

**PROPOSED BRAKPAN EXTENSION 12 SUBSIDISED
HOUSING DEVELOPMENT LOCATED ON THE
REMAINING EXTENT OF PORTION 51
MODDERFONTEIN 76 IR**

DRAFT BASIC ASSESSMENT REPORT

Reference Number: 002/20-21/E0045



JANUARY 2021

PROJECT APPLICANT:



GAUTENG PROVINCE
HUMAN SETTLEMENTS
REPUBLIC OF SOUTH AFRICA

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**DETAILS OF THE INDEPENDENT
ENVIRONMENTAL ASSESSMENT PRACTITIONER (EAP)**

THE REPORT WAS COMPILED BY:

Environmental Assessment Practitioner:

Ms Prisantha Govender

Qualifications:

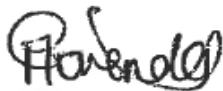
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- Short Course in Environmental Law

Work Experience:

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Independence:

I, Prisantha Govender declare that this report has been prepared independently of any influence or prejudice as may be specified by the Gauteng Department of Agriculture and Rural Development. A record will be kept of all comments received from Interested and Affected Parties (I&APs) and will be submitted in the Final Basic Assessment Report to GDARD in the form of a Comments and Responses Report.



Ms. Prisantha Govender
K2M Environmental (Pty) Ltd

January 2021

Date

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Independence:

I, Gert Watson declare that this report has been prepared independently of any influence or prejudice as may be specified by the Gauteng Department of Agriculture and Rural Development. A record will be kept of all comments received from Interested and Affected Parties (I&APs) and will be submitted in the Final Basic Assessment Report to GDARD in the form of a Comments and Responses Report.



Mr. Gert Watson

K2M Environmental (Pty) Ltd

Director

January 2021

Date

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1 BACKGROUND INFORMATION

1.1 INTRODUCTION AND BACKGROUND

The Gauteng Provincial Government has identified the need to provide suitable housing within its area of jurisdiction. This process was initiated as a means to address the Province's housing backlog due to the increase in population. In doing so, the Gauteng Provincial Government approved the Gauteng Rapid Land Release Programme which is aimed at fast tracking the provision of high-density residential units to qualifying beneficiaries within the Province.

Phumaf Holdings (Pty) Ltd was appointed by the Gauteng Department of Human Settlements to assist with all pre-planning, planning, design and construction management associated with some of the projects under the Gauteng Rapid Land Release Programme. Subsequently, K2M Environmental (Pty) Ltd was appointed as the independent Environmental Assessment Practitioner (EAP) to undertake the Environmental Impact Assessment and to manage the application for the Environmental Authorization process for the proposed Brakpan Extension 12 Housing Development.

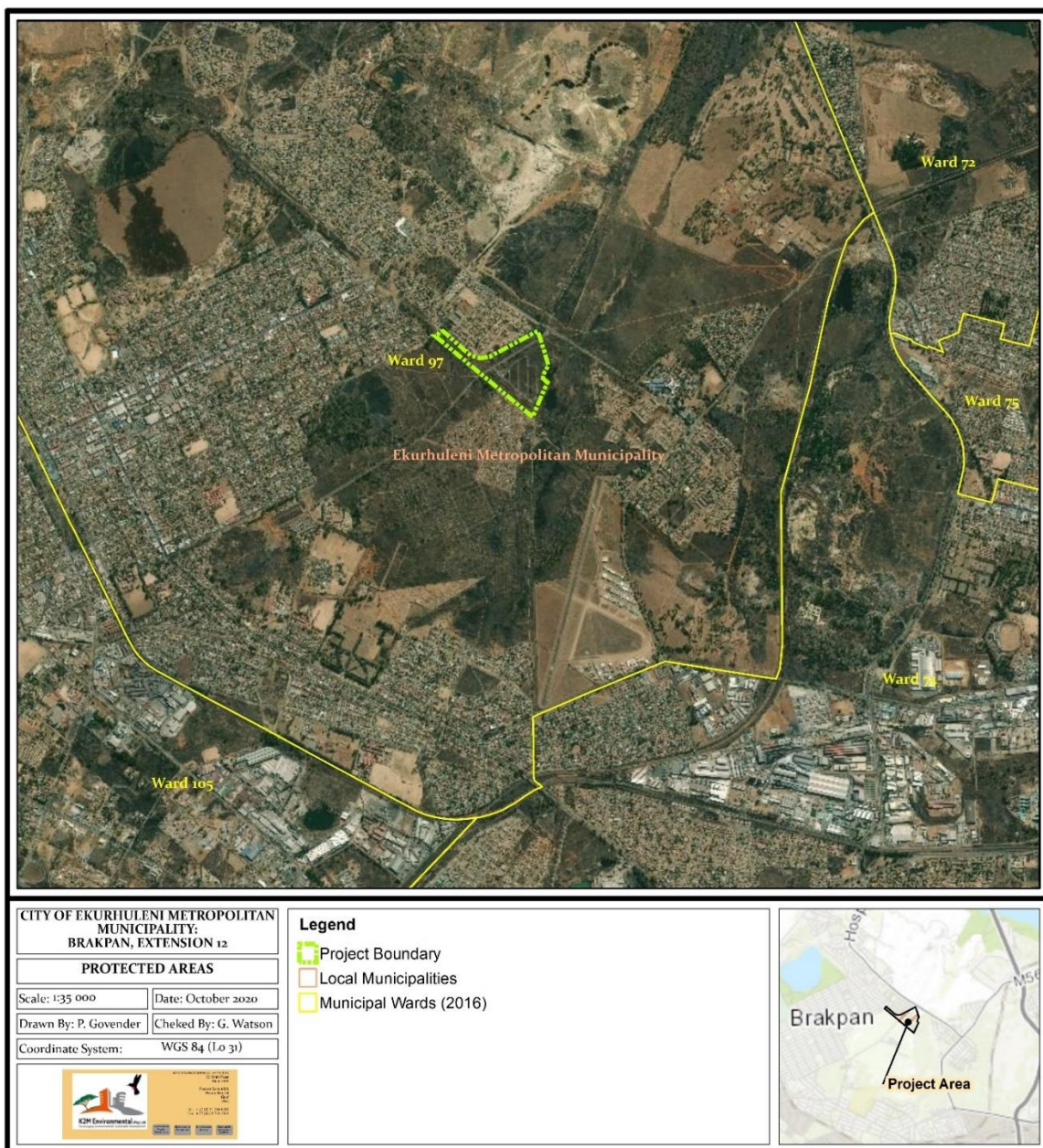
The proposed Brakpan Extension 12 Housing Development is located on a portion of Portion 51 (remaining extent) of the Farm Modderfontein 76 IR, within Ward 97 of the City of Ekurhuleni Metropolitan Municipality. The total extent of the project area is approximately 21.83 ha with a development footprint of approximately 5.8 ha. It should be noted that the site contains two powerline servitudes that affect the south-western and north-western boundaries. These servitudes are approximately 13.36ha in extent and take up more than half of the total site area. The site contains existing internal roads as well as a boundary fence/wall. There are wetlands that have been identified within the eastern portion of the project area. The proposed development entails the removal of vegetation for the following purpose:

