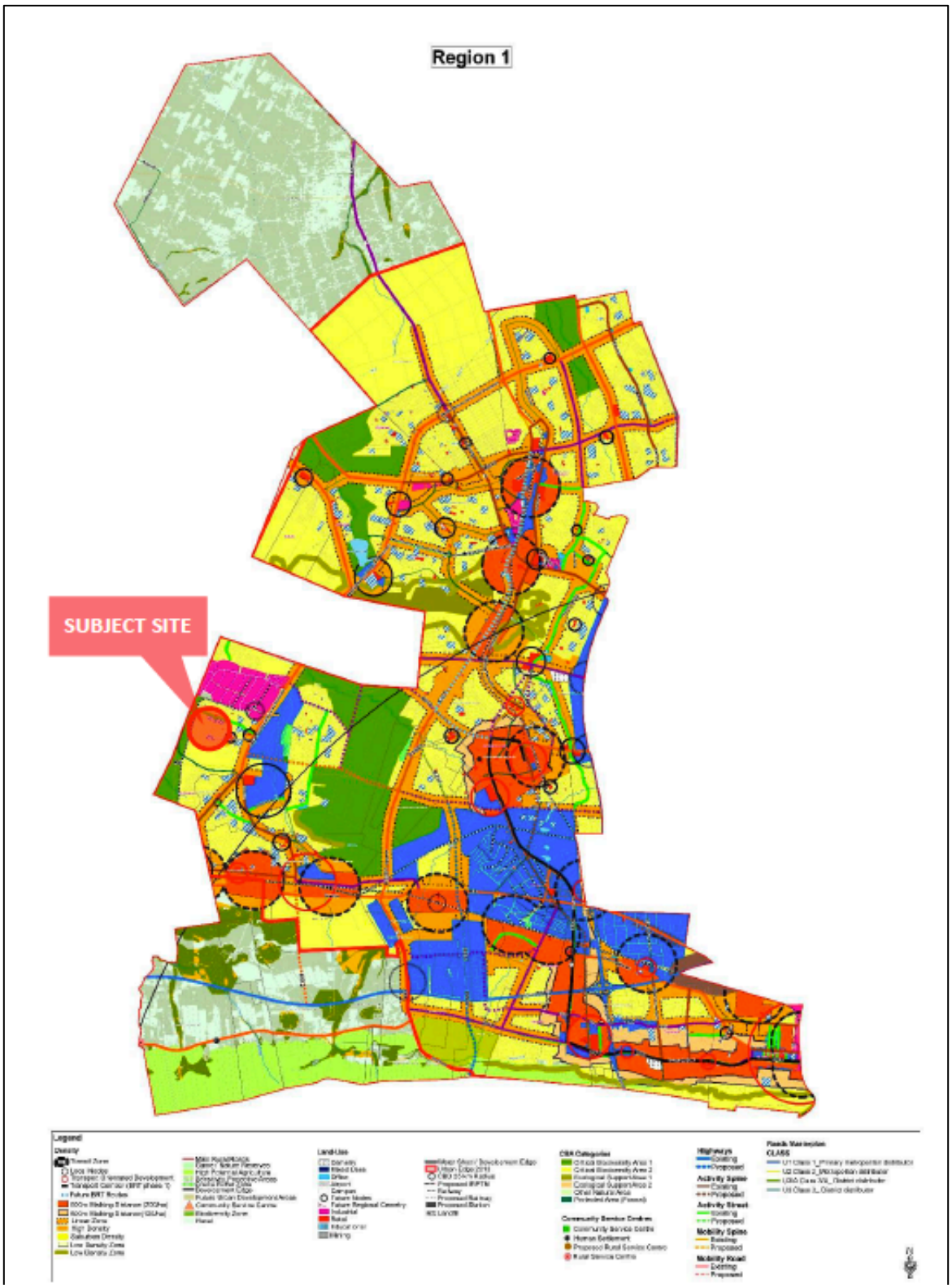


Figure 20: Tshwane Regional Spatial Development Framework – Region 1

4.2.2.3 Tshwane Metropolitan Spatial Development Framework 2030

The MSDF represents the spatial interpretation of desired growth and development directions for the City. It spatially focuses economic and infrastructure development and gives spatial expression to the development plans above (CDS and IDP), both for the long-term and the medium term.

The purpose of a metropolitan spatial framework for the city is to provide a spatial representation of the city vision and to be a tool to integrate all aspects of spatial (physical) planning such as land use planning; planning for pedestrian movement vehicular and other movement patters; planning regarding buildings and built-up areas; planning of open space systems; planning of roads and other service infrastructure; as well as to guide all decision-making processes regarding spatial (physical) development.

It is the intention of the MSDF to restructure our fragmented, inequitable and inefficient urban form to create a more equitable, efficient and environmentally and financially sustainable urban dispensation in line with current legislation and policy. The compaction and functional integration of the city are normative directives from national level, and implies:

- higher density urban development,
- greater mixing of compatible land uses and
- focused concentration of high-density residential land uses and intensification of non-residential land uses in nodes, around transit stations (such as the Gautrain, BRT, Rail and other formalised intermodal transport facilities.

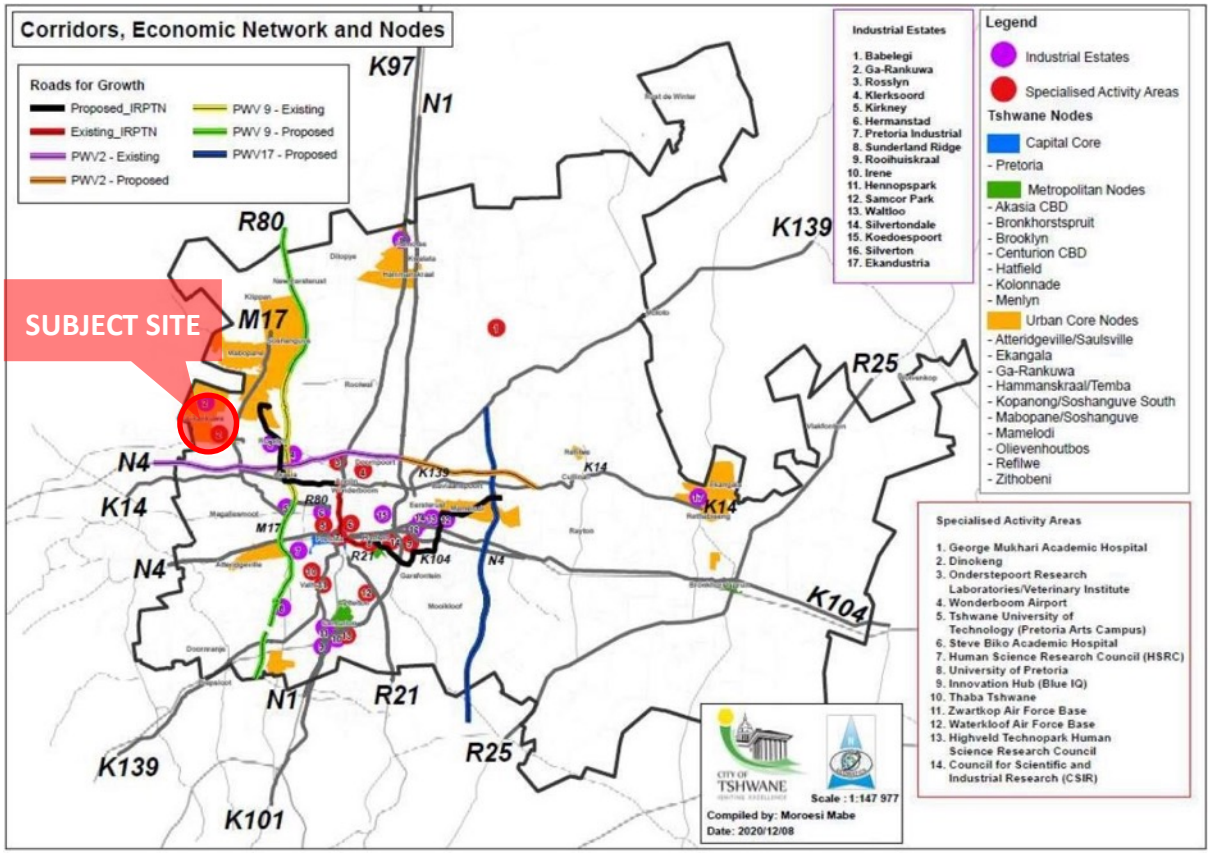


Figure 21: Schematic Representation of the Spatial One Plan

According to the Spatial One Plan of the City, Ga-Rankuwa falls with an area earmark as one of the Urban Core Nodes.

Urban Core – During apartheid, the so-called "township" areas were developed as a result of forced relocation programmes. Inevitably, these townships grew to accommodate large populations of low-income or unemployed people. The economic circumstance was clearly evident in the quality of the physical environment. Under the new government, which was established in 1994, these township areas were

identified, not as a blight in the urban fabric as previously thought of, but as beacons of opportunity through the human capital that was concentrated within the various communities of the townships. Due to the great need that often belies such nodes, the government must play a more active role in social and economic restructuring, especially in view of the limited private investment in relation to metropolitan cores. These urban cores are also the most spatially and economically marginalised areas within the urban fabric. The Neighbourhood Development Partnership Programme is a nationally funded programme that aims to address the improved quality of the environment in urban cores and is an important component of "township regeneration" and supporting the "township economy".

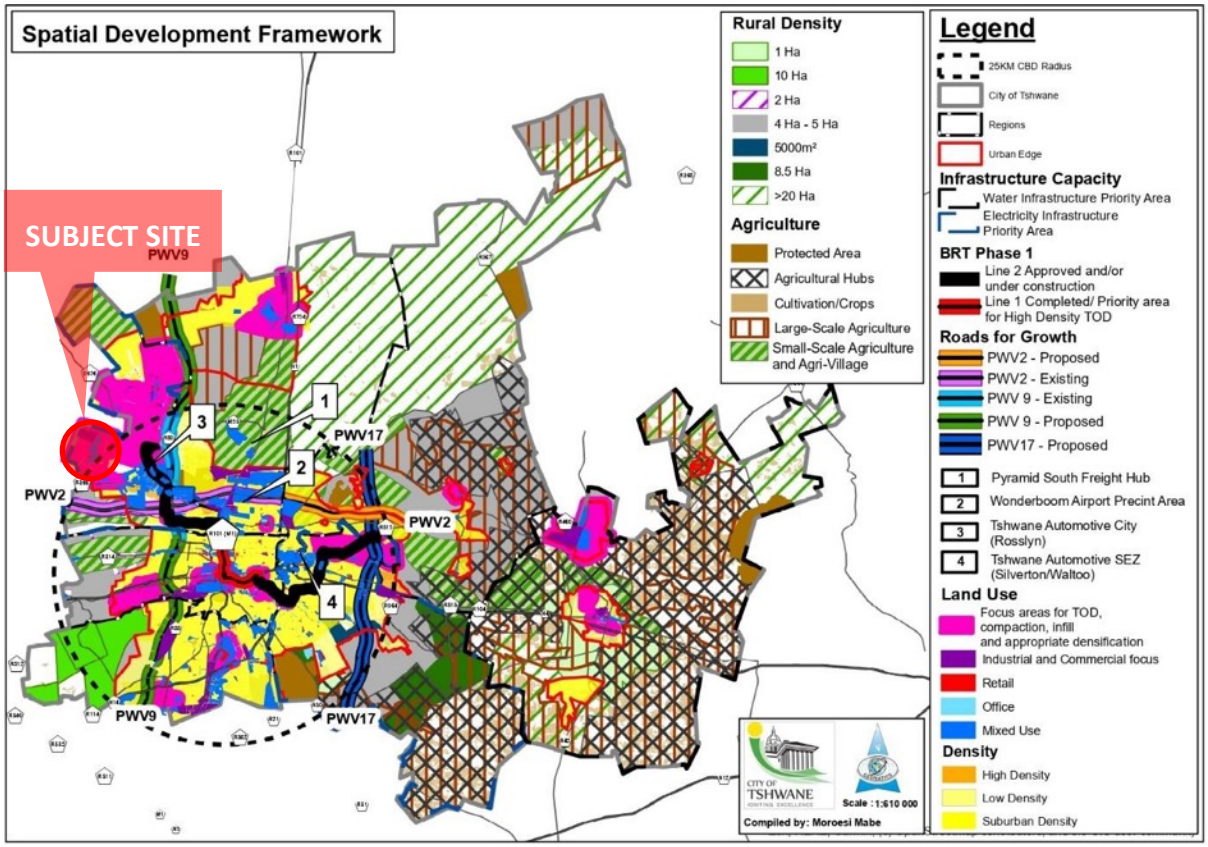


Figure 22: Tshwane Spatial Development Framework

According to the Spatial Development Framework of the City, Ga-Rankuwa falls within a land use earmarked as Focus Areas for TOD, Compaction, Infill and Appropriate Densification.

4.2.3 Reasonableness

As the subject properties are not utilised for Agricultural Purposes and informal residential structures are constructed on part of the properties, this land would be adequate for the proposed housing development. The site is strategically located close to amenities and there are existing engineering services for the development. It is not unreasonable to subdivide and rezone these properties to accommodate the proposed housing development.

4.2.4 Public Interest

The City of Tshwane Policy Framework (RSDF and MSDF) were conceptualised and approved in the public interest (for the greater good). These policies were done with public participation as part of the process and this application also includes public participation.

The proposed development takes these policies into account and is in line with the proposals made in the public policies mentioned in this document and is therefore in the public interest. The proposed development adopts a holistic approach to providing a well-functioning, sustainable community which is in the community's best interest.

The proposed development takes into consideration the future and existing approved surrounding land uses, servitudes and road infrastructure, as well as the need for supportive land uses.

4.2.5 Coordinated and Harmonious Development

The proposes development will result in stronger component of supportive land uses to the greater City of Tshwane, which will contribute to the sustainability of the area.

4.3 Consideration of principles of environmental management as set out in section 2 of NEMA

Various principles of environmental management as set out in section 2 of NEMA have been taken into account.

People and their needs have been placed at the forefront of this assessment by taking into account the impact of the proposed activity on their physical, psychological, cultural and social interests.

- The disturbance of landscapes and sites that constitute the nation's cultural heritage is avoided, or where it cannot be altogether avoided, is minimised and remedied (e.g. no structures of cultural importance has been recorded on the property);
- Negative impacts on the environment and on people's environmental rights by assessing potentially negative impacts in the selection of preferred alternatives and providing appropriate mitigating measures (no potentially adverse negative impacts have been identified during the impact assessment process).

The assessment also followed a risk-averse and cautious approach, which takes into account the limits of current knowledge about the consequences of decisions and actions as is reflected in the opinion of the EAP in this report.

It has been acknowledged in the assessment that all elements of the environment are linked and interrelated, and it must take into account the effects of decisions on all aspects of the environment and all people in the environment by pursuing the selection of the best practicable environmental option / alternative.

Environmental justice has been pursued in that adverse environmental impacts shall not be distributed in such a manner as to unfairly discriminate against any person, particularly vulnerable and disadvantaged persons. This has been achieved by ensuring that the proposed activity will not lead to adverse environmental impacts.

Equitable access to environmental resources, benefits and services to meet basic human needs and ensure human well-being has been pursued and measures have been taken to ensure access to it.

The social, economic and environmental impacts of activities, including disadvantages and benefits, will be considered, assessed and evaluated in the EIA report, and decisions are deemed appropriate in the light of such consideration and assessment.

The right of workers to refuse work that is harmful to human health or the environment and to be informed of dangers is being respected and protected in inter alia the relevant EMPr.

The regulatory requirement to advertise the Environmental Authorisation and the placement of information within the public domain guarantee transparency and access to information.

Intergovernmental co-ordination and harmonisation of policies, legislation and actions relating to the environment has been promoted by keeping governmental stakeholders informed on the process and providing them with draft reports.

It is being understood that actual or potential conflicts of interest between organs of state should be resolved through conflict resolution procedures.

The assessment will also be conducted with the underlying understanding that the environment is held in public trust for the people, the beneficial use of environmental resources must serve the public interest and the environment must be protected as the people's common heritage.

The relevant EMPr will 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 must be paid for by those responsible for harming the environment.

5 LEGAL FRAMEWORK

5.1 The Constitution of South Africa (No. 108 of 1996)

Section 24 of the Constitution of South Africa (No. 108 of 1996) states 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 (c) secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development."

This protection encompasses preventing pollution and promoting conservation and environmentally sustainable development. These principles are embraced in the National Environmental Management Act (Act No. 107 of 1998) (as amended) and given further expression.

5.2 National Environmental Management Act, Act 107 of 1998 and EIA Regulations 2017

National Environmental Management Act, Act 107 of 1998: The Environmental Impact Assessment Regulations 2017: The NEMA EIA 2017 regulations and the listing notices thereto are relevant.

In terms of the EIA Regulations (GN R. 327, 325 and 324) of April 2017, a number of listed activities, as summarised in the table below, have been identified that may be triggered by the proposed project, and which will subsequently require environmental authorisation from GDARD:

Table 3: Initial listed activities in terms of NEMA for the proposed Ga-Rankuwa Unit 23 and Unit 25 development:

Relative Notice	Description (Verbatim and applicability to the project)
GN.R. 327, 7 April 2017 Listing Notice 1 Activity 9	To make provision for the installation of pipelines for the bulk transportation of water and/or stormwater above these thresholds, if required.

The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water— (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where— (a) such infrastructure is for bulk transportation of water or storm water or storm water drainage inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	*Applicability* *The proposed development falls within an urban area (within the City of Tshwane Urban Edge). Listing Notice 1, Activity 9 is therefore <u>not</u> applicable.*
GN.R. 327, 7 April 2017 Listing Notice 1 Activity 10 The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes – (i) with an internal diameter of 0,36 metres or more; or (ii) with a peak throughput of 120 litres per second or more; excluding where— (a) such infrastructure is for the bulk transportation of sewage, effluent, process water, waste water, return water, industrial discharge or slimes inside a road reserve or railway line reserve; or (b) where such development will occur within an urban area.	To make provision for the installation of pipelines for the bulk transportation of sewage above these thresholds, if required. *Applicability* *The proposed development falls within an urban area (within the City of Tshwane Urban Edge). Listing Notice 1, Activity 10 is therefore <u>not</u> applicable.*
GN.R. 327, 7 April 2017 Listing Notice 1 Activity 24 The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists where the road is wider than 8 metres; but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or (c) which is 1 kilometre or shorter.	To allow for two 7m wide access roads with 20m road reserves approximately 240m in length. *Applicability* The proposed access roads fall within an urban area *(within the City of Tshwane Urban Edge)* and are shorter than 1km in length. Listing Notice 1, Activity 24 is therefore <u>not</u> applicable.