- 564 residential units
- Internal water reticulation. The pipe sizes, materials, and class will be Type PE 100, PN 12.5. The thickness of the pipelines will have a diameter of 110mm. The water mains will be installed 1.5m from the erf boundary forming a loop. Isolating valves will be placed at the reticulation nodes to provide effective isolation of loops.

- Internal sewer reticulation. The pipes will be 160mm diameter Type PE 100 or higher PN 10, SDR, and the manholes will be 1000mm to 1500mm diameter HDPE manhole/pre-cast concrete rings with concrete covers.
- Construction and redesign of internal roads and stormwater infrastructure.
- An internal MV reticulation to supply the proposed development with electricity.

The project area in relation to the Municipal Wards is illustrated in Map 1.1 below.

Map 1.1: Project Area



1.2 ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

The Environmental Impact Assessment Regulations of 2014 (as amended) promulgated in terms of Section 24(5) of the National Environmental Management Act, (Act No. 107 of 1998) as amended, requires Environmental Authorisation from the competent authority (Gauteng Department of Agriculture and Rural Development) for activities listed in Government Notices R324, R325 and R327. Table 1.1 below identifies the activities that has been triggered for the proposed development.

Table 1.1: Triggered Activities

| Activity No. | Description of Activity | Relevance to Project |
|--------------------------|---|---|
| Activity 27 of GN.R. 327 | The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation except where such clearance of indigenous vegetation is required for – (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan. | The proposed development will entail the removal of more than 1 hectares of indigenous vegetation but less than 20 hectares. |
| Activity 12 of GN.R. 324 | 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>c. Gauteng</u> i. Within any critically endangered or endangered ecosystem listed in terms of 52 of the NEMBA or prior to the publication of such list, within an area that has identified as critically endangered in the National Spatial Biodiversity Assessment, 2004; ii. Within any Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or in bioregional plans. | The proposed development may entail the clearance of indigenous vegetation within an area classified as: <ul style="list-style-type: none"> • endangered vegetation • CBAs and ESAs |
| Activity 14 of GN.R. 324 | The development of- (ii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs— | The proposed development may entail development of infrastructure and structures with a physical footprint of |

| | |
|---|--|
| <p>(a) within a watercourse; (b) in front of a development setback; or (c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse;</p> <p>excluding the development of infrastructure or structures within existing ports or harbors that will not increase the development footprint of the port or harbor.</p> <p>c. Gauteng</p> <p>iv. Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans; v. Sites identified within threatened ecosystems listed in terms of the National Environmental Management Act: Biodiversity Act (Act No. 10 of 2004);</p> | <p>10 square metres or more within a watercourse or within 32m of a watercourse on a site classified:</p> <ul style="list-style-type: none"> • CBA and ESA • endangered vegetation |
|---|--|

1.3 TERMS OF REFERENCE

Regulation 19 of the Environmental Impact Assessment Regulations of 2014 determines that a Basic Assessment Procedure must be followed for all activities listed in Government Notice R327 and R324. K2M Environmental (Pty) Ltd has been appointed as the independent Environmental Assessment Practitioner (EAP) by the applicant (Gauteng Department of Human Settlements) and will therefore be responsible for the Basic Assessment procedures concerned with the proposed development as specified in Sections 19 and 20 of Government Notice R326 promulgated in terms of Section 24(5) of the National Environmental Management Act, (Act No. 107 of 1998), as amended.

K2M Environmental lodged an EIA Enquiry with the Gauteng Department of Agriculture and Rural Development to establish if the Department has previously issued any Environmental Authorisation for the property since the site has been fenced off and infrastructure such as internal roads have already been constructed. In their response letter (**Appendix B1**), GDARD indicated that insufficient information was provided to establish whether an Environmental Authorisation was issued for this project and if development is proposed on the site then a Basic Assessment Process must be followed. Subsequently, K2M Environmental has submitted the completed Application form for Environmental Authorisation to the Gauteng Department

of Agriculture and Rural Development (GDARD) (see **Appendix B2**). GDARD registered the project with **Reference Number 002/20-21/E0045** in their email correspondence on the 09th of December 2020. This reference number is to be quoted in all correspondence with GDARD for ease of reference.