GN.R. 327, 7 April 2017 Listing Notice 1 Activity 28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares.	The proposed development will cover an area of approximately 21.9803 ha of land, inside an urban area, previously and currently used for grazing of free roaming cattle and goats. ***Applicability*** *Listing Notice 1, Activity 28 is applicable.*
GN R. 325, 7 April 2017 Listing Notice 2 Activity 15 The clearance of an area of 20 hectares or more of indigenous vegetation	The proposed development will require the clearance of approximately 21.9803 hectares of area including indigenous vegetation. ***Applicability*** *Listing Notice 2, Activity 15 is applicable.*
GN R. 324, 7 April 2017 Listing Notice 3 Activity 4 The development of a road wider than 4 metres with a reserve less than 13,5 metres. <u>Gauteng</u> iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;	To allow for 5m wide roads with 13m road reserves within CBAs. ***Applicability*** *Listing Notice 3, Activity 4 is applicable.*
GN R. 324, 7 April 2017 Listing Notice 3 Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. <u>Gauteng</u> i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii) Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans.	The proposed development will require the clearance of approximately 21.9803 hectares of area including indigenous vegetation. The site falls within CBAs. ***Applicability*** *Listing Notice 3, Activity 12 is applicable.*

Table 4: Final listed activities in terms of NEMA for the proposed Ga-Rankuwa Unit 23 and Unit 25 development:

Relative Notice	Description (Verbatim and applicability to the project)
GN.R. 327, 7 April 2017 Listing Notice 1 Activity 28 Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development: (ii) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares.	The proposed development will cover an area of approximately 21.9803 ha of land, inside an urban area, previously and currently used for grazing of free roaming cattle and goats. ***Applicability*** *Listing Notice 1, Activity 28 is applicable.*
GN R. 325, 7 April 2017 Listing Notice 2 Activity 15 The clearance of an area of 20 hectares or more of indigenous vegetation	The proposed development will require the clearance of approximately 21.9803 hectares of area including indigenous vegetation. ***Applicability*** *Listing Notice 2, Activity 15 is applicable.*
GN R. 324, 7 April 2017 Listing Notice 3 Activity 4 The development of a road wider than 4 metres with a reserve less than 13,5 metres. Gauteng iv) Critical biodiversity areas as identified in systematic biodiversity plans adopted by the competent authority;	To allow for 5m wide roads with 13m road reserves within CBAs. ***Applicability*** *Listing Notice 3, Activity 4 is applicable.*
GN R. 324, 7 April 2017 Listing Notice 3 Activity 12 The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. Gauteng i) Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004; ii) Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans.	The proposed development will require the clearance of approximately 8.94ha of area indigenous vegetation within CBAs. ***Applicability*** *Listing Notice 3, Activity 12 is applicable.*

5.3 National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)

The purpose of the Biodiversity Act is to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA and the protection of species and ecosystems that warrant national protection. As part of its implementation strategy, the National Spatial Biodiversity Assessment was developed. In terms of the Biodiversity Act, the developer has a responsibility for:

- The conservation of endangered ecosystems and restriction of activities according to the categorisation of the area (not just by listed activity as specified in the EIA regulations).
- Application of appropriate environmental management tools in order to ensure integrated environmental management of activities thereby ensuring that all developments within the area are in line with ecological sustainable development and protection of biodiversity.
- Limit further loss of biodiversity and conserve endangered ecosystems.
- National Spatial Biodiversity Assessment, The National Spatial Biodiversity Assessment (NSBA) classifies areas as worthy of protection based on its biophysical characteristics, which are ranked according to priority levels.

An ecological specialist was appointed to undertake the flora and fauna biodiversity assessment, with specific attention to Red Data Listed species, habitats and biodiversity. The specialist study is aligned to requirements of this act. The proposed development aligns to the purpose of this Act and the above-mentioned specialist report.

According to the Biodiversity Impact Assessment Study the subject site falls within a Critical Biodiversity Area.

5.4 National Environmental Management: Protected Areas Act (Act No. 57 of 2003)

This Act (NEM:PAA) aims to provide for a national system of protected areas in South Africa as a part of a strategy to manage and conserve its biodiversity. The Protected Areas Act tries to ensure protection of the entire range of biodiversity, referring to natural landscapes and seascapes.

The Act makes express reference to the need to move towards Community Based Natural Resource Management (CBNRM) as its objectives include promoting the participation of local communities in the management of protected areas.

The purpose of the Act is:

- To protect ecologically viable areas representative of South Africa's biological diversity and its natural landscapes and seascapes and their ecological integrity;
- To conserve biodiversity in those areas;
- To protect South Africa's rare species;
- To protect vulnerable or ecologically sensitive areas;
- To assist in ensuring the sustained supply of environmental goods and services;
- To provide for the sustainable use of natural and biological resources;
- To create or augment destinations for nature-based tourism;
- To manage the interrelationship between natural environmental biodiversity, human settlement and economic development;
- To contribute to human, social, cultural, spiritual and economic development; and
- To rehabilitate and restore degraded ecosystems and promote the recovery of endangered and vulnerable species.

This Act further stipulates various criteria which must be met before an area can be declared as a special nature reserve, national park, nature reserve and protected environment. It also prescribes a range of procedures, including consultation and public participation procedures, which must be followed before any of the kinds of protected areas are declared.

The Biodiversity Impact Assessment Study took the NEM:PAA into consideration. The study area does not fall within any National Priority Areas.

5.5 National Environmental Management Waste Act (NEMWA), 2008 (Act No. 59 of 2008) (as amended)

The National Environmental Management: Waste Act (No. 59 of 2008) (NEM:WA) serves to reform the law regulating waste management in order to protect human health and the environment. This is managed by providing reasonable measures for the prevention of pollution and ecological degradation. The NEM:WA aims to secure ecologically sustainable development while promoting justifiable economic and social development. The NEM:WA provides national norms and standards for regulating the management of waste by all spheres of government, for specific waste management measures and for matters incidental thereto. In terms of the NEM:WA the Minister of the DEA may publish a list of waste management activities that have, or are likely to have, a detrimental effect on the environment. Furthermore, the NEM:WA prohibits any person to commence, undertake or conduct a waste management activity except in accordance with the requirements or standards determined in terms of the NEM:WA for that activity or where a waste management licence (WML) has been issued in respect of that activity.

The Act, read together with the list of waste activities that have, or are likely to have, a detrimental effect on the environment (GN No. 921 of 29 November 2013) and the Amendments to the list of waste management activities that have, or are likely to have, a detrimental effect on the environment have been considered for purposes of potential relevance.

The proposed activity will not trigger any listed activities in terms of NEM:WA.

5.6 National Water Act, 1998, Act 36 of 1998

The NWA provides for fundamental reformation of legislation relating to water resources and use. The preamble to the NWA recognises that the ultimate aim of water resource management is to achieve sustainable use of water for the benefit of all users and that the protection of the quality of water resources is necessary to ensure sustainability of the nation's water resources in the interests of all water users. In terms of the NWA, the national government, acting through the Minister of the DEA, is the public trustee of South Africa's water resources, and must ensure that water is protected, used, developed, conserved, managed and controlled in a sustainable and equitable manner for the benefit of all persons. The Minister of the DEA is responsible to ensure that water is allocated equitably and used beneficially in the public interest, while promoting environmental values. The national government, acting through the Minister of the DEA, has the power to regulate the use, flow and control of all water in South Africa.

The most fundamental departure from the NWA is the removal of the concept of water as private property. Instead, water will be made available through user licences, which may be issued for a maximum period of forty years, subject to renewal. A priority of users has been established for the allocation of licences, with the environment near the top of the list of priorities.

Section 21 of the NWA indicates that "water use includes":

- Taking water from a water resource;
- Storing water;
- Impeding or diverting the flow of water in a water course;
- Engaging in a stream flow reduction activity contemplated in section 36;
- Engaging in a controlled activity which has either been declared as such or is identified in section 37(1);
- Discharging waste or water containing waste into a water resource througha pipe, canal, sewer, sea outfall or other conduit;
- Disposing of waste in a manner which may detrimentally impact a water resource;
- Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process;
- Altering the bed, banks, course or characteristics of a water course;
- 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
- Using water for recreational purposes.

Specified water uses, in section 21 of the NWA, must be licensed unless listed in Schedule 1; the continuation of an existing lawful water use; is permissible under a general authorisation issued under section 39 of the NWA, or if a responsible authority waives the need for a license.

No application required to be submitted to the Department of Water and Sanitation (DWS), for a water use authorisation in terms of the General Notice 509, Government Gazette 40229, dated 26 August 2016, "General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) (NWA)".

5.7 National Environmental Management: Air Quality Act, Act 39 of 2004

The National Environmental Management: Air Quality Act (No. 39 of 2004) (NEM:AQA) allows for national, provincial and local air quality standards to be established as well as the declaration of priority areas. In addition the NEM:AQA requires that Air Quality Management Plans (AQMP) form part of the environmental implementation plan or environmental management plans to be prepared by national departments or the province as required by Chapter 3 of the NEMA. Furthermore the NEM: AQA requires municipalities to include an AQMP into its integrated development plan (IDP).

Key features of the NEM: AQA include:

- A decentralisation of air quality management responsibilities;
- The identification and quantification of significant emission sources that then need to be addressed;
- The development of ambient air quality targets as goals for driving emission reductions;
- The use of source-based (command-and-control) measures in addition to alternative measures, including market incentives and disincentives,voluntary programmes, and education and awareness;
- The promotion of cost-optimised mitigation and management measures;
- Air quality management planning by authorities, and emission reduction and management planning by sources; and
- Access to information and public consultation.

The overall objectives of the NEM:AQA include the following:

- The protection of the environment by providing reasonable measures for the protection of the quality of the air in the country;
- Protection of the environment by the prevention of air pollution and ecological degradation;
- Protecting the environment by securing ecologically sustainable development while promoting justifiable economic and social development; and
- To give effect to the constitution in order to enhance the quality of ambient air in order to secure an environment that is not harmful to the health and well-being of the people of South Africa.
- The NEM:AQA requires the Minister of the DEA to publish a list of activities which results in atmospheric emissions which may have a detrimental effect on the environment, including health, social conditions, economic conditions, ecological conditions, ecological conditions or cultural heritage. The NEM:AQA requires that an Atmospheric Emissions License (AEL) be obtained for such listedactivities. Such a list of activities was published in GNR 248 (31 March 2010).

Following a detailed analysis of the proposed project against the activities listed in GNR 248, the opinion is being expressed that based on information at hand, none of these activities will be triggered.

The City of Tshwane Metropolitan Municipality is responsible for the issuing of AEL's in this instance. The said Municipality has also been notified about the proposed activity and as a registered Interested and Affected Party will be provided with a draft copy of this report and an opportunity to comment.

5.8 National Heritage Resources, Act, 1999, Act 25 of 1999

The Act sets requirements for assessment of impacts on the cultural and heritage assets, the processes to be followed in notifying the competent authority and the elements of a report on the assessment. The protection of archaeological and palaeontological resources is the responsibility of a provincial heritage resources authority and all archaeological objects, palaeontological material and meteorites are the property of the State. "Any person who discovers archaeological or palaeontological objects or material or a meteorite in the course of development must immediately report the find to the responsible heritage resources authority, or to the nearest local authority offices or museum, which must immediately notify such heritage resources authority".

A Heritage Impact Assessment must be done under the following circumstances:

a. Any development or other activity that will change the character of a site and exceed 5 000m^2 or involve three or more existing erven or subdivisions thereof
b. Re-zoning of a site exceeding 10 000 m^2

The size of this site qualifies for a Heritage Impact Assessment (HIA). A Cultural Heritage Consultant was appointed to conduct a HIA. Refer to Appendix C (vi) and Section 7.3.4.

5.9 Occupational Health and Safety Act, 1993, Act 85 of 1993

The objective of this Act is to provide for the health and safety of persons at work. The considerations of the Act must be incorporated into the Environmental Management Programme during the EIA process.

6 DESCRIPTION OF RECEIVING ENVIRONMENT

This chapter provides a description of the receiving environment within the study area. Three components to the environment are recognised:

- Physical Environment;
- Biological Environment; and
- Socio-Economic Environment.

6.1 Physical Environment

A Geotechnical Investigation was conducted by Holland-Muter & Associates Engineering and Environmental and Geologists. *(Refer to Appendix C (iv) Geotechnical Investigation Report).*

6.1.1 Climate

The study site is situated within the summer rainfall region of South Africa and on the boundary between the medium rainfall region (401mm to 600mm per annum) and the medium/high rainfall region (601mm to 800mm per annum. The average annual rainfall for the area varies between 500 mm to 650 mm. The winters are very dry.

The study site is within the Temperate Climatic Zone of South Africe . The climate is warm to hot during the summer months, with some days becoming very hot, while winter temperatures are typically moderate to cold, and occasionally, but seldom, very cold. The warm summers are long, while the winters are usually short, very dry and with mostly clear skies.

6.1.2 Topography and drainage

The site forms part of an undulating landscape with a moderate relief sloping towards the north, west and south. The higher elevated area of the site occurs on the northern side of the terrain. The site is primarily drained by means of sheetwash which collects in a weakly-defined drainage channel is located on a gentle steep slope towards the westerly direction. The area exhibits an average slope of between 1.5° and 2° west. No prominent regional topographical features occur within the boundaries of the site.

6.1.3 Hydrology

The site is located in the Olifants Water Catchment Management Area. The site drains by means of surface run off with storm water collecting towards the southern western direction.

6.1.4 Geology and Soils

A Geotechnical Investigation was conducted by Holland-Muter & Associates Engineering and Environmental and Geologists. *(Refer to Appendix C (iv) Geotechnical Investigation Report).* The report contained the following findings and recommendations:

The site is underlain by Bushveld Complex (Rustenburg Layered Suite, Upper zone or Ferrogabbro). The regional geology consists mainly of mafic rocks comprising mainly of norite and gabbro with a number of intrusives.

6.1.5 Discussion of Results of Geotechnical Investigation

Foundation Conditions

General
Where heavy buildings are to be erected, a detailed geotechnical investigation should be executed to determine the underlying soil conditions so that an appropriate foundation can be designed.

Potential expansiveness

All the soil horizons tested in Zones A and B have low activities with respect to heaving anticipated. However, soil tested in Soil Zone III, indicated medium to high activity. *Refer to Figure 2, Geotechnical Report.*

Settlement

According to the laboratory results all the tested transported and residual soil horizons in Zones A & B are compressible and collapsible in localised places.

Bearing capacities

The slightly moist conditions of the transported and residual material occurring on the terrain make it possible that the various soil layers can support a load with a bearing capacity of more than 80 kPa. However, taking the open-texture structure into account, it is imperative that the compressibility of the collapse soil horizons as well as the heave is accommodated during the construction with a suitable engineering solution.

Foundation recommendations

Since the proposed development structures are expected to exert low pressures on the soils (less than 100kPa), little or no settlements is expected to occur. However, the precautionary measures required to design appropriate structures to accommodate the movement of the compressible/collapsible and heaving materials will necessitate one of the following construction types:

- Modified normal
- Compaction of in situ soils below individual footings
- Deep strip footings
- Spoil rafts.

Erodibility

The transported materials over the site comprise mainly of silts, sands and clays. The silt and sandy materials are of low plasticity making them very susceptible to water erosion. It is therefore very likely that stormwater can cause serious erosion constraints to the development if not controlled in Zones A & B.

Slope stability

The areas proposed for the development are anticipated to be stable. No adverse features were observed which are indicative of landslide activity. However, excavated trenches should be supported for safety purposes, especially in Zone C if extracted below perched water conditions.

Excavation Characteristics

No problems are foreseen with excavatability of the area except where hard rock outcrops occur at shallow depths below surface. The overall excavations for foundations and services can be done with a pick and shovel in the transported soils and soft rock materials. These materials classify as soft excavation but the shallow, hard, unweathered gabbro, norite or intrusive diabase which occur in Zone B will require large back actors, jack hammers and/or intermediate blasting to excavate to a depth of 1,5 m. The very limited appearance of scattered rock outcrop which occurs all over the site will also require large back-actors, power tools and/or limited blasting to excavate.

Groundwater and drainage conditions

The flat to moderate slopes of the area makes it unlikely that erosion will scour the building sites during construction. However, the sandy nature of the upper transported materials can result in erosion damage

once the vegetation has been disturbed. It is therefore imperative that the development should be constructed in such a manner that minimum velocities in stormwater runoff are created. Control of the stormwater can be done by coordinating the road layout with the drainage system.

Water-Bearing services
It is recommended that a water-borne sewerage system be used for sanitation.

Land-Use Potential
All the parameters used during the geotechnical investigations were utilised to determine and describe the development potential of the site.

- Zone A (NHBRC Site Classification: C1)

A moderate slope characterized this zone which is covered with transported soils overlying residual soils and soft rock gabbro, norite and diabase bedrock. This zone is easily excavatable with a 46 kW backhoe. Normal founding can be done but cognizance must be taken to ensure that no differential movements occur where the proposed structures straddle the soil rock contacts. This can be done by excavating the loose materials adjacent to the rock to a competent layer and backfilling to founding kevel with the same materials compacted at 2% wet of optimum moisture content.

The land-use potential of this zone is good and this area can be utilized for any type of development.

- Zone B: (NHBRC Site Classification: C1/R)

Weathered soft and hard rock underlie this zone at a depth of less than 1,5m. Normal founding and development can be done. Limited excitability problems are foreseen in this zone. Perched water conditions can be expected to occur on the shallow rock head during periods of high precipitation which can result in flooding of services and foundation excavations. The foundation design should be such as to prevent the passage of moisture to the inside structure. Effective site drainage precautions should be taken to prevent the sub-soils of wetting up. Ventilated improved pit latrines or other acceptable on-site human waste disposal systems can be considered in this zone. To prevent erosion scouring of the building sites, development should be conducted in such a manner that minimum velocities in stormwater runoff are created.

The. Land-use potential of this zone is fair and can be economically viable provided that the excavatability problems and on-site disposal of human waste systems can be accommodated.

- Zone B: (NHBRC Site Classification: H3)

Thick (>1,7m), grey to black colored transported and highly active clayey soil horizons characterize this soils zone. Specially designed foundations and development precautions should be considered for this zone. No excavatibility problems are foreseen. The grey colours and high clay content indicate that marshy and high perched water conditions can be expected during the wet season. The soil structures of the various soil horizons vary from fissured to slickensided relating to the active nature of these soils. The overall consistency of the clayey soils is soft to firm. Effective site drainage precautions should also be taken to prevent the sub-soils of wetting-up. Although ventilated improved double pit latrines or other acceptable on-site human waste disposal systems can be considered, wet systems are recommended for this zone.

The land-use potential for this zone is poor and can only be economically viable provided that the activity or swelling characteristics of the spoils and problems with respect to on-site disposal of human waste systems be accommodated.

Conclusions and recommendations

- The greatest portion of the site is covered by colluvium comprising mainly of transported hillwash underlain by weathered gabbro while the rest of the terrain is covered by highly active, thick clays.
- Soil tests were done on disturbed soils samples from representative soil horizons. The results of these tests were utilized to determine the engineering properties of the various soil horizons.
- Most of the in-situ materials can be used as subgrade and fill materials. However, it is recommended that construction materials be imported to the site to optimize the development potential of the site.
- Adequate bearing capacity exists for the intended housing structures. However, precautionary measures should be taken during design and construction for the expected differential settlement associated with compressibility, collapse potential and activity of the transported and residual soils which may occur between the founding depth and bedrock. The uneven weathered bedrock may result in differential movements in the super structures.
- First class site drainage must be provided to reduce the risk of subsurface materials from becoming saturated, the risk of differential settlement and to prevent scouring and erosion of the surface materials.
- On-site sanitation systems should accommodate the various geotechnical constraint described in each development zone.
- No severe problems are envisaged for mechanical excavations for the installation of services and foundations.
- It may be discovered that soil conditions are at variance with those discussed in the report do occur in very small, localised patches. The involved geotechnical engineers are, however, of the opinion that the soils are generally of a somewhat homogenous nature and little variability is expected, except in the hard rock profile variation.

6.2 BIOLOGICAL ENVIRONMENT

A Biodiversity Assessment was conducted by Flori Scientific Services *(Refer to Appendix C (v) Biodiversity Report)*. The report contained the following findings and recommendations:

6.2.1 Vegetation

6.2.1.1 General Vegetation

The study site is situated in the Savanna Biome of South Africa and in the Central Bushveld Bioregion of the biome. The site is within the original extent of the veldtype commonly known as Marikana Thornveld. The veldtype is a threatened veldtype / ecosystem and has a status of 'Endangered' (Skowno, 2019). Marikana Thornveld is characterised open Vachellia (Acacia) karroo (Sweet Thorn) woodland, occurring in valleys and slightly undulating plains, and some lowland hills. Shrubs tend to be denser along drainage lines, on termitaria and rocky outcrops or in other habitat protected from fire (Mucina & Rutherford, 2010).

6.2.1.2 Vegetation of the Study Area

The study site is within the original extent of Marikana Thornveld, which is dominated by thorn trees (mainly sweet thorn). The vegetation of the study site comprises mostly of badly degraded, altered or totally transformed veld. Excessive and continual removal of trees and shrubs for firewood and clearing of areas for vegetable fields, along with frequent veldfires has badly degraded and altered the veld. There is no pristine or even fairly natural Marikana Thornveld left on the study site. During field investigations no large, mature trees were observed.

6.2.1.3 Priority Floral Species

No red data listed (RDL) (endangered & threatened) floral species were observed during field investigations. No orange data listed (ODL) plant species were found to be present.

6.2.1.4 Protected Tree Species

No protected trees were observed during field investigations.

6.2.1.5 Conservation status

The conservation status (or threat status) of the veldtype in which the study site is situated is shown in the table below. The status is based on Skowno (2019).

Table 5: Veldtype status

Veldtype	Status	Info
Marikana Thornveld	Endangered (EN)	Less than 1% statutorily conserved in, for example, Magaliesberg Nature Area. More conserved in addition in other reserves, mainly in De Onderstepoort Nature Reserve. Considerably impacted, with 48% transformed, mainly cultivated and urban or built-up areas. Most agricultural development of this unit is in the western regions towards Rustenburg, while in the east (near Pretoria) industrial development is a greater threat of land transformation. Erosion is very low to moderate. Alien invasive plants occur localised in high densities, especially along the drainage lines (Mucina & Rutherford, 2010)

6.2.2 Fauna

Of the 295 species and subspecies of South African mammals evaluated, 57 (19.3%) were assigned threat categories according to the IUCN Red List criteria as follows: 10 (3.4%) Critically Endangered 18 (6.1%) Endangered and 29 (9.8%) Vulnerable.

53 (18%) Species were assessed as being Data Deficient and therefore, a threat category could not be assigned to these species. 38 (12.9%) Species were assessed as being Near Threatened and 147 (49.8%) as Least Concern (Red Data Book of South African Mammals: A Conservation Assessment).

During the field investigations no species of conservation concern (SCC) were observed, and none are expected to occur. The site is also outside of the known areas of some SCC such as Julian's Golden Mole *(Neamblysomus julianae*), which is critically endangered (CR).

The study site is not situated within any of the priority butterflies, priority lizards or priority snakes hotspots.

Invertebrates such as spiders, scorpions and butterflies are important faunal groups, but are difficult to fully assess in a short time period. During field investigations specific attention was given to priority species such as *Mygalomorphae arachnids* (Trapdoor and Baboon spiders) and red data butterflies. No priority species were observed. According to the Gauteng: State of the Environment Report (2011), spiders and scorpions are no longer included in the list of conservation priorities for the Province due to the lack and

paucity of data on spiders and the wide distribution of scorpions. Conservation efforts are now more focused on specific species, as opposed to faunal groups.

Currently there are three invertebrate species of conservation concern in Gauteng, which qualify for IUCN Red List status, namely two butterflies (the Highveld blue *(Lepidochrysops praeterita)* and the Heidelberg copper *(Chrysoritis aureus)* and a scarab beetle *(Ichnestoma stabbiai).*

Recorded butterfly fauna in the Gauteng Province falls into: 5 families, 16 subfamilies, 90 genera, 211 species and 1 additional subspecies (212 taxa). Shared endemic genera: 8. Exclusively endemic species: 1 (1 taxon). Exclusively endemic subspecies: none. Shared endemism: 19 species and 2 subspecies (21 taxa). The proposed Red List taxa for the province is: 6 (SA Red Data Book: Butterflies. SANBI. 2009).

Gauteng butterfly hot spots are the Suikerbosrand Nature Reserve *(Aloeides dentatis dentatis, Chrysoritis aureus, Orachrysops mijburghi,* and *Metisella meninx*); and South of Carletonville and Hillshaven *(Lepidochrysops praeterita,* and *Platylesches dolomitica)* (SA Red Data Book, 2009).

6.2.3 Aquatic Systems

6.2.3.1 Watercourses in the study area

There are no rivers or streams in the study area. The nearest river or large stream is the Rosespruit (Rose Stream), which is southwest of the study site at varying distances of between 1,7km and 1,5km (Figure 23). The latest national wetland map (Map 5, 2018) shows no wetlands in the study site or within a 500m radius of the study site boundaries.

Figure 23: Main watercourses in the region

6.2.3.2 Drainage Regions

South Africa is geographically divided up into a number of naturally occurring Primary Drainage Areas (PDAs) and Quaternary Drainage Areas (QDAs). The different areas are demarcated into Water Management Areas (WMAs) and Catchment Management Agencies (CMAs). Previously there were 19 WMAs and 9 CMAs, but as of September 2016, these were revised and there are now officially only nine

WMAs, which correspond directly in demarcation to the nine new CMAs (Government Gazette, 16 September 2016. No.1056, pg. 169-172).

The study area is situated within the Primary Drainage Area (PDA) of A and the Quaternary Drainage Area (QDA) of A21J.

The study site is situated in the top end of the quaternary drainage area (QDA) of A21J. The site is also at the top end of the smaller, sub-catchment area in which it is situated. The surface stormwater in the sub-catchment, including that falling on the study site, drains into the Rosespruit and then westward and eventually into the Crocodile River and then the Limpopo River. The sub-catchment is not a priority sub-catchment in terms of fish FEPA or fish corridors, compared to the sub-catchment to the east, which is.

6.2.3.3 Strategic Water Source Areas

The study site is not situated within any Strategic Water Source area of South Africa (SWSA), or important Water Source Area (WSA) of the Province.

That is, not within a groundwater (gw) or a surface water (sw) SWSA. The study site is outside of, but borders on, the West Rand Cast Belt, which is a national gw-SWSA.

A Water Source Area (WSA) is a water catchment or aquifer system that either supplies a relatively large volume of water for its size or is the primary source of water for a town, city or industrial activity. Strategic Water Source Areas of South Africa (SWSA) are defined as areas of land that either: (a) supply a large) volume of surface water runoff (i.e. watercourses) in relation to their size and so are considered nationally important; (b) have relatively high groundwater recharge and groundwater forms a nationally important resource; (c) areas that meet both criteria (a) and (b) (WRC, 2019).

According to SANBI, a Strategic Water Source Areas of South Africa (SWSA) are those areas that supply a disproportionate amount of mean annual runoff in relation to the size of the geographical region. These areas are important because they have the potential to contribute significantly to overall water quality and supply, supporting growth and development needs that are often a far distance away. These areas make up 8% of the land area across South Africa, Lesotho and Swaziland, but provide 50% of the water in these countries (SANBI).

6.2.4 National Priority Areas

The study site is not within or immediately adjacent to any national priority areas. The closest priority area is the Magaliesberg IBA, which is approximately 5km south of the site. The IBA area also includes the Magaliesberg Biosphere Conservation Area.

National priority areas include formal and informal (private) protected areas (nature reserves); important bird areas (IBA); RAMSAR sites; National freshwater ecosystem priority areas (NFEPA) and National protected areas expansion strategy (NPAES) focus areas.
According to the Protected Areas Register, which is maintained by the Department of Department of Forestry, Fisheries and the Environment (DFFE) (https://portal.environment.gov.za), the study site is not within a protected area.

6.2.5 Gauteng Ridges

The study site is not situated on any ridge or within 200m of any Class 1 or Class 2 ridges.

All ridges in Gauteng have been classified into four classes, based on the percentage of the ridge that has been transformed (mainly through urbanization) using the 1994 CSIR/ARC Landcover data. This forms the basis of the development guidelines that are detailed the GDARD's Development Guideline For Ridges (Pfab, 2001). In the light of the motivations presented in the report and due to the extremely limited distribution, rarity and threatened status of the ridges in Gauteng, it is was deemed imperative that the Department adopts a strict no-go or low impact development policy for these systems. However, this policy, by necessity, will have to be adapted according to the current transformed status of some of these ridges (Pfab, 2001).

Please note that although rocky outcrops are not covered by the policy (since their small area coverage does not allow the classification of these features as ridges) they are regarded as sensitive areas characterized by high biodiversity and as such a no-go development policy should be applied. Implementation of this guideline is specifically needed at the local council level during the passing of building plans (Pfab, 2001).

6.2.6 Gauteng EMF Zones

The study site is situated within the Gauteng EMF Zones of 3 & 4 (Figure 24). However, it is not completely clear if under the Gauteng Province's Human Settlement Housing Project if the entire area is now demarcated as Zone 1. Zone 2 is a 'high control zone' within the urban development and low control zones of 1 & 4.

The Gauteng Environmental Management Framework (GEMF / EMF) has demarcated the province into various EMF Zones in terms of development. The EMF Zones were derived from the desired state, the environmental sensitivity as well the unique control areas as identified in sections 1, 2 and 3 of the GEMF. The zones were also presented to the Gauteng Planning Forum where it was generally accepted as a suitable contribution to facilitate appropriate development in Gauteng Province. The final demarcated zones also took the Gauteng Growth and Management Perspective, 2014, into account and are therefore aligned to the general development policy for Gauteng.

Five EMZs were identified and overlaying those a further six Special Management Areas were identified where specific planning and policy measures are necessary to achieve the development objective of those areas. One of the Special Management Areas is the Cradle of Humankind World Heritage Site (CoHWHS) for which a recent EMF has been completed. It was decided to incorporate that EMF within the GPEMF (the only other EMF to be incorporated as a whole).

Zone 2 is a 'high control zone' within the urban development and low control zones of 1 & 4. The study site is situated within Zone 4.

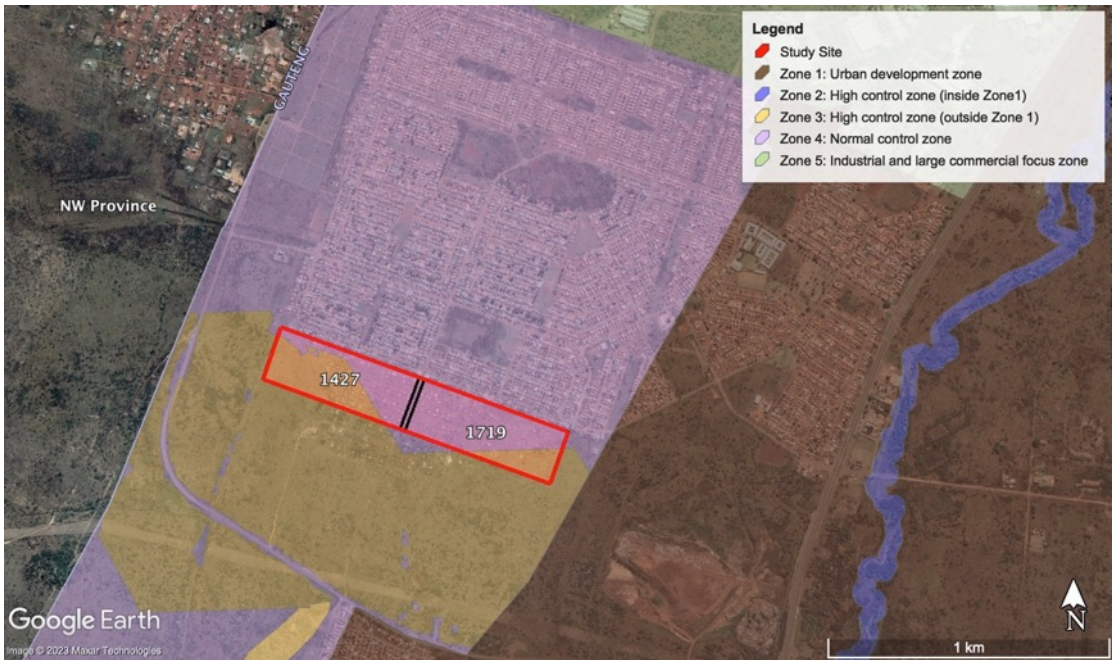


Figure 24: Gauteng EMF Zones in the area of the Study Site

6.2.7 Critical Biodiversity Areas & Ecological Support Areas

According to the Gauteng Conservation Plan (C-Plan) Version 3.3, the study site is partially within a demarcated Critical Biodiversity Area (CBA), but not within an Ecological Support Area (ESA) (Figure 25). The CBA is a CBA 2 – Important and not a CBA 1 – Irreplaceable. The reasons given for the demarcation in the C-Plan data are: Biodiversity feature description: Red Listed plant habitat and Prime vegetation. However, there are no Red Data Listed (RDL) plants present and the area is not prime vegetation (Marikana Thornveld). However, it is understandable as Marikana Thornveld is endangered and there is a steady loss of this vegetation unit due to urbanisation and agriculture.

Critical biodiversity areas (CBAs) are terrestrial and aquatic features in the landscape that are critical for retaining biodiversity and supporting continued ecosystem functioning and services (SANBI, 2007). These form the key outputs of a systematic conservation assessment and are the biodiversity sectors inputs into multi-sectoral planning and decision-making tools. CBAs are areas of the landscape that need to be maintained in a natural or near-natural state in order to ensure the continued existence and functioning of species and ecosystems and the delivery of ecosystem services (SANBI).

Ecological Support Areas (ESAs) are mostly natural or semi-natural areas that are often used to buffer CBAs as well as form corridors for the movement of fauna between CBAs and other natural areas.

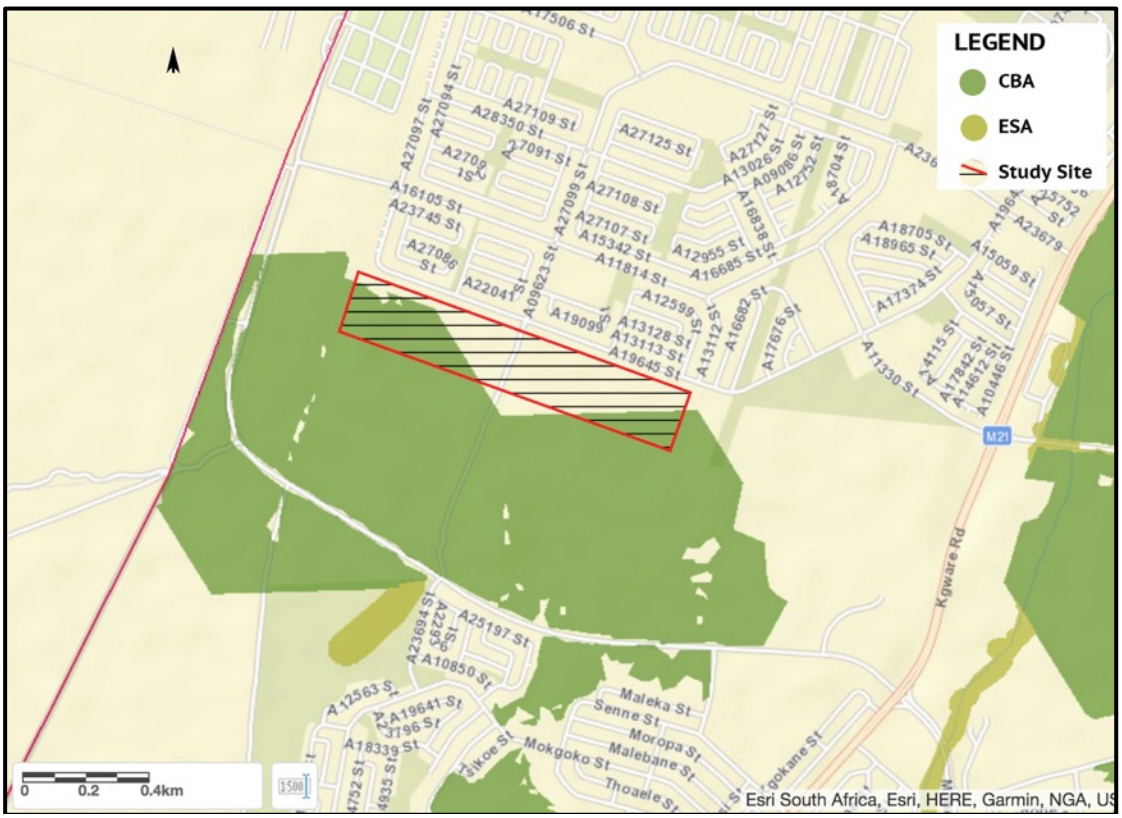


Figure 25: Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs)

6.2.8 National Screening Tool

The National Screening Tool (www.screening.environment.gov.za) is a desktop assessment and guideline implemented by the DFFE.