1.4 **APPROACH AND METHODOLOGY**

The overall approach to this assignment included the following activities:

- Apply for Environmental Authorisation to GDARD regarding the Brakpan Extension 12 Housing Development.
- A detailed analysis of the proposed development, the area where it will take place, and the identification of potential impacts.
- Identification of specialist input required and the facilitation of the studies.
- All legislative requirements in terms of the EIA Regulations and to provide GDARD with sufficient information to take a decision regarding the development.

1.5 **ASSUMPTIONS AND LIMITATIONS**

The following assumptions and limitations apply to the EIA:

- The environmental authorization application has been initiated during the conceptual design and planning stages of the development.
- It is assumed that the information provided by the various specialists and project engineers are accurate.
- The EIA project team is of the view that an adequate level of information is provided in order to facilitate the required assessment of potential impacts of the proposed project alternatives and decision-making in this regard.
- The study involves the assessment of impacts on the current conservation value of affected land and not on either the historic or potential future conservation value.

1.5.1 **Baseline Information**

Sufficient baseline information for the Draft Basic Assessment Report was available from a variety of desktop data sources, reports and relevant data bases. This was supplemented by site visits to the project area and inputs from other professionals involved in the project.

1.5.2 Time Constraints

There were no time constraints and sufficient time was available for the Basic Assessment Process.

1.6 REPORT STRUCTURE

The report is structured as follows:

Section 2 consists of a summary description of the proposed activity.

Section 3 provides a description of the environment that may be affected by the activity.

Section 4 consists of the Engineering Services

Section 5 consists of a summary of the potential **impacts of the proposed activity** on the environment.

Section 6 provides describes the **public participation** process conducted during the scoping phase.

Supporting documents, reports, correspondence and other relevant information are contained in various Appendixes attached to this report. Table 1.2 has been included to assist the reader to find the relevant sections in the report.

Table 1.2: 2014 EIA Requirements for the Basic Assessment Report

| Information Required | Document Section |
|--|--|
| Details of- (i) the EAP who prepared the report; and (ii) the expertise of the EAP, including a curriculum vitae; | Just after cover page, Appendix T & Appendix U |
| The location of the activity, including: (i) the 21-digit Surveyor General code of each cadastral land parcel; (ii) where available, the physical address and farm name; (iii) where the required information in items (i) and (ii) is not available, the coordinates of the boundary of the property or properties; | Section 2.1 |
| A plan which locates the proposed activity or activities applied for as well as associated structures and infrastructure at an appropriate scale; or, if it is- (i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken; | Section 2.1 & Appendix B |
| A description of the scope of the proposed activity, including (i) all listed and specified activities triggered and being applied for; and (ii) a description of the activities to be undertaken including associated structures and infrastructure; | Sections 1.2 & 2.3 |

| | |
|---|------------------------------------|
| <p>A description of the policy and legislative context within which the development is proposed including-</p> <ul style="list-style-type: none"> (i) an identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments; | <p>Section 1.7</p> |
| <p>A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;</p> | <p>Section 5.3.2</p> |
| <p>A motivation for the preferred site, activity and technology alternative;</p> | <p>Section 2.5</p> |
| <p>A full description of the process followed to reach the proposed preferred alternative within the site, including:</p> <ul style="list-style-type: none"> (i) details of all the alternatives considered; (ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) a summary of the issues raised by interested and affected parties, and an indication of the manner in which the issues were incorporated, or the reasons for not including them; (iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) the impacts and risks identified for each alternative, including the nature, significance, consequence, extent, duration and probability of the impacts, including the degree to which these impacts- <ul style="list-style-type: none"> (aa) can be reversed; (bb) may cause irreplaceable loss of resources; and (cc) can be avoided, managed or mitigated; (vi) the methodology used in determining and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated with the alternatives; (vii) positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (viii) the possible mitigation measures that could be applied and level of residual risk; (ix) the outcome of the site selection matrix; (x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity; | <p>Sections 2.5, 3, 5 & 6.</p> |
| <p>A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including-</p> <ul style="list-style-type: none"> (i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and (ii) an assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation measures; | <p>Section 5</p> |
| <p>An assessment of each identified potentially significant impact and risk, including-</p> <ul style="list-style-type: none"> (I) cumulative impacts; | <p>Section 5</p> |