The assessments of sensitivities according to the screening tool (accessed in January 2023) are as follows:

- Terrestrial Biodiversity Theme Sensitivity: Very High.
- Aquatic Biodiversity Theme Sensitivity: Low.
- Animal Species Theme Sensitivity: Medium.
- Plant Species Theme Sensitivity: Medium.

Figure 26 below, shows the screening tool maps for the study area and surrounds. The screening tool is a desktop screening which needs to be ground-truthed. During field investigations the Aquatic theme sensitivity was verified to be 'Low' and the Animal theme sensitivity was verified to be 'Medium'.

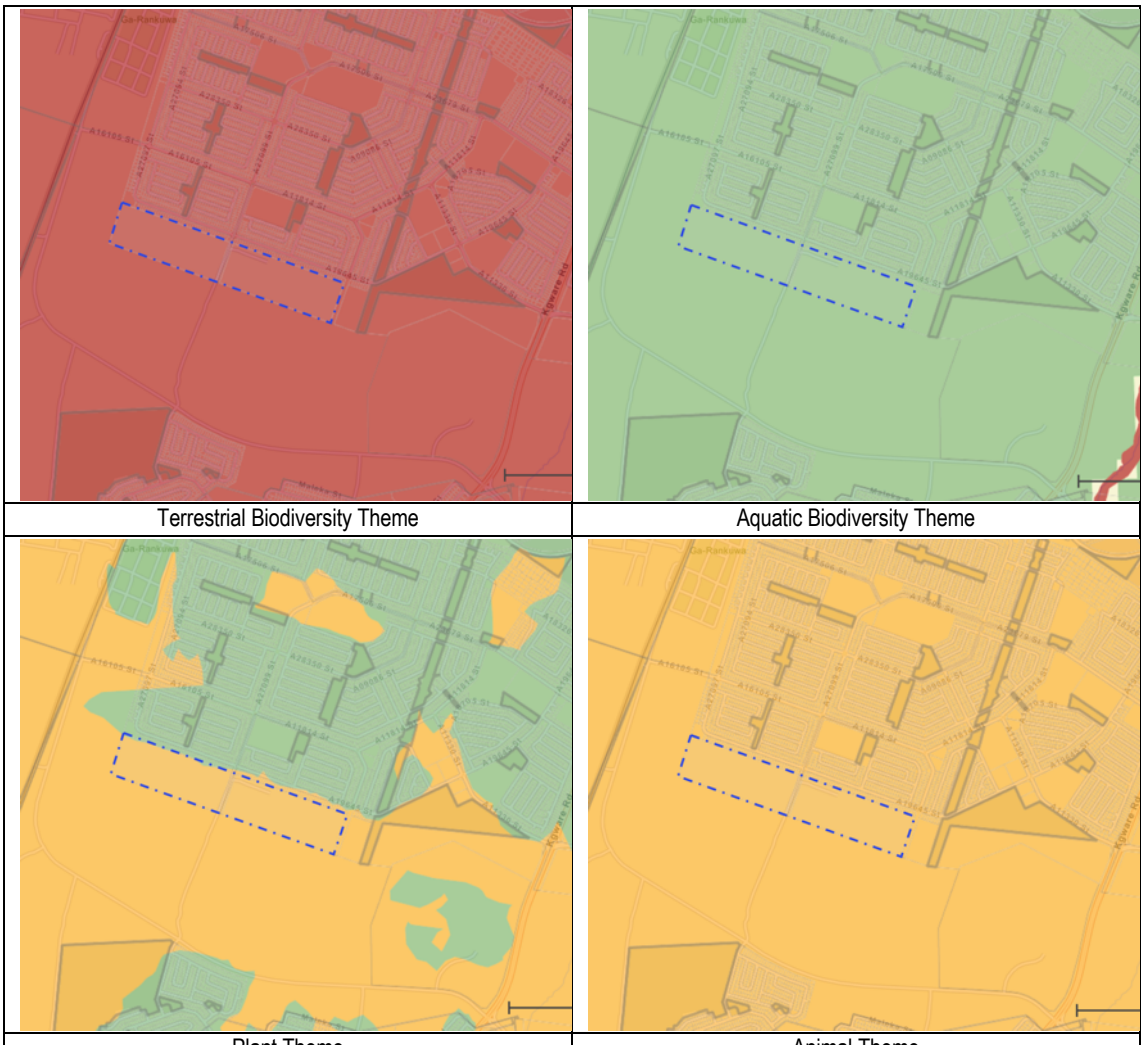
However, the plant theme sensitivity was found to be 'Low' and not 'Medium', due to high levels of transformation by areas totally cleared for houses and fields, while open areas where badly degraded by over-utilisation of resources such as wood for firewood, etc. However, it is understood and appreciated that the study site is within a threatened veldtype / ecosystem and in terms of that the sensitivity level of 'Medium' is also accepted.

The overall biodiversity theme sensitivity of 'Very High' is disputed. During site investigations the overall sensitivity, which includes the other themes of aquatic, plant, and animal was found to be in reality 'Low' and for the same reasons given for the plant theme sensitivity. The loss of vegetation in turn is loss of

habitat for fauna, including RDL or SCC fauna. The high levels of urbanisation on the site and surrounding the site also have large negative impact on all wild fauna in the area. These impacts include high levels of illegal hunting and snaring, etc.

In summary, the screening tool sensitivities for the plants and animals were verified (confirmed), but the sensitivities for the overall terrestrial and aquatic are disputed.

The overall biodiversity theme was ground-truthed to be a mix of 'Medium' and 'Low'. Medium for the degraded, still open thornveld areas and low for the totally transformed areas with dwellings and cleared yards.



Terrestrial Biodiversity Theme	Aquatic Biodiversity Theme
Plant Theme	Animal Theme

Dotted blue line: Study Site. Red: Very High Sensitivity. Orange: Medium Sensitivity. Green: Low Sensitivity

Figure 26: Screening Tool Maps

6.2.9 Ecological Sensitivity Assessment

The sensitivity assessment identifies those areas and habitats within the study site that have a high conservation value and that may be sensitive to disturbance. All watercourses, including seasonal streams and drainage lines are, by default, viewed as sensitive, even if they are degraded. Areas or habitats have a higher conservation value (or sensitivity) based on their threatened ecosystem / veldtype status; ideal habitat for priority species (including Red Data species); species-richness; distinctive habitats; etc.

Demarcated priority areas such as nature reserves also have a higher ecological sensitivity, even if not within a threatened ecosystem.

The sensitivities of the habitats are first assessed separately in terms of fauna and flora (Table 6 and Table 7 and then combined into an overall ecological sensitivity analysis (Table 8).

Note: The final / overall ecological sensitivity is taken to be that of the highest individual rating of the Floristic and Faunal Sensitivity.

Two distinctive habitats were identified, namely, Transformed (houses, roads, fields) and Thornveld (open thornveld).

Table 6: Floristic sensitivity analysis

Criteria	Distinctive habitats in the study area	
	Transformed	Thornveld
Red Data Species	0	2
Habitat Sensitivity	0	5
Floristic Status	2	5
Floristic Diversity	2	5
Ecological Fragmentation	5	5
Sensitivity Index	18%	44%
Sensitivity Level	Low	Medium

High: 80 – 100%; Medium/high: 60 – 80%; Medium: 40 – 60%; Medium/low: 20 – 40%; Low: 0 – 20%

Table 7: Faunal sensitivity analysis

Criteria	Distinctive habitats in the study area	
	Transformed	Thornveld
Red Data Species	0	4
Habitat Sensitivity	0	4
Faunal Status	2	5
Faunal Diversity	2	5
Ecological Fragmentation	5	5
Sensitivity Index	18%	46%
Sensitivity Level	Low	Medium

High: 80 – 100%; Medium/high: 60 – 80%; Medium: 40 – 60%; Medium/low: 20 – 40%; Low: 0 – 20%

6.2.10 Ecological Sensitivity Analysis

The ecological sensitivity of the study area is determined by combining the sensitivity analyses of both the floral and faunal components. The highest calculated sensitivity unit of the two categories is taken to represent the sensitivity of that ecological unit, whether it is floristic or faunal in nature (Table 8).

Table 8: Ecological sensitivity analysis

Ecological community	Floristic sensitivity	Faunal sensitivity	Ecological sensitivity
Transformed	Low	Low	Low
Thornveld	Medium	Medium	Medium

High: 80 – 100%; Medium/high: 60 – 80%; Medium: 40 – 60%; Medium/low: 20 – 40%; Low: 0 – 20%

6.2.11 Buffer Areas

There are no sensitive habitats on the study site such as (eg. Koppies), watercourses (e.g. rivers, wetlands), or patches of pristine Marikana Thornveld that need to be protected with buffers. Furthermore, much of the CBA area and 'open veld' bordering on the south of the site is also filling up with informal settlements. So there is not need to protect this area with a buffer along the southern boundary of the study site.
In other words, no buffers area required for the project.

6.2.12 Sensitivity mapping of the study area

Taking all of the above information and findings into account the sensitivity of the study area was found to be a mix of 'Low' and 'Medium' (Figure 27). The open thornveld is highly degraded and altered and even though some of it is within a demarcated CBA and Marikana Thornveld is a threatened veldtype, in reality the ecological state and sensitivity in terms of conservation in that area is 'Medium'. The transformed areas have a sensitivity of 'Low'.

Figure 27: Sensitivity Map of the Study Area

6.2.13 Impact Assessment

6.2.13.1 Existing Impacts

The largest existing impacts on the area are the increasing high levels of urbanisation and development. Including in these negative impacts are all the relevant and typical anthropogenic activities and impacts that accompany urban expansion and development. The study area is theoretically vacant land or open thornveld. However, it has been badly degraded and transformed by fairly new expansion of informal settlements and 'formal' structures, brick houses, roads and electricity infrastructure.

6.2.13.2 Potential Impacts

The project and related activities will have moderate negative impacts on the study site and moderate to low impacts on the larger region. Impacts include the typical and standard negative impacts that accompany most township developments, such as loss of natural vegetation, loss of faunal habitat, fringe impacts, etc.

The project will have no positive impacts on the environment. However, it is strongly recommended that open public spaces be zoned and development and that large amounts of indigenous trees (sweet thorn, karee, white stinkwood be planted in the parks (public open spaces) and along the main roads.

6.2.13.3 Assessment of potential impacts

The assessment of potential impacts on the natural environment arising from the project and related activities is shown below in Table 9.

The scoring method used in the impact assessment is as follows:

- SP = [extent (E) + duration (D) + magnitude (M)] x probability (P).

The maximum value is 100 significance points (SP). Environmental impacts will be rated as either that of High, Moderate or Low significance on the following basis:

- SP ≥60: High; SP 31 ≥ 59: Moderate; SP ≤ 30: Low.

6.2.13.4 Cumulative Effect

The Cumulative Effect can be defined as the total negative impacts on the natural environment which are caused by the combined (total) effects of past, current and future activities. Cumulative impacts (or the cumulative effect) are the sum of the overall impacts arising from the project (under the control of the developer / contractor), other activities (that may be under the control of others, including other developers, local communities, government and landowners) and other background pressures and trends which may be unregulated, including existing impacts.

The cumulative impacts are:

- Moderate in terms of localised impact on the study site.
- Moderate in terms of cumulative impact on the region, but lower than in terms of the localised impact.

Table 9: Assessment of Potential Impacts

Potential Impacts arising from Project	**Phase of Project**	**Impact Rating (Low: <30; Moderate: 31-59; High: >60)**					
		Extent	Duration	Magnitude	Probability	Total	**Significance**
Total Impact of Proposed Project	**Pre-Mitigation**	Local (2)	Long-term (4)	High (8)	High (4)	56	**Moderate**
	Post Mitigation	Site (1)	Long-term (4)	Moderate (6)	Medium (3)	33	**Moderate**
Mitigating Measures	1. Impacts on the existing natural environment related to the project are '**MODERATE**' 2. Any temporary storage, lay-down areas or accommodation facilities to be setup in the study area itself and not within any open veld outside of the study site. 3. Ensure small footprint during construction phase, with high controls on fringe impacts on any adjacent thornveld. 4. No buffer zones are required. These are 'No-Go' zones in terms movement of vehicles and contractors, as well as development of houses and other buildings. However, no new access roads may be developed through the open thornveld outside of the study site during the construction phase. 5. All hazardous materials must be stored appropriately to prevent these contaminants from entering the water environment (including the groundwater). 6. All excess materials brought onto site for construction must be removed after construction. 7. Very strict control and monitoring must be put in place to ensure that no building rubble, excavated soils and rocks, etc. are dumped in the nearby open veld. All rubble must be transported to a registered landfill site and proof of off-loading obtained and kept on site with other records for easy inspection and site audits. 8. No open trenches or mounds of soils to be left. All disturbed areas to be re-contoured to blend in with original contours and lines of undisturbed and undeveloped adjacent areas. 9. A rehabilitation plan for the project is required. 10. A weed control programme is required.						

	11. Site specific stormwater management plan is required, which should form part of the initial engineering / layout plans of the project. As part of the plan all attempts must be made to keep the surface stormwater flow / movement as free and natural as possible. 12. Public Open Spaces are essential and must be included in the final layout plans. 13. It is recommended that numerous indigenous trees be planted in the public open spaces and along the main streets in the townships.						
Cumulative Effect on a local scale		Site (1)	Long-term (4)	High (8)	High (4)	52	**Moderate**
Cumulative Effect on a regional scale		Site (1)	Long-term (4)	Moderate (6)	Medium (3)	33	**Moderate**
Individual Impacts (Low: <30; Moderate: 31-59; High: >60)							
		Extent	Duration	Magnitude	Probability	Total	Significance
1. Loss of natural vegetation	**Pre-Mitigation**	Site (1)	Long-term (4)	High (8)	High (4)	52	**Moderate**
	Post Mitigation	Site (1)	Long-term (4)	High (8)	High (4)	52	**Moderate**
Mitigating Measures	1. The loss of natural vegetation will be moderate on the localised footprint of the proposed development even though the study area is within a threatened veldtype. This is because there are high levels of transformation and degradation of the study site with no pristine or good thornveld present. 2. There are no protected trees or other RDL plant species on site. 3. The loss of vegetation can be slightly offset (although not fully) with the implementation of good sized public open spaces and the planting of numerous indigenous trees. 4. A weed control programme must be implemented. This can form part of the routine maintenance programme for the overall Townships. The responsibility falls to the municipality once operational and this is usually problematic due to lack of implementation. 5. A site-specific rehabilitation plan is required for the project.						
2. Loss or impact on wildlife	**Pre-Mitigation**	Site (1)	Long-term (4)	Moderate (6)	Medium (3)	33	**Moderate**
	Post Mitigation	Site (1)	Long-term (4)	Moderate (6)	Low (2)	22	**Low**
Mitigating Measures	1. Care must be taken not to interact directly with any wild life encountered. 2. Any bird nests or active animal burrows encountered during construction phase must not be interfered with. If encountered must first be discussed with specialist as how best to proceed. 3. Some form of offset is recommended such as establishment of bat houses and owl boxes. These can be set up in the public open spaces and/or along the western boundary of the study site, which opens up into existing thornveld.						
3. Impeding & Impounding waterflow	**Pre-Mitigation**	Local (2)	Short-term (2)	Low (4)	Low (2)	16	**Low**
	Post Mitigation	Site (1)	Short-term (2)	Minor (2)	Low (2)	10	**Low**
Mitigating Measures	1. There are no watercourses on the study site. However, surface stormwater flow may be diverted but the flow must be kept as natural as possible where possible. 3. Erosion potential is low on the study site due to the flatness of the topography and total lack of any significant ravines or valleys.						
6. Fringe impacts	**Pre-Mitigation**	Local (2)	Medium (3)	Low (4)	Medium (3)	27	**Low**
	Post Mitigation	Site (1)	Medium (3)	Low (4)	Medium (3)	24	**Low**
Mitigating Measures	1. Due to the nature of the project the potential for any significant fringe impacts are realistic and inevitable. Depending on the amount of offset and containment the fringe impacts might increase over time, but they are initially low due to the mostly built up areas surrounding the study area. 2. Care must be taken with heavy machinery used on the project. All access roads used during construction must be monitored and maintained. 3. Soils and stones excavated may be used on site as backfill, fixing of roads, filling of dongas, etc.						

	4. Excavated soils and rocks may not be simply dumped in any nearby open veld. 5. All temporary access roads, laydown areas, temporary camps, site offices, etc. must be fully rehabilitated by the contractors prior to final signing off of the construction phase of the project. 6. Dust suppression must be used during the dry autumn and winter months during construction.

6.2.14 Conclusions & Recommendations

The conclusions of the site investigations and study are as follows:

- The study site is within the original extent of the veldtype known as Marikana Thornveld, which is a threatened veldtype / ecosystem with a status of 'Endangered'. However, most of the site is either transformed (by existing houses and fields) or badly degraded (by over-utilisation of resources such as wood).
- During site investigations no red data listed (RDL) fauna or flora, or other species of conservation concern were observed on the study site.
- There are no watercourses in the study area or immediately adjacent, including wetlands.
- The study site is not with any national priority areas.
- Sections of the study site are within a critical biodiversity area (CBA).
- The biodiversity of the study area was found to be a mix of 'Low' (the transformed areas); and 'Medium' (the degraded open thornveld areas).
- All recommended mitigating measures must be implemented and form part of the conditions of any documentation or licences (e.g. The EMPr).

6.3 SOCIAL ENVIRONMENT

6.3.1 Existing Zoning and Land Use

The subject properties are currently zoned "Undetermined" in terms of the Tshwane Town Planning Scheme, 2008 (Revised 2014).

The site is mostly vacant with some informal settlements who will be accommodated in the proposed development.

6.3.2 Surrounding Land Uses

Surrounding zonings are mostly "Residential 1", "Residential 5" and "Undetermined". *Refer to Figure 28 Zoning Plan.*

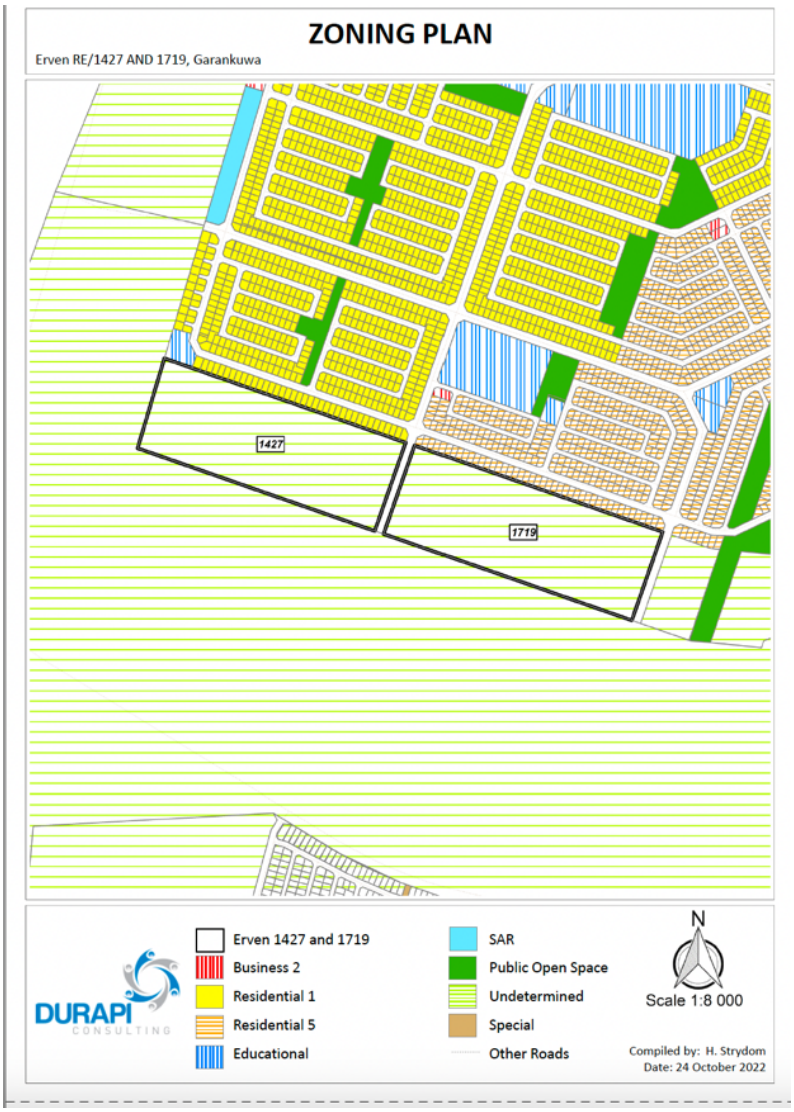


Figure 28: Zoning Plan

6.3.3 Socio Economic Impact

The proposed development complies with development guidelines contained in Local legislation i.e. Tshwane Regional Spatial Development Framework (SDF) 2018, Municipal legislation i.e. Gauteng Spatial Development Framework and National legislation i.e. The National Development Plan 2030, The Breaking New Ground Plan 2004.

Effective spatial planning requires increased strategic, socio-economic and bulk infrastructure investment that encourages infrastructure-led growth and increase the performance of the economy. To provide energy efficient and coordinated cities optimum utilisation of all resources including land, engineering services, transportation infrastructure, social infrastructure and ecological resources, is required. The proposed development was designed to be one which is compact and will take advantage of the above principles. The proposed development will also encourage infrastructure upgrades in the area as new bulk services will accompany the development and be integrated into the existing networks. The development of new infrastructure will also assist in maintenance of ageing infrastructure in surrounding neighbourhoods.

The proposed development aims to be inclusionary on all levels of urban life. The integration of socio economic, gender and racial predispositions lies at the heart of the intervention. The development will be

integrated with the greater Tshwane and Gauteng Province making it a functioning sustainable human settlement.

The development will comprise of residential units targeted at gap market, providing for a sector that highly requires entre into the housing market.

The subject site is located just close to various public transport facilities and surrounded by various businesses in an already built-up area. The development proposal entails the upgrading of an underutilized parcel of land as opposed to urban sprawl.

The proposed development will help to alleviate the current need for housing, which is one of South Africa's highest development priorities.

During the construction phase temporary employment will be created and skills enhancement will take place. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to the spin-offs that will result.

The proposed development will provide the Council with a higher income from services and property tax since more people will be making use of the services of the Council after the approval of this proposed township.

Negative social impacts associated with the proposed development mainly occur during the construction phase i.e., noise, dust, visual, security, safety and traffic. Mitigation measures will be included in the EMPr.

6.3.4 Heritage and Cultural Value

The size of this site qualifies for a Heritage Impact Assessment (HIA). According to the Environmental Screening Report the Archaeological and Cultural Heritage theme sensitivity is low. Integrated Heritage Services has been appointed to conduct a Heritage Impact Assessment. *Refer to Appendix C (vi) for HIA Report.* The report contained the following findings and recommendations:

6.3.4.1 Archaeology

The site was assessed for archaeological remains and no remains were identified during the survey. Based on the field study results and field observations, the receiving environment for the proposed residential development project site is low to medium potential to yield previously unidentified archaeological remains during construction. Literature review also revealed that no Stone Age sites are not shown on a map contained in a historical atlas of this area. This, however, should rather be seen as a lack of research in the area and not as an indication that such features do not occur.

6.3.4.2 Burial Grounds and Graves

Human remains and burials are commonly found close to archaeological sites and abandoned settlements; they may be found in abandoned and neglected burial sites or occur sporadically anywhere because of prehistoric activity, victims of conflict or crime. It is often difficult to detect the presence of archaeological human burials on the landscape as these burials, in most cases, are not marked at the surface and concealed by dense vegetation cover. Human remains are usually identified when they are exposed through erosion, earth moving activities and construction. In some instances, packed stones or bricks may indicate the presence of informal burials. If any human bones are found during the course of construction, then they should be reported to an archaeologist and work in the immediate vicinity should cease until the

appropriate actions have been carried out by the archaeologist. Where human remains are part of a burial, they would need to be exhumed under a permit from either SAHRA (for pre-colonial burials as well as burials later than about AD 1500) or Department of Health for graves younger than 60 years.

The field survey did not record any burial site within the proposed project site. The project area is built up and it is less likely to encounter unknown graves within the project site It should be noted that burial grounds and gravesites are accorded the highest social significance threshold (see Appendix 3). They have both historical and social significance and are considered sacred. Wherever they exist or not, they may not be tempered with or interfered with without a permit from SAHRA. The possibility of encountering human remains during subsurface earth moving activities anywhere on the landscape is ever present. Although the possibility of encountering previously unidentified burial sites is low within project site, should such sites be identified during construction, they are still protected by applicable legislations, and they should be protected. The proposed residential development project may be approved without any further investigation and mitigation in terms of Section 36 of the NHRA read together with the Human Tissue Act of 1983 and SAHRA Regulations of 2020.

6.3.4.3 Public Monuments and Memorials

The study did not record any public memorials and monuments within the proposed project site that require protection during construction. As such the proposed residential development project may be approved without any further investigation and mitigation in terms of Section 27 & 9 of the NHRA.

6.3.4.4 Buildings and Structures

The study did not record any buildings or structures that older than 60 years and protected in terms of Section 34 of the NHRA. As such, the proposed residential development project may be approved without any further investigation and mitigation in terms of Section 34 of the NHRA.

6.3.4.5 Impact Statement

The main cause of impacts to archaeological sites is direct, physical disturbance of the archaeological remains themselves and their contexts. It is important to note that the heritage and scientific potential of an archaeological site is highly dependent on its geological and spatial context. This means that even though, for example a deep excavation may expose buried archaeological sites and artefacts, the artefacts are relatively meaningless once removed from their original position. The primary impacts are likely to occur during clearance and digging of house foundations, indirect impacts may occur during movement of heavy construction vehicles and machinery during construction. Any additional clearance of access roads will result in the relocation or destruction of all existing surface heritage material (if any are present).

Since heritage sites, including archaeological sites, are non-renewable, it is important that they are identified, and their significance assessed prior to construction. It is important to note that due to the localised nature of archaeological resources, that individual archaeological sites could be missed during the survey, although the probability of this is very low within the proposed residential development project site. Further, archaeological sites and unmarked graves may be buried beneath the surface and may only be exposed during surface clearance. The purpose of the AIA is to assess the sensitivity of the area in terms of archaeology and to avoid or reduce the potential impacts of the proposed residential development project by means of mitigation measures (see appended Chance Find Procedure). It is the considered opinion of the author that the chances of recovering significant archaeological materials is very low within the proposed residential development project site.

Table 10: Summary of Findings

Heritage resource	Status/Findings
Buildings, structures, places and equipment of cultural significance	None recorded within the proposed project site
Areas to which oral traditions are attached or which are associated with intangible heritage	None exist
Historical settlements and townscapes	None survives in the proposed area
Landscapes and natural features of cultural significance	None
Archaeological and palaeontological sites	None recorded within the proposed project site
Graves and burial grounds	None recorded within the proposed project site
Movable objects	None
Overall comment	The surveyed area has no confirmable archaeological remains. The proposed development project is supported from a heritage perspective.

6.3.4.6 Assessment of development impacts

An impact can be defined as any change in the physical-chemical, biological, cultural, and/or socio-economic environmental system that can be attributed to human activities related to the project site under study for meeting a project need. The significance of the impacts of the process will be rated by using a matrix derived from Plomp (2004) and adapted to some extent to fit this process. These matrixes use the consequence and the likelihood of the different aspects and associated impacts to determine the significance of the impacts. Refer to Table 11 for Construction Phase Heritage Impacts.

Table 11: Construction Phase Impacts

Impacts and Mitigation measures relating to the proposed project during Construction Phase														
Activity/Aspect	**Impact /**	**Aspect**	**Nature**	**Magnitude**	**Extent**	**Duration**	**Probability**	**Impact before mitigation**	**Mitigation measures**	**Magnitude**	**Extent**	**Duration**	**Probability**	**Impact after mitigation**
Clearing and construction	Destruction of archaeological remains	Cultural heritage	-	2	1	1	2	8	• Use chance find procedure to cater for accidental finds	2	1	1	2	8
	Disturbance of graves	Cultural heritage	-	2	2	2	2	12	• Use appended Chance find procedure to cater for accidental finds.	2	1	1	1	4
	Disturbance of buildings and structures older than 60 years old	Operational	-	2	1	1	1	4	• Construction management and workers must be educated about the value of historical buildings and structures.	2	1	1	1	4
Haulage	Destruction public monuments and plaques	Operational	-	2	1	1	1	4	• Mitigation is not required because there are no public monuments within the project site	2	1	1	1	4

6.3.4.7 Cumulative impacts

Cumulative impacts as are defined as Impacts that result from incremental changes caused by other past, present or reasonably foreseeable actions together with the project. Therefore, the assessment of cumulative impacts for the proposed residential development project is considered the total impact associated with the site when combined with other past, present, and reasonably foreseeable future development projects. An examination of the potential for other projects to contribute cumulatively to the impacts on heritage resources from this site was undertaken during the preparation of this report. The total impact arising from the proposed residential development project (under the control of the applicant), other activities (that may be under the control of others, including other developers, local communities, government) and other background pressures and trends which may be unregulated.

The impacts of the proposed residential development project were assessed by comparing the post-project situation to a pre-existing baseline. Where projects can be considered in isolation, this provides a good method of assessing a project's impact. However, in this case there are several infrastructure developments, including residential, road networks, commercial infrastructure where baselines have already been affected, the proposed development will add to the existing impacts in the project area. As such increased development in the project area will have cumulative impacts on heritage resource whether known or covered in the ground. For example, during construction phase there will be increase in human activity and movement of heavy construction equipment and vehicles that could change, alter or destroy heritage resources within and outside the proposed development project site given that archaeological remains occur on the surface. Cumulative impacts that could result from a combination of this project and other actual or proposed future developments in the broader study area include site clearance and the removal of topsoil which could result in damage to or the destruction of heritage resources that have not previously been recorded for example abandoned and unmarked graves.

Heritage resources such as burial grounds and graves, archaeological as well as historical sites are common occurrences within the greater study area. These sites are often not visible and as a result, can be easily affected or lost. Furthermore, many heritage resources in the greater study area are informal, unmarked and may not be visible, particularly during the wet season when grass cover is dense. As such, workers may not see these resources, which results in increased risk of resource damage and/or loss.

Earth moving and extraction of gravel have the potential to interact with archaeology, architectural and cultural heritage.

No specific paleontological resources were found in the project area during the time of this study; however, this does not preclude the fact that paleontological resources may exist within the greater study area. As such, the proposed residential development project has the potential to impact on possible paleontological resources in the area. Sites of archaeological, paleontological, or architectural significance were not specifically identified, and cumulative effects are not applicable. The nature and severity of the possible cumulative effects may differ from site to site depending on the characteristics of the sites and variables.

Cumulative impacts that need attention are related to the impacts of clearances, digging pole foundations, access roads and impacts to buried heritage resources. Allowing the impact of the proposed residential development project to go beyond the surveyed area would result in a significant negative cumulative impact on sites outside the surveyed area. A significant cumulative impact that needs attention is related to stamping by especially construction vehicles at the site. Movement of heavy construction machinery must be monitored to ensure they do not drive beyond the approved sites. No significant cumulative impacts, over and above those already considered in the impact assessment, are foreseen at this stage of the assessment process.

6.3.4.8 Mitigation

Heritage mitigation is not required for the proposed residential development project because the proposed residential development project site did not yield any confirmable heritage resources during the survey.

6.3.4.9 Discussion

Several archaeological and heritage studies were conducted within the project area and its vicinity since 2001 and these presents the nature and heritage character of the area. The HIA conducted in the area also provide some predictive evidence regarding the types and ranges of heritage resources to be expected in the proposed project area: (see reference list for HIA reports). The studies include residential, road, water pipeline and powerline projects completed by Pelser (2007), Van Schalkwyk (2007, 2008, 2013, 2014), Pistorius, J.C.C. & Miller, S. (2011), Tomose (2015), Kusel (2005, 2006, 2008, 2011, 2012), Birkholtz (2007) and Mlilo 2018a, 2018b. The studies confirm the occurrence of several stone walled Late Iron Age sites in the project area. A search on the SAHRIS data base confirmed that several sites have been rescued or destroyed by infrastructure developments residential and agriculture. The reports also mention the existence of structures older than 60 years and traditional burial sites in the project area, but none will be affected by the proposed residential development project. The lack of confirmable archaeological sites recorded during the current survey is thought to be a result of two primary interrelated factors:

1. That proposed residential development project is located within a degraded area and have reduced sensitivity for the presence of high significance physical cultural site remains, be they archaeological, historical, or burial sites, due to previous destructive land use activities.
2. Limited ground surface visibility on sections of the proposed residential development project site was impeded by built up informal settlement. It should be borne in mind that the absence of confirmable and significant archaeological cultural heritage site is not evidence in itself that such sites do not exist within the proposed residential development project.

Based on the significance assessment criterion employed for this report, the proposed residential project site was rated low from an archaeological perspective, However, it should be noted that significance of the sites of Interest is not limited to presence or absence of physical archaeological sites. Significant archaeological remains may be unearthed during construction. (See appended chance find procedure).

6.3.4.10 Recommendations

1. It is recommended that SAHRA endorse the report as having satisfied the requirements of Section 38 (8) of the NHRA requirements.

2. It is recommended that SAHRA makes a decision in terms of Section 38 (4) of the NHRA to approve the proposed residential development project.

3. From a heritage perspective supported by the findings of this study, the proposed residential development project is supported. However, it should be approved under observation that the project dimensions do not extend beyond the area considered in this report.

4. Should chance archaeological materials or human remains be exposed during construction on any section of the proposed residential development project site, work should cease on the affected area and the discovery must be reported to the heritage authorities immediately so that an investigation and evaluation of the finds can be made. The overriding objective, where remedial action is warranted, is to minimize disruption in project scheduling while recovering archaeological and any affected cultural heritage data as stipulated by the NHRA regulations.

Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of the project EMPr, there are no significant cultural heritage resources barriers to the proposed

residential development project. The Heritage authority may approve the proposed residential development project as planned without investigation and mitigation.

6.3.4.11 Conclusions

Integrated Specialist Services (Pty) Ltd was requested by Setala Environmental (Pty) Ltd on behalf of City of Tshwane Metropolitan Municipality to carry out HIA for the proposed Ga Rankuwa Unit 23 Stand 1719 & Unit 25 Stand 1427 residential development project located in the City of Tshwane Metropolitan Municipality of Gauteng Province. Desktop research revealed that the project area is rich in Late Iron Age and historical sites, however, the field study did not identify any sites within the proposed development site. In terms of the archaeology, there are no obvious 'Fatal Flaws' or 'No-Go' areas. However, the potential for chance finds, remains and the applicant and contractors are urged to lookout for chance finds during construction. The procedure for reporting chance finds has clearly been laid out and if this report is adopted by SAHRA, then there are no archaeological reasons why the proposed residential development project cannot be approved.

6.3.5 Visual Impact

Visual intrusion is defined as the level of compatibility or congruence of the project with the particular qualities of the area, or it's 'sense of place'. This is related to the idea of context and maintaining the integrity of the landscape or townscape.

High visual intrusion – results in a noticeable change or is discordant with the surroundings.

Moderate visual intrusion – partially fits into the surroundings, but clearly noticeable.

Low visual intrusion – minimal change or blends in well with the surroundings.

The proposed development will change the scenic resources of the local area from an undeveloped area to a formal residential/business area. The visual intrusion is considered to be moderate as the proposed development will have minimal change and blends in with the surroundings.

The proposed development will require additional lighting on and in buildings and along roads. This will change the night landscape from unlit to lit.

Mitigation measures will be included in the EMPr.

7 PROJECT ALTERNATIVES

7.1 Introduction

In terms of the EIA Regulations, Section.28 (1) (c) feasible alternatives are required to be considered as part of the environmental investigations. In addition, the obligation that alternatives are investigated is also a requirement of Section 24(4) of the National Environmental Management Act (Act No. 107 of 1998) (as amended). An alternative in relation to a proposed activity refers to the different means of meeting the general purpose and requirements of the activity (as defined in GNR 982 of the EIA Regulations, 2014), which may include alternatives to:

- the property on which or location where it is proposed to undertake the activity;
- the type of activity to be undertaken;
- the design or layout of the activity;
- the technology to be used in the activity;

- the operational aspects of the activity; and
- the option of not implementing the activity.

Based on the above the following alternatives were investigated for the proposed Ga-Rankuwa development.

a) Site alternatives

No site alternatives were considered as the site (Stand 1719 Unit 23 and Stand 1427 Unit 27 Ga-Rankuwa) is the only site available to the applicant.

b) Activity alternatives

The proposed activity entails the establishment of a Residential development on Ga-Rankuwa Unit 23 & 25. This activity will allow for the expansion of the Ga-Rankuwa Township to provide additional single-dwelling house opportunities for the informal settlement that is currently on site. Erven 1719 and 1427 Ga-Rankuwa will consist of 384 erven and 368 erven respectively with a total of 752 erven.