| | |
|---|------------------------------|
| (ii) the nature, significance and consequences of the impact and risk; (iii) the extent and duration of the impact and risk; (iv) the probability of the impact and risk occurring; (v) the degree to which the impact and risk can be reversed; (vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and (vii) the degree to which the impact and risk can be avoided, managed or mitigated; | |
| Where applicable, a summary of the findings and impact management measures identified in 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 report; | Sections 3.6, 3.7, 3.8 & 3.9 |
| An environmental impact statement which contains- (i) a summary of the key findings of the environmental impact assessment; (ii) a map at an appropriate scale which superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and (iii) a summary of the positive and negative impacts and risks of the proposed activity and identified alternatives; | Section 5.3.1 and 2.3.2 |
| Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for the development for inclusion in the EMPr; | Not Applicable |
| 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 authorization; | Section 7 |
| A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed; | Section 1.5 |
| A reasoned opinion as to whether the proposed activity should or should not be authorized, and if the opinion is that it should be authorized, any conditions that should be made in respect of that authorization; | Section 7 |
| Where the proposed activity does not include operational aspects, the period for which the environmental authorization is required, the date on which the activity will be concluded, and the post construction monitoring requirements finalized; | Not Applicable |
| An undertaking under oath or affirmation by the EAP in relation to: the correctness of the information provided in the reports; (ii) the inclusion of comments and inputs from stakeholders and I&APs; (iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected parties; and | Just after cover page |
| Where applicable, details of any financial provisions for the rehabilitation, closure, and ongoing post decommissioning management of negative environmental impacts; | Not Applicable |
| Any specific information that may be required by the competent authority; and | Not Applicable |
| Any other matters required in terms of section 24(4)(a) and (b) of the Act. | Not Applicable |

1.7 APPLICABLE LEGISLATION, POLICIES AND GUIDELINES

In addition to the Environmental Impact Assessment Regulations of 2014 (as amended), Table 1.3 below indicates other applicable legislation that has been considered in the preparation of this Draft Basic Assessment Report.

Table 1.3: Applicable Legislation

| Legislation | Relevance to the development |
|---|--|
| Constitution of the Republic of South Africa (Act No. 108 of 1996) | All environmental aspects should be interpreted within the context of the Constitution. The Constitution has enhanced the status of the environment by virtue of the fact that environmental rights have been established in terms of Section 24. |
| National Environmental Management Act (No. 107 of 1998) | This development requires a Basic Assessment to be conducted in terms of the 2014 EIA Regulations, as amended. The purpose of the Basic Assessment is to ensure that the development does not impact on the natural environment. |
| National Water Act (No. 36 of 1998) | The proposed development will entail development within 500m of wetlands. A pre-application meeting will be arranged with the Department of Water and Sanitation to discuss the way forward in terms of the Water Use License. |
| National Heritage Resource Act (Act No. 25 of 1999) | This Act has been put into place to conserve, protect and conserve heritage resources. Documentation has been submitted to SAHRA for their comment. In their response, SAHRA indicated that A Phase 1 HIA is required for the proposed Brakpan Extension 12 Housing Development. See Appendix G1 for interim comments from SAHRA and Appendix G2 and G3 for the HIA Report and PIA Reports, respectively. |
| Occupational Health and Safety Act (No. 85 of 1993) | The contractor needs to manage his staff and crew in strict accordance with the Occupational Health and Safety Act in order to prevent injuries to the staff. |
| Polluters Pay Principal | The Polluters Pay Principal has been included into the preparation the EMPr. |
| City of Ekurhuleni IDP 2018/2019 Review | The Proposed Brakpan Extension 12 Housing Development has been included in the City of Ekurhuleni's IDP. |
| City of Ekurhuleni SDF 2011 | Infill social housing in the Brakpan area was mentioned as a spatial objective in the Municipal SDF. |
| Gauteng Conservation-Plan Version 3.3 | The Gauteng C-Plan classified areas within the province on the basis of its contribution to reach the conservation targets within the province. These areas are classified as Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) to ensure sustainability in the long term. According to C-Plan, the project area the south-eastern portion is classified as CBA Important Areas and ESA. |

1.8 THE APPLICANT

The details of the applicant are as follows:

Applicant name: Gauteng Department of Human Settlements

Contact Person: Shingai T N Mpinyuri

Tel: 071 609 0051

Email: shingai.mpinyuri@gauteng.gov.za

Address: 37 Sauer Street, Marshalltown, Johannesburg

1.9 THE INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER

K2M Environmental (Pty) Ltd was appointed as the Independent EAP responsible for the following tasks:

- Processes, information, plans and reports produced in complying with the Regulations
- Ensuring that the relevant authority has access to all information
- Public Participation Process

The contact details of the independent Environmental Assessment Practitioner are as follows:

Name: K2M Environmental (Pty) Ltd

Contact Person: Mr Gert Watson

Telephone: 082 776 0881

Fax: 086 622 7276

E-mail: gert@k2m.co.za

Postal Address : PostNet Suite #509, Private Bag X4, Kloof, 3640

2 DESCRIPTION OF PROPOSED ACTIVITY

2.1 PROJECT LOCATION

2.1.1 Co-ordinates

Table 2.1 below indicates the co-ordinates of the project area.

Table 2.1: Co- ordinates of the projects area

| Latitude /Longitude | Degrees | Minutes | Seconds |
|---------------------|---------|---------|---------|
| South | 26° | 14' | 5.13" |
| East | 28° | 23' | 39.72" |

2.1.2 21 Digit Surveyor General Code

Table 2.2 below indicates the 21-digit surveyor general code.