The proposed development is a City of Tshwane Metropolitan Municipality (CTMM) Human Settlements Housing Project and no feasible activity alternatives were considered.

c) Layout alternatives

No issues have been identified as potential impacts that necessitated the consideration of site layout alternatives subject to the outcome, findings and recommendations of the respective specialist studies. The proposed layout is regarded as the preferred layout allowing for the maximum number of erven on the site. No layout alternatives were considered.

d) Technology alternatives

Energy efficient alternatives will be considered during the environmental impact reporting process.

e) No-Go alternative

Should this option be implemented, the "status quo" will prevail and none of the advantages associated with the proposed residential development will realize.

The "no-go" alternative will be considered during the environmental impact assessment process.

7.2 Alternatives considered

Based on the preceding discussion the following alternatives have been identified for purposes of detailed comparative assessment:

- Technology alternatives (e.g. energy efficient alternatives); and
- "No Go" alternative.

7.2.1 Technology alternatives (e.g. energy efficient alternatives)

Technology Alternative 1 (Sustainable design) and Technology Alternative 2 (Conventional design) alternatives were investigated.

Built environment professionals, government officials and community members all have a vital role to play in making the shift toward building more sustainable settlements and neighbourhoods[2].

Sustainable design criteria should include:

- Thermally Efficient Design
- Sustainable building materials
- Renewable energy options
- Sustainable water and sanitation systems
- Waste minimisation and recycling

Thermally Efficient Design

Orientation and Placement of Windows

Windows allow solar energy to enter a building which is unwanted in summer and desirable in winter. In the southern hemisphere, houses should be orientated to face North. In general, windows facing the north should be larger (for heat gain during winter) but not too large (increased heat losses in winter and heat gains in summer) while windows facing south should be smaller (to prevent heat losses during winter).

The sun changes position in the sky during the year and by designing an appropriate overhang above the window, the summer sun will be blocked while the winter sun can enter. This is a very cost effective and sustainable way of regulating temperatures within a house or building. An overhang or awning can also be fitted to an existing window.

Appropriate Use of Thermal Mass

Thermal mass is the ability of a material to absorb heat energy. A great portion of heat energy is required to change the temperature of high density materials e.g. concrete, stone, brick and tiles. These materials are therefore considered to have high thermal mass. Lightweight materials such as timber have low thermal mass.

Through the correct application of thermal mass internal temperatures are moderated by averaging the day/ night extremes. This increases comfort and reduces energy costs. The ignorant use of thermal mass can exacerbate the worst extremes of the climate and can be a huge energy and comfort liability. To be effective, thermal mass must be integrated with sound passive design techniques. This means having appropriate areas of glazing facing appropriate directions with appropriate levels of shading, insulation and thermal mass.

The appropriate use of thermal mass can delay heat flow through the building envelope by as much as 10 to 12 hours producing a warmer house at night in winter and a cooler house during the day in summer. Building materials with high thermal mass include adobe brick, stone, brick, etc.

Sustainable Building Materials

According to the Western Cape Human Settlement Strategy, building construction and operation results in 50% of all CO^2 emissions worldwide (Department of Local Government and Housing. 2007). The average middle income house uses five to ten tons of cement in the building process, and for every ton of cement manufactured, a ton of CO^2 is released.

[2] Information obtained from Sustainable Neighbourhood Design Manual published by the Sustainability Institute

Thermally efficient, low carbon emission, structurally sound and inexpensive building materials exist that have been used for centuries in household design. Hemp has huge potential in the building market, as do adobe, sand bag construction, cob, thatch, brick, stone and recycled materials. Other 'low cement' options, including SABS approved compressed earth blocks (CEBs) using 6% soil stabilisers, are currently being investigated and proposed in sustainable neighbourhood designs.

Energy Efficiency Applications

Some of the most common, cost effective energy efficiency applications are listed below.

Ceilings

The benefits associated with ceiling installations include a reduction in expenditure on indoor heating, improved health as a result of improved air quality and more stable internal air temperatures (particularly in households which use paraffin, coal and other heating systems which damage respiratory health), increased productivity resulting from improved health and increased quality of life.

Heat loss through the roof is often greater than heat loss in other areas of the house, thus one of the most effective ways to insulate a house is to put in a ceiling. In cold climactic regions, or regions with cold winters, a ceiling can reduce space heating costs by up to 50 per cent. The Department of Housing's Draft Framework on Environmentally Efficient Housing has identified ceilings as an important intervention within the social housing frameworks.

Insulation

One of the best ways to make a house more efficient is to reduce the flow of heat into and out of the house. Ceiling and roof insulation serve to conserve heat in winter and maintain cooler temperatures in summer. Climactic regions can make a difference in the level of insulation necessary for a comfortable living environment within a home.

Sky Lights

A skylight is a window placed in the roof of a building or in the ceiling of a room to admit light into the room. Designs include transparent roof plates, glass windows and plastic domes with a circular duct connected to the room. Skylights should ideally be incorporated in the building design to keep the costs down but can be retrofitted to existing buildings with significant contributions to increased light levels and accompanied energy savings.

Solar Blinds

When an existing building does not have an appropriate overhang, a solar blind can be fitted. These blinds block all the summer sun and let the majority of winter sun through. These fixed blinds let sunlight through and does not block the view since they are placed horizontally and are never closed or adjusted. They can be manufactured locally and are cost effective.

CFL Bulbs

The use of energy efficient lighting is one of the best and most cost-effective ways of reducing energy consumption. Efficient lighting will reduce energy consumption and in particular peak demand, which will improve energy security, Eskom also recognizes that efficient lighting will play a major role in its demand side management (DSM) process.

Renewable energy applications

Solar Water Heaters

Lack of access to hot water can have negative safety and health impacts on low-income households. SWHs can replace the use of "dirtier" fuels, such as paraffin, for water heating. Also, the time lost in heating water

by using more 'traditional' fuels, such as wood, could be saved by using solar water heaters. Solar water heaters in the low-income sector should become a stronger focus.

Sustainable water and sanitation systems
Water efficiency measures can include low flow fixtures in sinks and showers, dual flush systems in toilets, rain water harvesting and water recycling.

Waste Minimisation and Recycling
Waste separation and recycling can generate jobs as well as removing recyclable resources from landfill. Individuals and recycling cooperatives can collect and separate wastes and sell recyclable materials. Buyback centres can be established in neighbourhoods, where recyclers can buy recyclable materials for reprocessing. Organic materials can also be separated and made into compost, adding nutrients to soil for agricultural production and greening.

Technology Alternative 2 (Conventional Design) does not include energy efficiency measures and design and will not contribute to a sustainable development.

Technology Alternative 1 (Sustainable design), which include energy efficiency measures and design, will ensure a sustainable development and reduce the carbon footprint of the development, is regarded as the preferred alternative.

7.2.2 "No-go" alternative

The No-Go alternative will entail leaving the site in its present state i.e. occupied by informal settlers and prone to further invasion by informal settlers, illegal dumping and removal of trees and shrubs for firewood and clearing of areas for vegetable fields.

All the environmental impacts associated with the construction and operational phases of the proposed development will apply to the No-Go alternative as the status quo will apply and the environment will remain as it is currently.

However, it is important to note that the benefits associated with the development will also not materialise, and it must be noted that the majority of the impacts identified for the development were mitigated to a negative low or positive impact once the measures for mitigation were applied, indicating that maintaining the status quo is to lose the opportunity of a beneficial development with negligible environmental impacts.

The No-go alternative is therefore not regarded as the preferred alternative in the long term.

8 PUBLIC PARTICIPATION PROCESS

Public participation is a process that is designed to enable all interested and affected parties (I&APs) to voice their opinion and/ or concerns which enables the practitioner to evaluate all aspects of the proposed development, with the objective of improving the project by maximising its benefits while minimising its adverse effects. I&APs include all interested stakeholders, technical specialists, and the various relevant organs of state who work together to produce better decisions.

The primary aims of the public participation process are:

- to inform interested and affected parties (I&APs) and key stakeholders of the proposed application and environmental studies;

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

The public participation process must adhere to the requirements of Regulations (GNR 982) under the NEMA.

For the purposes of the scoping phase, the PPP aims to ensure that the full range of stakeholders is informed about project scope. In order to achieve this, a number of key activities have taken place and will continue to take place. These included the following:

- The identification of stakeholders is a key deliverable at the outset, and it is noted that there are different categories of stakeholders that must be engaged, from the different levels and categories of government, to relevant structures in the NGO sector, to the communities of wards of residential dwellings which surround the works;
- The development of a living and dynamic database that captures details of stakeholders from all sectors;
- The convening of focused and general meetings with stakeholders at different times throughout the EIA process;
- The engagement of public leaders to whom the public generally turn for information, keeping such individuals well informed about process and progress;
- The fielding of queries from I&APs and others, and providing appropriate information;
- The convening of specific stakeholder groupings/fora as the need arises;
- The preparation of reports (both baseline and impact assessment) based on information gathered throughout the EIA via the PPP and feeding that into the relevant decision-makers; and
- The PPP includes distribution of pamphlets or Background Information Documents and other information packs.

Specifically, the proposed Ga-Rankuwa Erf 1719 and Erf 1427 development Scoping Phase PPP has entailed the following activities:

Refer to Appendix D: Public Participation.

8.1 Public Participation Activities Undertaken during the Scoping Phase

8.1.1 Authority Consultation

The competent authority, which is the GDARD, is required to provide an environmental authorisation (whether positive or negative) for the project. The GDARD was consulted and will be engaged throughout the project process.

8.1.2 Consultation with Other Relevant Stakeholders

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

The identified stakeholders of this project include:

Table 12: Key Stakeholders contacted as part of Public Participation Process

Contact Person	Company	Address
Ms. Lilian Siwelane	Department Water and Sanitation QDA of A21J	Water Quality office, 15th floor, Bothongo Plaza-east, 285 Francis Baard (Schoeman) Street,Pretora
Mr Philip Hine	SA Heritage Resource Agency	111 Harrington Street Cape Town 8000
Mr Aluoneswi Mafunzwa	City of Tshwane Metropolitan Municipality	Tshwane House 320 Madiba Street PRETORIA

Refer to Appendix D (i) for proof of correspondence to I & APs.

8.1.3 Site Notification

The NEMA EIA Regulations require that a site notice be fixed at a place conspicuous to the public at the boundary or on the fence of the site where the activity to which the application relates and at points of access or high through traffic. The purpose of this is to notify the public of the project and to invite the public to register as stakeholders and inform them of the PP Process. Setala Environmental erected a site notice at a noticeable location around the perimeter of the site on 14 October 2022 (refer to Appendix D (ii)).

8.1.4 Advertising

In compliance with the EIA Regulations (2014), notification of the commencement of the EIA process for the project was advertised in a local newspaper as follows:

Sosh News – 27 October 2022
(Refer to Appendix D (iii)).

Interested and affected parties (I&APs) were requested to register their interest in the project and become involved in the EIA process. The primary aim of these advertisements was to ensure that the widest group of I&APs possible was informed and invited to provide input and questions and comments on the project.

8.1.5 Identification of Interested and Affected parties

I&APs were identified primarily through an existing database as well as from responses received from the notices mentioned above. E-mails were sent to key stakeholders and other I&APs on the existing database, informing them of the application for the project, the availability of the draft Environmental Scoping Report (ESR) for review and indicating how they could become involved in the project. The contact details of all identified I&APs are updated on the project database, which is included in Appendix D (iv).

This database will be updated on an on-going basis throughout the EIA process.

8.1.6 Background Information Document (BID)

A briefing paper or Background Information Document (BID) for the project was compiled in English. The aim of this document is to provide a brief outline of the application and the nature of the development. It is also aimed at providing preliminary details regarding the EIA process and explains how I&APs could become involved in the project.

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

8.1.7 Issues Register

Issues and concerns raised in the public participation process during the EIA process have been and will continue to be compiled into a Comments and Response Report. The Comments and Response Report will be attached as Appendix D (v), in which all comments received, and responses provided will be captured. Correspondence received from I & APs are included as Appendix D (vi).

8.1.8 Public Review of the Scoping Report

All registered I&APs were notified of the availability of the report electronically.

The draft SR, together with the Plan of Study for EIA was made available for authority and public review for a total of 30 days from 14 March 2023 to 18 April 2023. The report was submitted to all I&APs and electronic copies could be downloaded with a link from the Setala Environmental website. *Refer to Appendix D (vii) for notification of I&APs.*

The Draft SR was submitted for review to the following key stakeholders:

- Environmental Management Division, City of Tshwane Metropolitan Municipality
- The Department of Water and Sanitation, Limpopo Water Management Area
- SAHRA via SAHRIS website

Refer to Appendix D (viii) for submission of Draft SR to key stakeholders.

<u>Comments on the Draft Scoping Report</u>

Comments on the Draft SR were received from the following parties:

- Eskom Transmission *(Refer to Appendix D (ix).*

In the comments received it indicated that Eskom Transmission is not affected by the application.

- SAHRA *(Refer to Appendix D (ix).*

SAHRA Development Applications Unit (DAU) accepts the HIA report. However, a Final Comment cannot be issued until the draft EIAr and it's appendices are submitted to the case for commenting.

SAHRA will further process the case once the aforementioned reports are submitted to the case.

- City of Tshwane Metropolitan Municipality *(Refer to Appendix D (ix).*

In reviewing the application, the Department made the following findings:

a) According to the TOSF, the proposed development site is not located within or near any open space typologies. Therefore, the proposed development does not conflict the TOSF's objectives.

b) The Bioregional Plan depicts an area measuring approximately 8,94Ha of the proposed development site is classified as a Critical Biodiversity Area. The high ecological sensitivity is attributed to the primary vegetation namely the Marikana Thornveld vegetation unit as well potential presence of red listed plant species in terms of the CPLAN. As a result, such areas are earmarked for biodiversity management and ecological conservation. However, the ecological status has been transformed by the established of an informal settlement. Therefore, the proposed development site does not conflict the objectives of Bioregional Plan and CPLAN.

c) The remaining section of the proposed development site measuring approximately 13Ha is classified as Other Natural Areas. As a result, this section is not earmarked for nay biodiversity management and conservation in terms of CPLAN. Therefore, the proposed development does not conflict the objectives of Bioregional Plan and CPLAN.

d) The Biodiversity Assessment report indicates that the proposed development site has a Marikana Thornveld vegetation unit. However, no red listed species of fauna were observed due to high level of transformation caused by the informal settlement within the proposed development.

e) According to the GPEMF, an area measuring approximately 8,94Ha of the proposed development site is classified as a normal control zone (alias Zone 4). The framework requires promotion of agricultural activities within this zone. However, the site and surrounding properties have never been utilized for agricultural purposes as informed by the Google Earth imagery. In addition, the proposed development is an extension of the existing township abutting the site. Therefore, the proposed development does not conflict the objectives of Bioregional Plan and CPLAN.

f) The GPEMF depicts the remaining 13Ha classified as a high control zone outside an urban area (Zone 3). The framework requires protection of environmental sensitivities within this zone. However, no species of conservation concern has been confirmed onsite as pr the findings of the ecologist. Therefore, the proposed development does not conflict with the GPEMF's objectives.

g) The following studies have been identified and will be included in the Draft EIR:
    - Civil Engineering Assessment;
    - Traffic Impact Assessment;
    - Geotechnical Assessment;
    - Biodiversity Assessment; and
    - Archaeological and Heritage Impact Assessment.

Recommendations

The Department recommends that the identified specialist studies should be commissioned and included in the Draft EIR.

No comments were received from DWS.

8.2 Public Participation Activities Undertaken during the EIA Phase

All registered I&APs were notified of the availability of the Draft EIA report electronically.

The draft EIA Report will be made available for authority and public review for a total of 30 days from 5 July 2023 to 5 August 2023. The report will be submitted to all I&APs and electronic copies can be downloaded with a link from the Setala Environmental website. *Refer to Appendix D (x) for proof of notification (to be included in Final EIAR).*

Comments received will be included in the Issues Register attached as Appendix D (v) and correspondence received from I & APs will be included as Appendix D (vi).

Copies of the DEIAR will be submitted to the following key stakeholders:

- Environmental Management Division, City of Tshwane Metropolitan Municipality
- The Department of Water and Sanitation, Limpopo Water Management Area
- SAHRA via SAHRIS website

Refer to Appendix D (xi) for proof of notification (to be included in Final EIAR).

Virtual/Public Meeting/Open Day

The opportunity to partake in the Public Participation Process, without face-to-face contact, was provided. Communication was proposed in writing via fax or email, and verbally via text messages, WhatsApp, Zoom or Teams sessions.

8.2.1 Public Review of the Draft EIA Report

Comments on the Draft EIA Report will be included in the Final EIA Report.

9 ENVIRONMENTAL IMPACT ASSESSMENT

9.1 Introduction

The EIA of the project activities is determined by identifying the environmental aspects and then undertaking an environmental risk assessment to determine the significant environmental aspects. The environmental impact assessment has included all phases of the project namely:

- Construction Phase; and
- Operational Phase.

Please note: due to the nature of the development it is anticipated that the infrastructure would be permanent, thus not requiring decommissioning or rehabilitation. Maintenance of infrastructure will be addressed under the operational phase.

9.2 Impact Assessment Methodology

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

- Nature: A brief written statement of the environmental aspect being impacted upon by a particular action or activity.

- Extent: The area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment phase of a project in terms of further defining the determined significance or intensity of an impact. For example, high at a local scale, but low at a regional scale;

- Duration: Indicates what the lifetime of the impact will be;

- Intensity: Describes whether an impact is destructive or benign;

- Probability: Describes the likelihood of an impact actually occurring; and

- Cumulative: In relation to an activity, means the impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.

TABLE 13: CRITERIA TO BE USED FOR RATING OF IMPACTS

Criteria	**Description**			
Extent	**National (4)** The whole of South Africa	**Regional (3)** Provincial and parts of neighbouring provinces	**Local (2)** Within a radius of 2 km of the construction site	**Site (1)** Within the construction site
Duration	**Permanent (4)** Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient	**Long-term (3)** The impact will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter. The only class of impact which will be non-transitory	**Medium-term (2)** The impact will last for the period of the construction phase, where after it will be entirely negated	**Short-term (1)** The impact will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase
Intensity	**Very High (4)** Natural, cultural and social functions and processes are altered to extent that they permanently cease	**High (3)** Natural, cultural and social functions and processes are altered to extent that they temporarily cease	**Moderate (2)** Affected environment is altered, but natural, cultural and social functions and processes continue albeit in a modified way	**Low (1)** Impact affects the environment in such a way that natural, cultural and social functions and processes are not affected
Probability of occurrence	**Definite (4)** Impact will certainly occur	**Highly Probable (3)**	**Possible (2)** The impact may occur	**Improbable (1)** Likelihood of the impact

		Most likely that the impact will occur		materialising is very low

Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

TABLE 14: CRITERIA FOR THE RATING OF CLASSIFIED IMPACTS

Low impact (4 - 6 points)	A low impact has no permanent impact of significance. Mitigation measures are feasible and are readily instituted as part of a standing design, construction or operating procedure.
Medium impact (7 - 9 points)	Mitigation is possible with additional design and construction inputs.
High impact (10 - 12 points)	The design of the site may be affected. Mitigation and possible remediation are needed during the construction and/or operational phases. The effects of the impact may affect the broader environment.
Very high impact (13 - 20 points)	Permanent and important impacts. The design of the site may be affected. Intensive remediation is needed during construction and/or operational phases. Any activity which results in a "very high impact" is likely to be a fatal flaw.
Status	Denotes the perceived effect of the impact on the affected area.
Positive (+)	Beneficial impact.
Negative (-)	Deleterious or adverse impact.
Neutral (/)	Impact is neither beneficial nor adverse.
It is important to note that the status of an impact is assigned based on the status quo – i.e. should the project not proceed. Therefore not all negative impacts are equally significant.	

The suitability and feasibility of all proposed mitigation measures will be included in the assessment of significant impacts. This will be achieved through the comparison of the significance of the impact before and after the proposed mitigation measure is implemented. Mitigation measures identified as necessary will be included in an EMPr. The EMPr will form part of the Environmental Impact Assessment Report (EIAR). Refer to Appendix E.

9.3 Impacts

9.3.1 Geology Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Stability of structures	1	2	2	4	Negative Medium (-8)	• Most of the in-situ materials can be used as subgrade and fill materials. However, it is recommended that construction materials be imported to the site to optimize the development potential of the site. • Adequate bearing capacity exists for the intended housing structures. However, precautionary measures should be taken during design and construction for the expected differential settlement associated with compressibility, collapse potential and activity of the transported and residual soils which may occur between the founding depth and bedrock. The uneven weathered bedrock may result in differential movements in the super structures. • First class site drainage must be provided to reduce the risk of subsurface materials from becoming saturated, the risk of differential settlement and to prevent scouring and erosion of the surface materials. • It is recommended that a water-borne sewerage system be used for sanitation.	1	2	1	2	Negative Low (-6)

9.3.2 Topographical Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Surface gradient	1	2	2	3	Negative Medium (-8)	• Surface drainage measures should be in place according to the engineer's design to ensure good site drainage without ponding of water after precipitation. • First class site drainage must be provided to reduce the risk of subsurface materials from becoming saturated, the risk of differential settlement and to prevent scouring and erosion of the surface materials.	1	2	1	2	Negative Low (-6)
Alteration of topography due to stockpiling of soil, building material and debris and waste material on site.	1	3	2	3	Negative Medium (-9)	• All stockpiles must be restricted to designated areas and are not to exceed a height of 2 metres. • Stockpiles created during the construction phase are not to remain during the operational phase. • The contractor must be limited to clearly defined access routes to ensure that sensitive and undisturbed areas are not disturbed.	1	2	1	2	Negative Low (-6)

9.3.3 Hydrogeology Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation	Significance Rating	Mitigation and management measures	After Mitigation	Significance Rating

	E	D	I	P	(before mitigation)		E	D	I	P	(after mitigation)
CONSTRUCTION											
Groundwater contamination due to construction activities	2	4	3	3	Negative High (-12)	Construction Site • Encourage the construction contractor to employ local people as far as is reasonably practical and encourage the contractor to transport them daily to and from site. This would reduce solid and liquid waste production and water demand at the site camp. • During and after construction, stormwater control measures should be implemented especially around stockpiled soil, excavated areas, trenches etc. so that export of soil into any watercourse is avoided. Diesel, hydraulic fluid and lubricants • Minimise on-site storage of petroleum products; • Ensure measures to contain spills readily available on site (spill kits). • All petrochemical leaks and spills must be appropriately contained and disposed of at a licensed waste disposal site. Construction Vehicles • All earth moving vehicles and equipment must be regularly maintained to ensure their integrity and reliability. No repairs may be undertaken beyond the contractor laydown area. • Should any transfer of vehicle fuel take place on site, it is important to demarcate a specific area for this purpose. This area should be covered with an impermeable layer to prevent any penetration of fuel and oil spillage into the soil. The area could also be sloped towards an oil	2	4	1	2	Negative Medium (-9)

						trap or sump to ease collection of spilled substances. • All construction vehicles should be serviced on a regular basis to minimise the risk of oil spillage on site. • Servicing of vehicles or equipment must take place off-site at appropriate workshop facilities. • When not in use, construction vehicles must be parked in an area provided with an impermeable layer to prevent leaks and spills from penetrating the substrate. Construction site domestic waste and sewage • Minimise on-site accommodation. • Deposit solid waste in containers and dispose at municipal waste disposal sites regularly. • Dispose of liquid waste (grey water) with sewerage. • Install appropriate ablution facilities. • Preferably utilise municipal systems or chemical toilets. Construction site inert waste (waste concrete, reinforcing rods, waste bags, wire, timber etc) • Ensure compliance with stringent daily clean up requirements on site. • Dispose at municipal waste disposal sites. Construction site hazardous waste • All hazardous substances must be stored on an impervious surface in a designated bunded area, able to contain 110% of the total volume of materials stored at any given time. • Material safety data sheets (MSDSs) are to be clearly displayed for all hazardous materials. • The integrity of the impervious surface and bunded area must be inspected regularly and any maintenance work conducted must be					

						recorded in a maintenance report. • Employees should be provided with absorbent spill kits and disposal containers to handle spillages. • Train employees and contractors on the correct handling of spillages and precautionary measures that need to be implemented to minimise potential spillages. • Employees should record and report any spillages to the responsible person. • An Emergency Preparedness and Response Plan will be developed and implemented should and incident occur. • Access to storage areas on site must be restricted to authorised employees only. • Contractors will be held liable for any environmental damages caused by spillages.					
OPERATIONAL											
Leaks of untreated water from pipelines may occur and impact on the groundwater quality.	1	2	2	3	Negative Medium (-8)	Any leaks should be fixed immediately, and areas rehabilitated as needed.	1	2	1	2	Negative Low (-6)

9.3.4 Hydrology Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Increased urban run-off	2	2	2	1	Negative Medium (-7)	• Land disturbance must be minimized in order to prevent erosion and run-off - this includes leaving exposed soils open for a prolonged	2	1	1	1	Negative Low (-5)

						period of time. As soon as vegetation is cleared (including alien) the area must be re-vegetated if it is not to be developed on in future.					
OPERATIONAL											
The proposed development could have a negative impact on water resources. Increased coverage of paved/hardened surfaces may increase the volume and velocity of stormwater runoff.	1	3	2	3	Negative Medium (-9)	Stormwater Management are addressed in the Environmental Management Programme (EMPr). A site-specific stormwater management plan is required.	1	2	1	2	Negative Low (-6)

9.3.5 Vegetation and Fauna Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	**Before Mitigation**				**Significance Rating (before mitigation)**	**Mitigation and management measures**	**After Mitigation**				**Significance Rating (after mitigation)**
	E	**D**	**I**	**P**			**E**	**D**	**I**	**P**	
CONSTRUCTION											
Total Impacts	2	4	2	3	Negative High (-1)	1. Impacts on the existing natural environment related to the project are '**MODERATE**' 2. Any temporary storage, lay-down areas or accommodation facilities to be setup in the study area itself and not within any open veld outside of the study site. 3. Ensure small footprint during construction phase, with high controls on fringe impacts on any adjacent thornveld. 4. No buffer zones are required. These are 'No-Go' zones in terms movement of vehicles and contractors, as well as development of houses and other buildings. However, no new	1	4	2	2	Negative Medium (-9)

						access roads may be developed through the open thornveld outside of the study site during the construction phase. 5. All hazardous materials must be stored appropriately to prevent these contaminants from entering the water environment (including the groundwater). 6. All excess materials brought onto site for construction must be removed after construction. 7. Very strict control and monitoring must be put in place to ensure that no building rubble, excavated soils and rocks, etc. are dumped in the nearby open veld. All rubble must be transported to a registered landfill site and proof of off-loading obtained and kept on site with other records for easy inspection and site audits. 8. No open trenches or mounds of soils to be left. All disturbed areas to be re-contoured to blend in with original contours and lines of undisturbed and undeveloped adjacent areas. 9. A rehabilitation plan for the project is required. 10. A weed control programme is required. 11. Site specific stormwater management plan is required, which should form part of the initial engineering / layout plans of the project. As part of the plan all attempts must be made to keep the surface stormwater flow / movement as free and natural as possible. 12. Public Open Spaces are essential and must be included in the final layout plans.					

						13. It is recommended that numerous indigenous trees be planted in the public open spaces and along the main streets in the townships.					
Loss of natural vegetation	1	3	2	3	Negative Medium (- 9)	1.The loss of vegetation can be slightly offset (although not fully) with the implementation of good sized public open spaces and the planting of numerous indigenous trees. 2. A weed control programme must be implemented. This can form part of the routine maintenance programme for the overall Townships. The responsibility falls to the municipality once operational and this is usually problematic due to lack of implementation. 3. A site-specific rehabilitation plan is required for the project.	1	3	2	3	Negative Medium (- 9)
Loss or impact on wildlife	1	3	2	2	Negative Medium (-8)	1. Care must be taken not to interact directly with any wild life encountered. 2. Any bird nests or active animal burrows encountered during construction phase must not be interfered with. If encountered must first be discussed with specialist as how best to proceed. 3. Some form of offset is recommended such as establishment of bat houses and owl boxes. These can be set up in the public open spaces and/or along the western boundary of the study site, which opens up into existing thornveld.	1	2	2	1	Negative Low (-6)
Impeding & impounding of watercourses	1	2	1	2	Negative Low (-6)	1. There are no watercourses on the study site. However, surface stormwater flow may be diverted but the flow must be kept as natural as possible where possible.	1	1	2	1	Negative Low (-5)

						2. Erosion potential is low on the study site due to the flatness of the topography and total lack of any significant ravines or valleys.					
Fringe impacts arising from the construction phase	1	1	2	2	Negative Low (- 6)	1. Due to the nature of the project the potential for any significant fringe impacts are realistic and inevitable. Depending on the amount of offset and containment the fringe impacts might increase over time, but they are initially low due to the mostly built up areas surrounding the study area. 2. Care must be taken with heavy machinery used on the project. All access roads used during construction must be monitored and maintained. 3. Soils and stones excavated may be used on site as backfill, fixing of roads, filling of dongas, etc. 4. Excavated soils and rocks may not be simply dumped in any nearby open veld. 5. All temporary access roads, laydown areas, temporary camps, site offices, etc. must be fully rehabilitated by the contractors prior to final signing off of the construction phase of the project. 6. Dust suppression must be used during the dry autumn and winter months during construction.	1	2	1	1	Negative Low (-5)
CUMULATIVE											
The cumulative effect speaks to the total sum of negative impacts on the natural environment. The cumulative effect looks at the sum of the existing impacts and the new, additional impacts arising from the proposed project and related activities.	1	3	2	2	Negative Medium (- 8)						

9.3.6 Waste Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Contamination of the surface and site with general waste.	1	2	2	3	Negative Medium (-8)	• An adequate number of general waste receptacles, including bins must be arranged around the site to collect all domestic refuse, and to minimise littering. • Bins must be provided on site for use by employees. • Bins should be clearly marked and lined for efficient control and safe disposal of waste. • Different waste bins, for different waste streams must be provided to ensure correct waste separation. • A fenced area must be allocated for waste sorting and disposal on the site. • General waste produced on site is to be collected in skips for disposal at the local municipal waste site. • Hazardous waste is not to be mixed or combined with general waste earmarked for disposal at the municipal landfill site. • Under no circumstances is waste to be burnt or buried on site. • Waste bins should be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance. • All general waste must be removed from the site at regular intervals and disposed of in suitable waste receptacle	1	2	1	2	Negative Low (-6)

Contamination of the surface and site with general and hazardous waste. Hazardous waste produced on site include: • Oil and other lubricants, diesel, paints, solvent; • Containers that contained chemicals, oils or greases; and • Equipment, steel, other material (rags), soils, gravel and water contaminated by hazardous substances (oil, fuel, grease, chemicals or bitumen).	1	2	3	3	Negative Medium (-9)	• Hazardous waste is to be disposed at a Permitted Hazardous Waste Landfill Site. • The Environmental Manager must have as part of his/her records the waste manifest for each batch based disposal. • Hazardous waste bins must be clearly marked, stored in a contained area (or have a drip tray) and covered (either stored under a roof or the top of the container must be covered with a lid). • A hazardous waste disposal certificate must be obtained from the waste removal company as evidence of correct disposal. • In the case of a spill of hydrocarbons, chemicals or bituminous, the spill should be contained and cleaned up and the material together with any contaminated soil collected and disposed of as hazardous waste to minimize pollution risk.	1	1	2	2	Negative Low (-6)
OPERATIONAL											
Generation and disposal of domestic waste by the proposed development.	1	3	2	2	Negative Medium (-8)	• Waste will be collected by an accredited waste company and disposed of at an appropriate and licensed waste disposal facility. • Waste minimisation and recycling will be implemented to ensure a sustainable development.	2	1	1	2	Negative Low (-6)
CUMULATIVE											
The generation of waste associated with the proposed development together with waste from other developments could put strain on existing landfill sites in the area.	1	3	2	2	Negative Medium (-8)						

9.3.7 Air Quality Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Dust and emissions during construction generated by debris handling and debris piles, truck transport, bulldozing, general construction.	1	2	2	3	Negative Medium (-8)	• Dust must be suppressed on the construction site and during the transportation of material during dry periods by the regular application of water. Water used for this purpose must be used in quantities that will not result in the generation of run-off. • Loads could be covered to avoid loss of material in transport, especially if material is transported off site. • Dust and mud should be controlled at vehicle exit and entry points to prevent the dispersion of dust and mud beyond the site boundary. • Facilities for the washing of vehicles should be provided at the entry and exit points. • A speed limit of 40 km/hr should be set for all vehicles travelling over exposed areas. • During the transfer of materials, drop heights should be minimised to control the dispersion of mater being transferred. • The height of all stockpiles on site should be a maximum of 2m. • Use of dust retardant road surfacing if made necessary due to the exceedance of Air Quality Guidelines.	2	1	1	2	Negative Low (-6)

9.3.8 Noise Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before		Mitigation and management measures	After	

	Mitigation				Significance Rating (before mitigation)		Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
During the construction phase there is likely to be an increase in noise pollution from construction vehicles and construction staff.	1	2	3	2	Negative Medium (-8)	• All construction activities should be undertaken according to daylight working hours between the hours of 07:00 – 17:00 on weekdays and 7:30 –13:00 on Saturdays. • No construction activities may be undertaken on Sunday. • Provide all equipment with standard silencers. Maintain silencer units in vehicles and equipment in good working order. • All earth moving vehicles and equipment must be regularly maintained to ensure their integrity and reliability. • Construction staff working in area where the 8-hour ambient noise levels exceed 60 dBA must have the appropriate Personal Protective Equipment (PPE). • All operations should meet the noise standard requirements of the Occupational Health and Safety Act (Act No. 85 of 1993).	1	1	1	2	Negative Low (-5)

9.3.9 Heritage Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											

During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may destroy, damage, alter, or remove from its original position archaeological and paleontological material or objects.	1	3	1	1	Negative Low (-6)	• Use chance find procedure to cater for accidental finds. • Should chance archaeological materials or remains be exposed during construction on any section of the proposed residential development project site, work should cease on the affected area and the discovery must be reported to the heritage authorities immediately so that an investigation and evaluation of the finds can be made. The overriding objective, where remedial action is warranted, is to minimize disruption in project scheduling while recovering archaeological and any affected cultural heritage data as stipulated by the NHRA regulations.	1	3	1	1	Negative Low (-6)
During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may disturb graves.	2	4	2	2	Negative Medium (-9)	• Use chance find procedure to cater for accidental finds.	1	3	1	1	Negative Low (-6)
During the construction phase activities resulting in disturbance of surfaces and/or sub-surfaces may disturb / destroy buildings and structures older than 60 years old.	1	2	1	2	Negative Low (-6)	• Construction management and workers must be educated about the value of historical buildings and structures.	1	2	1	2	Negative Low (-6)

9.3.10 Traffic Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
There is likely to be an increase in traffic from construction vehicles.	1	2	2	3	Negative Medium (-8)	• Construction vehicles are to avoid main roads during peak traffic hours.	1	1	1	2	Negative Low (-5)

						• All vehicles entering the Site are to be roadworthy. • When using heavy or large vehicles / equipment, "spotters" are to be present to assist the driver with his blind spots. • Any incident or damage to a vehicle must be reported immediately.					
OPERATIONAL											
The proposed development would have an impact on the current road network.	2	4	3	2	Negative High (-11)	• The road upgradings and access recommended by the Traffic Engineers to be implemented. • Public Transport and pedestrian facilities to be provided according to TIA	2	4	1	1	Negative Medium (-8)
CUMULATIVE											
The proposed development together with other developments in the region would have a significant impact on the current road network						• Traffic control measures at intersections along the main roads will have to be changed once more development occurs in the region					

9.3.11 Socio-Economic Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Employment											
The development will result in job creation and provision of employment.	1	2	1	3	Positive Medium (+7)	• All labour (skilled and unskilled) and contractors should be sourced locally where possible. • A labour and recruitment policy must be developed, displayed and implemented by the contractor.	1	2	1	3	Positive Medium (+7)

						• Recruitment at the construction site will not be allowed. • Where possible, labour intensive practices (as opposed to mechanised) should be practiced. • The principles of equality, BEE, gender equality and non-discrimination will be implemented.					
The development will lead to increased rates and taxes accruing to the local municipality.	1	2	1	3	Positive Medium (+7)						
Safety											
Public safety during construction, especially the informal settlers residing on the site.	1	2	2	3	Negative Medium (-8)	• Construction areas to be fenced off to prevent entry from informal settlers residing on the site. • Safety measures to be in place to prevent injury to informal settlers due to construction activities and vehicles. • Members of the public adjacent to the construction site should be notified of construction activities in order to limit unnecessary disturbance or interference. • Construction activities will be undertaken during daylight hours and not on Sundays.	1	2	2	2	Negative Medium (-7)
Construction staff safety during construction. Where sourcing of local labour is not possible, "outsiders" may need to be employed in order to address skills shortages. On-site accommodation may lead to social disturbances in the area and will also require additional service provisioning measures.	1	2	2	3	Negative Medium (-8)	• Ensure the appointment of a Safety Officer to continuously monitor the safety conditions during construction. • All construction staff must have the appropriate PPE. • The construction staff handling chemicals or hazardous materials must be trained in the use of the substances and the environmental, health and safety consequences of incidents. • Report and record any environmental, health and safety incidents to the responsible person.	1	2	2	1	Negative Low (-6)
Relocation of one dwelling											
A residential dwelling has unfortunately been constructed along the alignment of the southern extension of Road C (access road). This dwelling unit will need to be relocated.	1	4	2	4	Negative High (-11)	• The residents of the affected residential dwelling to be accommodated in the proposed development.	1	3	1	3	Negative Medium (-8)

OPERATIONAL											
Employment											
• The development will result in job creation and provision of employment. • Jobs for the maintenance of infrastructure and services will be created following the completion of the development. These jobs might be made available to existing labour there creating long term employment. • Service contractors could have access to other developments or projects in the area thereby creating long term employment.	2	3	2	3	Positive High (+10)						
Provision of housing											
• Provision of a much-needed housing within the City of Tshwane Urban Edge. • The informal settlers on the site will be provided with housing, infrastructure and services.	2	3	3	4	Positive High (+12)						

9.3.12 Infrastructure Impacts

Where E = Extent, D = Duration, I = Intensity and P = Probability of occurrence.