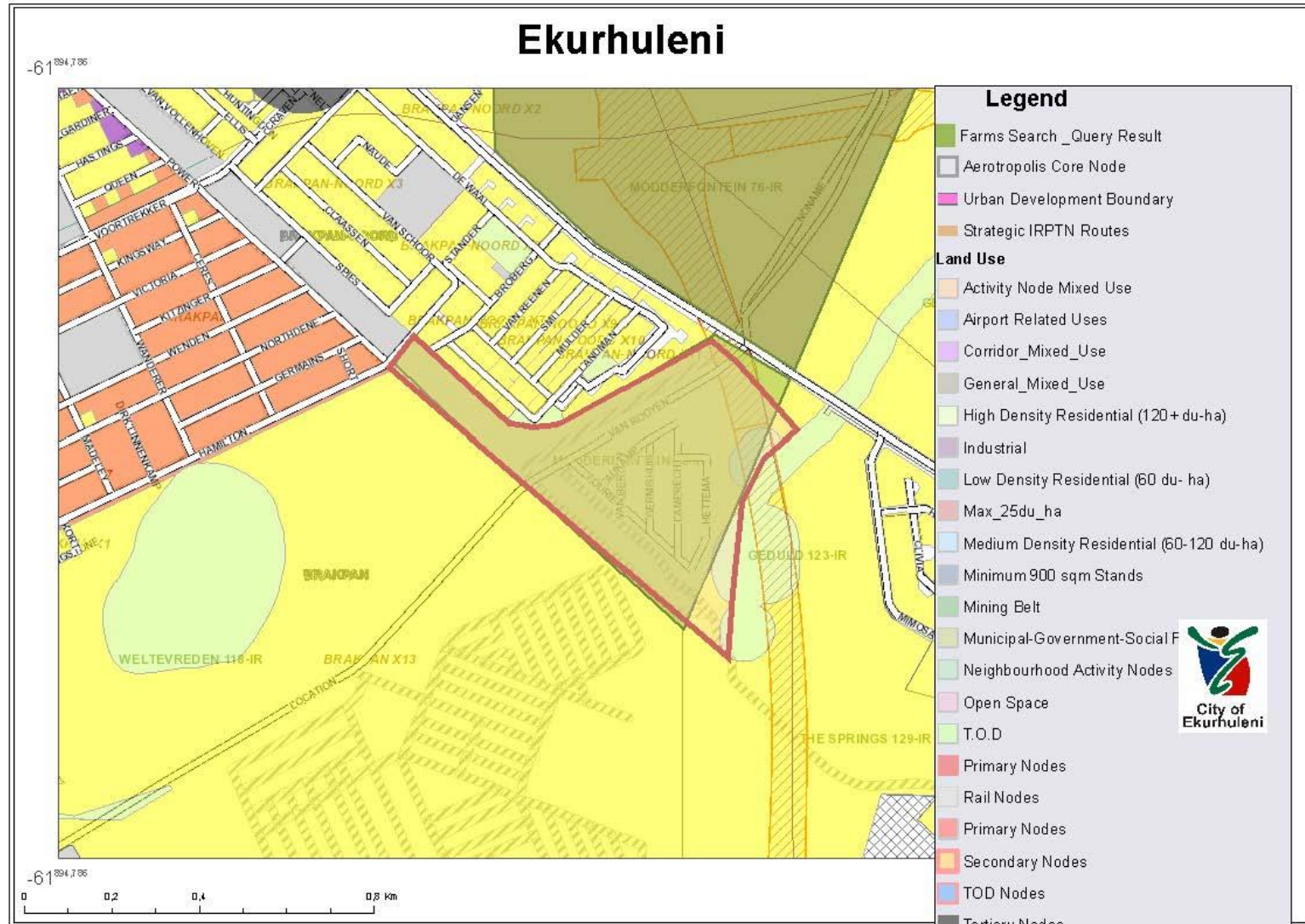
Table 2.2: Surveyor General Code

| Property Description | 21- Digit Surveyor Code |
|---|-------------------------|
| Remaining Extent of Potion 51 of the Farm Modderfontein 76 IR | ToIR00000000007600051 |

2.2 ZONING OF PROPERTY

As illustrated in Map 2.1, the zoning of the property is Agriculture (“Farm Search”) in terms of the City of Ekurhuleni’s Town Planning Scheme, 2014.

Map 2.1: Zoning of Property



2.3 ACTIVITY DESCRIPTION

2.3.1 Extent of Development

The total project area is approximately 21.83Ha in extent with a development footprint of approximately 5.8Ha. The land uses as per the preferred draft development (**Appendix C1**) is tabulated below.

Table 2.3: Land Uses

| | Land Use | Area (HA) | Density | Units |
|--|---------------------------|-----------|-----------|-------|
| | Residential (1-4 Storeys) | 5.6 | 130 du/ha | 564 |
| | Social | 0.27 | N/A | N/A |
| | Public Open Space | 0.67 | N/A | N/A |
| | Total Residential | | | 564 |

As indicated in Table 2.3 above, approximately 5.6 ha has been set aside for residential, 0.27 ha for social facilities and 0.67 ha public open space. The total development footprint is approximately 5.8 ha in extent.

2.3.2 Description of the proposed activity

The proposed Brakpan Extension 12 Housing Development is located on a portion of Portion 51 (remaining extent) of the Farm Modderfontein 76 IR. The total extent of the project area is approximately 21.83 ha with a development footprint of approximately 5.8 ha. It should be noted that the site contains two powerline servitudes that affect the south-western and north-western boundaries. These servitudes are approximately 13.36ha in extent and take up more than half of the total site area. The site contains existing internal roads as well as a boundary fence/wall. There are wetlands that have been identified within the eastern portion of the project area. The proposed development entails the removal of vegetation for the following purpose:

- 564 residential units
- Internal water reticulation. The pipe sizes, materials, and class will be Type PE 100, PN 12.5. The thickness of the pipelines will have a diameter of 110mm. The water mains will be installed 1.5m from the erf boundary forming a loop. Isolating valves will be placed at the reticulation nodes to provide effective isolation of loops.