Potential Aspect and / or Impact	Before Mitigation				Significance Rating (before mitigation)	Mitigation and management measures	After Mitigation				Significance Rating (after mitigation)
	E	D	I	P			E	D	I	P	
CONSTRUCTION											
Damage to the existing services and infrastructure during the construction phase and disruptions in services (i.e. electricity, water, damage to Telkom cables) during the	1	3	2	2	Negative Medium (-8)	Mitigation measures supplied in the EMPr must be adhered to.	1	1	1	2	Negative Low (-5)

construction phase.											
Provision of services and infrastructure	2	4	2	2	Negative High (-10)	• Availability of services have been confirmed. • Increased stress on municipal bulk services	1	3	2	2	Negative Medium (-8)
The proposed development will implement sustainable design principles to enhance energy efficiency, reduce energy demand and to reduce the carbon footprint of the development.	2	4	3	3	Positive High (+12)	Sustainable design criteria should include: • Thermally Efficient Design • Sustainable building materials • Renewable energy options • Sustainable water and sanitation systems • Waste minimisation and recycling					
The project will result in the upgrade of infrastructure and services in the area	2	3	3	4	Positive High (+12)						
OPERATIONAL											
The proposed development will implement sustainable design principles to enhance energy efficiency, reduce energy demand and to reduce the carbon footprint of the development.	2	4	3	3	Positive High (+12)	Sustainable design criteria should include: • Thermally Efficient Design • Sustainable building materials • Renewable energy options • Sustainable water and sanitation systems • Waste minimisation and recycling					
CUMULATIVE											
The proposed development together with new developments in the Ga-Rankuwa area will place additional strain on services and infrastructure in the area.	3	3	2	3	Negative High (-11)						

TABLE 15: SUMMARY OF IMPACT ASSESSMENT AFTER MITIGATION

CONSTRUCTION PHASE: TECHNOLOGY ALTERNATIVE 1 (SUSTAINABLE DESIGN) (PROPOSAL)

Impact Description	Intensity	Extent	Duration	Probability it would occur	Significance rating After Mitigation
Geology: Stability of structures	1	2	1	2	Low
Topography: Surface gradient	1	2	1	2	Low
Alteration of topography due to stockpiling of soil, building material and debris and waste material on site.	1	2	1	2	Low
Hydrogeology: Groundwater contamination	2	4	1	2	Medium
Hydrology: Erosion due to increased urban runoff	2	1	1	1	Low
Impeding & impounding of watercourses	1	1	2	1	Low
Loss of natural vegetation	1	3	2	3	Medium
Loss or impact on wildlife	1	2	2	1	Low
Fringe impacts arising from the construction phase	1	2	1	2	Low
Contamination of the surface and site with general waste.	1	2	1	2	Low
Contamination of the surface and site with general and hazardous waste.	1	1	2	2	Low
Impact of dust and emissions	2	1	1	2	Low
Noise impacts	1	1	1	2	
Impact on Cultural Heritage Resources, Graves and Buildings and structures older than 60 years old	1	3	1	1	Low
Traffic Impact	1	1	1	2	Low
Public safety during construction	1	2	2	2	Medium
Construction staff safety	1	2	2	1	Low
Impact on existing Infrastructure	1	1	1	2	Low
Economic Impacts Job creation This will be a POSITIVE impact	1	2	1	3	Medium
Economic Impacts Increased rates and taxes accruing to the municipality This will be a POSITIVE impact	1	2	1	3	Medium
Relocation of dwelling constructed along the southern extension of Road C (access road)	1	3	1	3	Medium
Provision of services and infrastructure	1	3	2	2	Medium
The project will result in the upgrade of infrastructure and services in the area This will be a POSITIVE impact	2	3	3	4	High
The proposed development will implement sustainable design principles to enhance energy	2	4	3	3	Positive High (+12)

efficiency, reduce energy demand and to reduce the carbon footprint of the development.					

OPERATIONAL PHASE: TECHNOLOGY ALTERNATIVE 1 (SUSTAINABLE DESIGN) (PROPOSAL)

Impact Description	Intensity	Extent	Duration	Probability Probability it would occur	Significance rating After Mitigation
Hydrogeology: Groundwater contamination due to leaks of untreated water from pipelines.	1	2	1	2	Low
Hydrology: The proposed development could have a negative impact on water resources. Increased coverage of paved/hardened surfaces may increase the volume and velocity of stormwater runoff.	1	2	1	2	Low
Waste management	2	1	1	2	Low
Infestation by Alien vegetation	1	2	1	2	Low
Traffic: The proposed development would have an impact on the current road network	2	4	1	1	Medium
Economic Impacts Creation of job opportunities This will be a POSITIVE impact	1	2	1	3	High
Provision of a much needed housing within the City of Tshwane Urban Edge. The informal settlers on the site will be provided with housing, infrastructure and services.	2	3	3	4	High
The proposed development will implement sustainable design principles to enhance energy efficiency, reduce energy demand and to reduce the carbon footprint of the development.	2	4	3	3	High
The project will result in the upgrade of infrastructure and services in the area	2	3	3	4	High

TABLE 16: SUMMARY OF IMPACT ASSESSMENT AFTER MITIGATION

CONSTRUCTION PHASE: TECHNOLOGY ALTERNATIVE 2 (CONVENTIONAL DESIGN)

Impact Description	Intensity	Extent	Duration	Probability it would occur	Significance rating After Mitigation
Geology: Stability of structures	1	2	1	2	Low
Topography: Surface gradient	1	2	1	2	Low
Alteration of topography due to stockpiling of soil, building material and debris and waste material on site.	1	2	1	2	Low

Hydrogeology: Groundwater contamination	2	4	1	2	Medium
Hydrology: Erosion due to increased urban runoff	2	1	1	1	Low
Impeding & impounding of watercourses	1	1	2	1	Low
Loss of natural vegetation	1	3	2	3	Medium
Loss or impact on wildlife	1	2	2	1	Low
Fringe impacts arising from the construction phase	1	2	1	2	Low
Contamination of the surface and site with general waste.	1	2	1	2	Low
Contamination of the surface and site with general and hazardous waste.	1	1	2	2	Low
Impact of dust and emissions	2	1	1	2	Low
Noise impacts	1	1	1	2	
Impact on Cultural Heritage Resources, Graves and Buildings and structures older than 60 years old	1	3	1	1	Low
Traffic Impact	1	1	1	2	Low
Public safety during construction	1	2	2	2	Medium
Construction staff safety	1	2	2	1	Low
Impact on existing Infrastructure	1	1	1	2	Low
Economic Impacts Job creation This will be a POSITIVE impact	1	2	1	3	Medium
Economic Impacts Increased rates and taxes accruing to the municipality This will be a POSITIVE impact	1	2	1	3	Medium
Relocation of dwelling constructed along the southern extension of Road C (access road)	1	3	1	3	Medium
Provision of services and infrastructure	1	3	2	2	Medium
The project will result in the upgrade of infrastructure and services in the area This will be a POSITIVE impact	2	3	3	4	High

OPERATIONAL PHASE: TECHNOLOGY ALTERNATIVE 2 (CONVENTIONAL DESIGN)

Impact Description	Intensity	Extent	Duration	Probability Probability it would occur	Significance rating After Mitigation
Hydrogeology: Groundwater contamination due to leaks of untreated water from pipelines.	1	2	1	2	Low
Hydrology: The proposed development could have a negative impact on water resources. Increased coverage of paved/hardened surfaces may	1	2	1	2	Low

increase the volume and velocity of stormwater runoff.					
Waste management	2	1	1	2	Low
Infestation by Alien vegetation	1	2	1	2	Low
Traffic: The proposed development would have an impact on the current road network	2	4	1	1	Medium
Economic Impacts Creation of job opportunities This will be a POSITIVE impact	1	2	1	3	High
Provision of a much needed housing within the City of Tshwane Urban Edge. The informal settlers on the site will be provided with housing, infrastructure and services.	2	3	3	4	High
The project will result in the upgrade of infrastructure and services in the area	2	3	3	4	High

9.4 Comparative Assessment of Alternatives

Tables 15 and 16 provided summaries of the impact assessment of Technology Alternative 1 (Sustainable Design) (Proposal) and Technology Alternative 2 (Conventional Design) after mitigation.

The impacts for both alternatives are the same except for the positive impacts associated with Sustainable Design which would enhance energy efficiency, reduce energy demand, and reduce the carbon footprint of the development. Technology Alternative 1 (Sustainable Design) (Proposal) is regarded as the preferred alternative.

All the impacts outlined above will not apply to the No-Go alternative as the status quo will apply and the environment will remain as it is currently.

However, it is important to note that the benefits associated with the development will also not materialise, and it must be noted that the majority of the impacts identified for the development were mitigated to a negative low or positive impact once the measures for mitigation were applied, indicating that maintaining the status quo is to lose the opportunity of a beneficial development with negligible environmental impacts.

The No-go alternative is therefore not regarded as the preferred alternative in the long term.

10 ENVIRONMENTAL IMPACT STATEMENT

10.1 Conclusions

The findings conclude that there are no environmental fatal flaws that could prevent the proposed Ga-Rankuwa Erf 1719 and Erf 1427 development if the recommended mitigation and management measures contained in the preceding chapter and EMPr (Appendix E) are implemented.

The results of the impact assessment indicate that the most significant impacts as a result of the proposed project would include the following:

PHYSICAL ENVIRONMENT

Geology

From a geotechnical point of view the site is regarded as suitable for the proposed Ga-Rankuwa Erf 1719 and Erf 1427 development. The foundation recommendations and precuationary measures supplied by the geotechnical engineer to be implemented. First class site drainage must be provided to reduce the risk of subsurface materials from becoming saturated, the risk of differential settlement and to prevent scouring and erosion of the surface materials.

Geohydrology

Groundwater contamination due to construction activities, disposal of waste water and sewage systems.

Recommendations and mitigations measures are included in the EMPr.

BIOLOGICAL ENVIRONMENT

The proposed development will result in loss of natural vegetation and loss/impact on wildlife. These impacts are not regarded as significant due to the following:

- The study site is within the original extent of the veldtype known as Marikana Thornveld, which is a threatened veldtype / ecosystem with a status of 'Endangered'. However, most of the site is either transformed (by existing houses and fields) or badly degraded (by over-utilisation of resources such as wood).
- During site investigations no red data listed (RDL) fauna or flora, or other species of conservation concern were observed on the study site.
- There are no watercourses in the study area or immediately adjacent, including wetlands.
- The study site is not with any national priority areas.
- Sections of the study site are within a critical biodiversity area (CBA).
- The biodiversity of the study area was found to be a mix of 'Low' (the transformed areas); and 'Medium' (the degraded open thornveld areas).
- All recommended mitigating measures must be implemented and form part of the conditions of any documentation or licences (e.g. The EMPr).

Recommendations and mitigation measures are included in the EMPr to be implemented.

SOCIO-ECONOMICAL ENVIRONMENT

Need and desirability

The need and desirability for the proposed residential development had been confirmed.

The site is mostly vacant with some informal settlements who will be accommodated in the proposed development.

The proposed development complies with development guidelines contained in Local legislation i.e. Tshwane Regional Spatial Development Framework (SDF) 2018, Municipal legislation i.e. Gauteng Spatial Development Framework and National legislation i.e. The National Development Plan 2030, The Breaking New Ground Plan 2004.

Effective spatial planning requires increased strategic, socio-economic and bulk infrastructure investment that encourages infrastructure-led growth and increase the performance of the economy. To provide energy

efficient and coordinated cities optimum utilisation of all resources including land, engineering services, transportation infrastructure, social infrastructure and ecological resources, is required. The proposed development was designed to be one which is compact and will take advantage of the above principles. The proposed development will also encourage infrastructure upgrades in the area as new bulk services will accompany the development and be integrated into the existing networks. The development of new infrastructure will also assist in maintenance of ageing infrastructure in surrounding neighbourhoods.

The proposed development aims to be inclusionary on all levels of urban life. The integration of socio economic, gender and racial predispositions lies at the heart of the intervention. The development will be integrated with the greater Tshwane and Gauteng Province making it a functioning sustainable human settlement.

The development will comprise of residential units targeted at gap market, providing for a sector that highly requires entre into the housing market.

The subject site is located just close to various public transport facilities and surrounded by various businesses in an already built-up area. The development proposal entails the upgrading of an underutilized parcel of land as opposed to urban sprawl.

The proposed development will help to alleviate the current need for housing, which is one of South Africa's highest development priorities.

During the construction phase temporary employment will be created and skills enhancement will take place. The increased employment in the area during the construction phase will also result in increased expenditure, which, in addition, will mean that more than just the proposed jobs required for the construction on the site will be created due to the spin-offs that will result.

The proposed development will provide the Council with a higher income from services and property tax since more people will be making use of the services of the Council after the approval of this proposed township.

Negative social impacts associated with the proposed development mainly occur during the construction phase i.e., noise, dust, visual, security, safety and traffic. Mitigation measures will be included in the EMPr.

A residential dwelling has unfortunately been constructed along the alignment of the southern extension of Road C (access road). This dwelling unit will need to be relocated and be accommodated in the proposed development.

Cultural heritage sites and graves

From a heritage perspective supported by the findings of this study, the proposed residential development project is supported. However, it should be approved under observation that the project dimensions do not extend beyond the area considered in this report.

The proposed residential development project is located within a degraded area and have reduced sensitivity for the presence of high significance physical cultural site remains, be they archaeological, historical, or burial sites, due to previous destructive land use activities.

Limited ground surface visibility on sections of the proposed residential development project site was impeded by built up informal settlement. It should be borne in mind that the absence of confirmable and significant archaeological cultural heritage site is not evidence in itself that such sites do not exist within the proposed residential development project.

Should chance archaeological materials or human remains be exposed during construction on any section of the proposed residential development project site, work should cease on the affected area and the discovery must be reported to the heritage authorities immediately so that an investigation and evaluation of the finds can be made. The overriding objective, where remedial action is warranted, is to minimize disruption in project scheduling while recovering archaeological and any affected cultural heritage data as stipulated by the NHRA regulations.

Subject to the recommendations herein made and the implementation of the mitigation measures and adoption of the project EMPr, there are no significant cultural heritage resources barriers to the proposed residential development project. The Heritage authority may approve the proposed residential development project as planned without investigation and mitigation.

The recommendations from the Heritage Specialist are included in the EMPr and in recommendations for Environmental Authorisation.

Availability of services and infrastructure

The subject properties are a proclaimed erf within a proclaimed township, and it is therefore accepted that the necessary engineering services are available to service the proposed development.

It is further accepted that with the approval of this application certain bulk service contributions will be payable to the City of Tshwane for any necessary upgrades to the existing municipal services infrastructure.

Sustainable development principles that seek to optimise resource efficiency while promoting the transition to a green economy should be incorporated in the architectural design of the buildings and structures where possible.

Sustainable design criteria should include:

- Thermally Efficient Design
- Sustainable building materials
- Renewable energy options
- Sustainable water and sanitation systems
- Waste minimisation and recycling

Traffic Impacts

The proposed development would have an impact on the current road network. The recommended access arrangements, road upgrades and public transport and pedestrian facilities must be implemented.

Socio-economic

The proposed development will create employment opportunities during both the construction and operational phase.

The development will lead to increased rates and taxes accruing to the City of Tshwane Metropolitan Municipality.

The project will result in the upgrade of infrastructure and services in the area.

It is the opinion of Setala Environmental that there are presently no environmental impacts emanating from the proposed activity that cannot be adequately managed. The management of the negative impacts will require the implementation of the necessary mitigatory measures detailed in the EMPr (refer to

Appendix E) of this report.

10.2 Recommendations

Based on the assumption that the mitigation measures will be effectively implemented for the proposed Ga-Rankuwa Erf 1719 Unit 23 and Erf 1427 Unit 25 development and that no fatal flaws have been identified to date, it is the opinion of the EAP that this activity (Proposal) should be authorised to proceed to the final stages of decision making.

In order to achieve appropriate environmental management standards and ensure that the findings of the environmental studies are implemented through practical measures, the recommendations from this EIA study are included within the EMPr (Appendix E).

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

- The EMPr (attached in Appendix E) must be implemented and complied with to ensure the minimisation, control and mitigation of construction phase impacts.
- Compliance with the EMPr should be evaluated and audited by an independent, appropriately qualified and experienced ECO, on a monthly basis, as a minimum.
- The implementation of a site-specific Stormwater Management Plan that complies with the standard and requirements of the City of Tshwane Roads and Stormwater Division.
- The project may only proceed based on approval from SAHRA.
- A Landscape Development Plan and Rehabilitation Plan that meets the requirements of the Open Space Management Section of the City of Tshwane Metropolitan Municipality must be done and submitted to the City of Tshwane Metropolitan Municipality for approval.
- All recommendations made by the specialists in reports compiled for this development should be adhered to at all times.

10.3 Proposed Duration of Environmental Authorisation

If granted, the environmental authorisation is required for a period of at least ten years.

10.4 Assumptions, Uncertainties and Gaps In Knowledge

The assessment contained in this report as well as the recommendations made are based on the assumption that it does not replace or nullify any other spheres of legislation that may apply to any or all aspects of the proposed development.