- Internal sewer reticulation. The pipes will be 160mm diameter Type PE 100 or higher PN 10, SDR, and the manholes will be 1000mm to 1500mm diameter HDPE manhole/pre-cast concrete rings with concrete covers.
- Construction and redesign of internal roads and stormwater infrastructure.
- An internal MV reticulation to supply the proposed development with electricity.

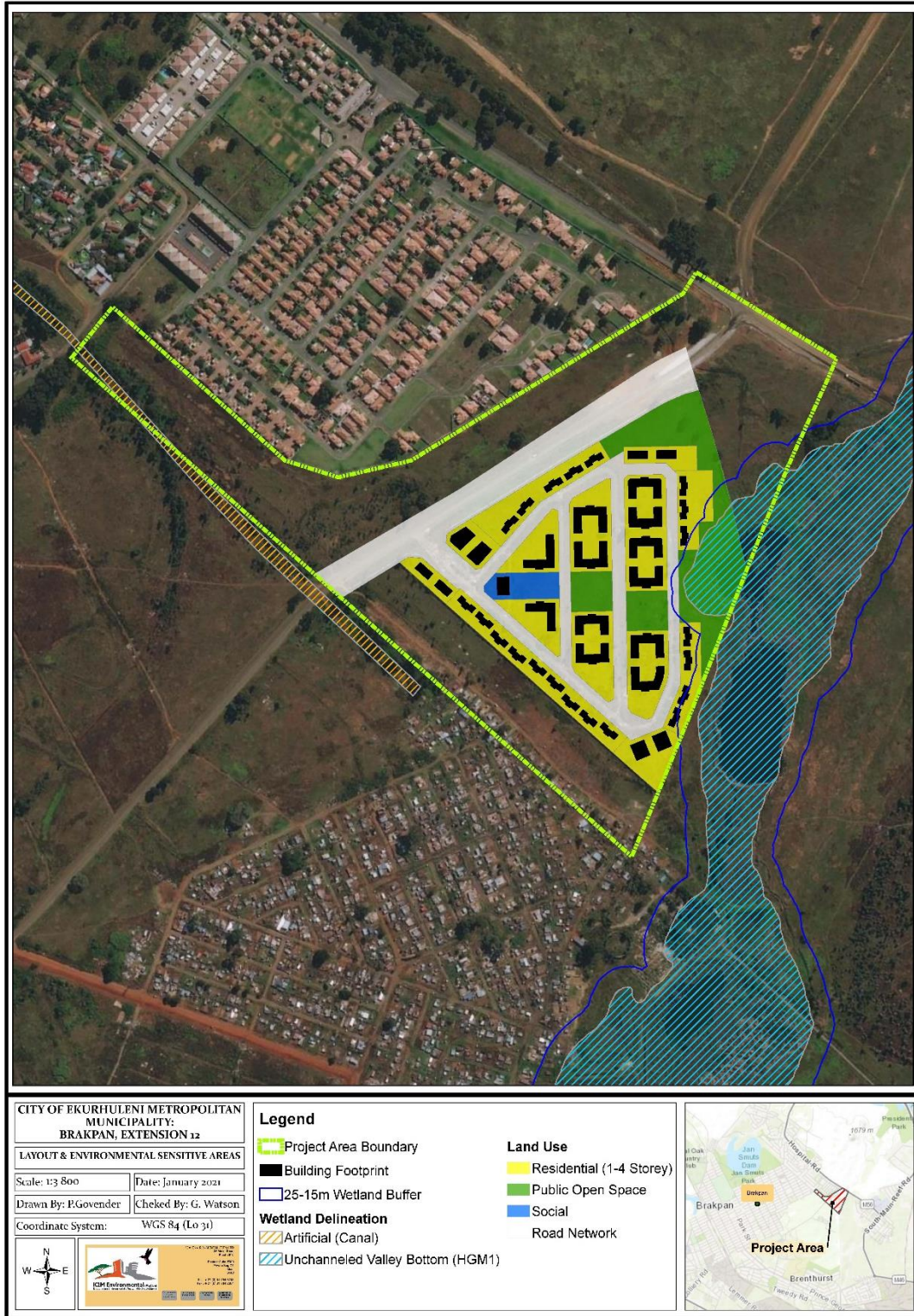
Map 2.2 and **Appendix D1** below depicts the environmentally sensitive areas that are situated within the project area. The environmentally sensitive areas on site include the delineated wetland (HGM 1 – unchanneled valley-bottom wetland) and the 25-15m wetland buffer. As per the Wetland Assessment Report an overall buffer of 25 m is prescribed to this system except for the portion that overlaps the project area. Here a 15 m buffer is prescribed based on the highly degraded and temporary nature of the wetland which shows signs of longstanding historical disturbance coupled with the presence of existing infrastructure in the form of tar roads.

Map 2.3 below and **Appendix D2** illustrates the proposed development layout together with the environmentally sensitive areas that are located on site. The building footprint located on the south eastern portion of the development layout encroaches into the wetland buffer. The proposed development layout accommodates for this wetland encroachment by setting aside land for passive open space which is located to the north east portion of the site. Further to this, the wetland buffer is also being encroached by the road network. However, as indicated above, the site contains an existing road network which was previously constructed. It should however be noted that the proposed development layout does not encroach into the delineated wetland (HGM 1).

Map 2.2: Environmentally sensitive areas on site



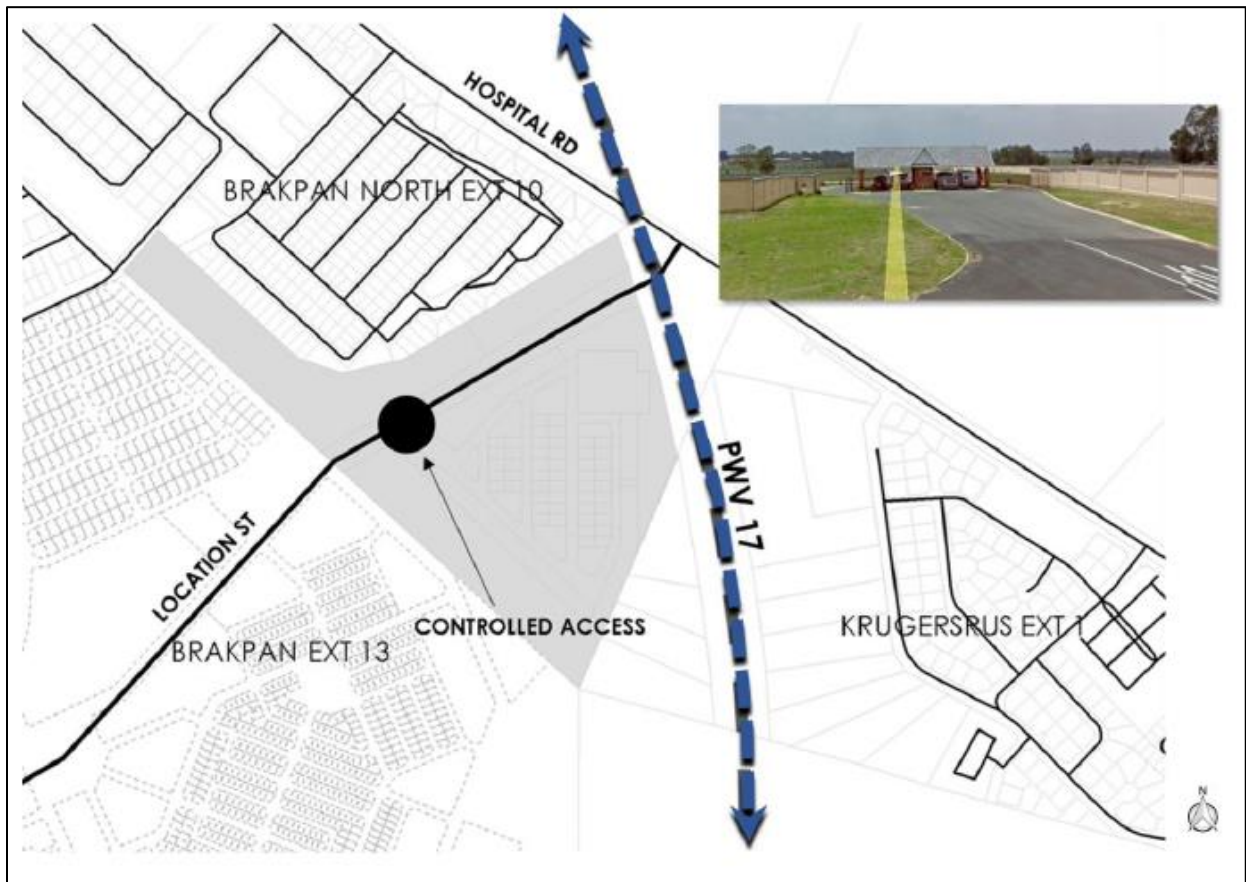
Map 2.3: Environmentally sensitive areas with Development Layout



2.3.3 Access to the proposed development

Access to the site is limited. There is only access to the site is along Location Street where there is already one access point that has access control. None of the existing townships, Brakpan North Ext 10 nor Brakpan Ext 13, have direct linkages to the site. Access to the site is depicted in Figure 2.1 below.

Figure 2.1: Access to the Site



Source: Brakpan North Ext 12 Draft UDF, July 2020

2.3.4 Existing Situation

As indicated in the Photos below, the site is currently vacant. The site contains existing internal roads as well as a boundary fence/wall. There are wetlands that have been identified outside the eastern boundary of the site.

Photo 2.1: Project Area Overview



Photo 2.2: Existing Situation

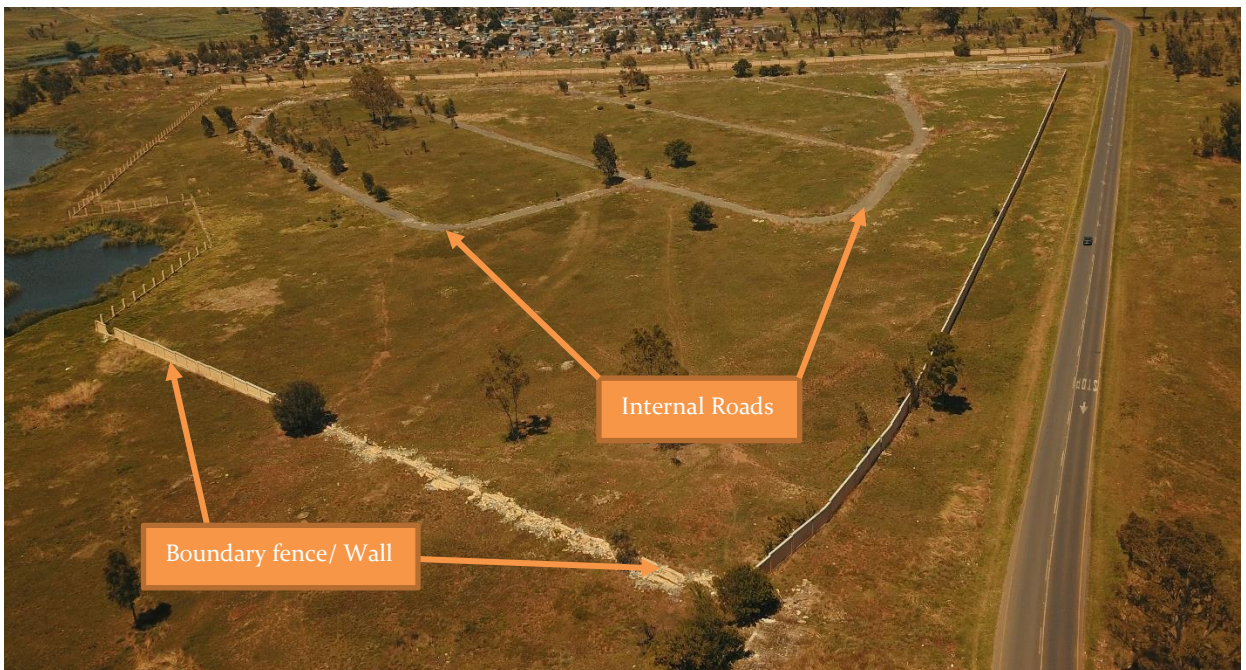


Photo 2.3: Wetland adjacent to the project area



2.4 **PROJECT PHASING AND CONSTRUCTION PROGRAM**

The construction of the project is scheduled to commence as soon as all the processes to comply with applicable legislation are completed. There will only be one phase in terms of construction, which will be completed from start to finish in one phase.

2.5 **CONSIDERATION OF ALTERNATIVES**

Alternatives are seen as different means of meeting the general purpose and need of a proposed activity.

Alternatives could include, amongst others, the following:

- Activity Alternatives: This requires a change in the nature of the proposed activity. This alternative is most appropriate at a strategic decision-making level.
- Location Alternatives: Alternative locations for the entire project proposal, or for components of the project proposal.

- **Layout Alternatives:** This alternative allows different spatial configurations of an activity on a specific site.
- **Scheduling Alternatives:** also refer to alternative phasing options for the development. This alternative considers different phasing options during the implementation of the development.
- **Infrastructure/ Input Alternatives:** Also referred to as technological or equipment alternatives. This option considers various alternatives that will result in the same end result.

Layout and Infrastructure (technology) alternatives are the most pertinent to this EIA process, however all the above-mentioned alternatives are briefly explored in the subsections below as well as the alternative of maintaining the status quo, commonly known as the “no-go” option.

2.5.1 **Activity Alternatives**

Activity alternatives refer to the consideration of alternatives requiring a change in the nature of the proposed activity to be undertaken. Given the need for housing within the municipality, housing has been the preferred activity. One alternative is to leave the site vacant, however this would not be feasible as it will leave the site vulnerable to illegal occupancy and land invasions.

2.5.2 **Location Alternatives**

The location for the project area was identified by the Applicant for the proposed housing development prior to commencement with the EIA Process. Furthermore, the site is located in close proximity to the Brakpan CBD.

2.5.3 **Layout Alternatives**

The preferred draft layout and Urban Design Framework was prepared by Metroplan Town Planners and Urban Designers. The preferred draft layout and the Urban Design Framework is attached as **Appendix C1** and **C2**, respectively.

2.5.4 Scheduling Alternatives

The detailed time frame for implementation and completion of the proposed residential development is not currently available. However, given the extent of demand for housing within the Gauteng Province, it is anticipated that construction will commence as soon as approval of necessary statutory processes and authorizations (including environmental authorization) is obtained. No scheduling alternatives were therefore considered.

2.5.5 Input Alternatives

Various types of materials can potentially be utilized during the construction phase of the project for both infrastructure and top structure purposes. This may include different material types (e.g. brick types, roof types and furnishings as well as green building designs. Green Building Guidelines have been recommended in this report to encourage sustainable development. It should be noted that the sections below have been adopted from the *Green Building Guideline: Medium Density Affordable Housing* and the *Msunduzi Green Building Guidelines*.

2.5.5.1 Hot Water Systems

SANS 10400-XA refers to SANS 10252: At least half of the annual average hot water heating requirements shall be provided by means other than electrical resistance heating. The alternative means could be via but not limited to heat pumps, solar water heating, heat recovery from other processes or heating via gas. Hot water installations need to comply with further SANS requirements as provided in section 4.1 of SANS 10400-XA:

- All hot water pipes must be clad with insulation
- Solar hot water systems must comply with the following standards which govern the quality and functioning of these systems: SANS 1307, SANS 10106, SANS 10254 and SANS 10252-1.

2.5.5.2 Insulation for Roof and External Walls

The installation of insulation lowers the thermal conductivity of a building element. Once the thermal conductivity of the building element decreases its insulating properties increase. The thermal conductivity of the building is defined to be the quantity of heat that flows through a unit area in a unit of time, per unit difference in temperature. It is expressed in Watts per square meter Kelvin (W/m²K). It provides an

indication of how much heat is transmitted through a material, but also includes losses due to convection and radiation. Insulation reduces the heat gained during warm summer months and reduces the heat lost during cold winter months.

2.5.5.3 High Efficiency Geyser for Hot Water

This initiative investigates the different energy sources that can be used to deliver hot water to a development. For this purpose, three fuels or sources of energy were investigated these include: electrical resistance, Liquid Petroleum Gas (LPG) and Natural Gas. The water heater selected must have a high efficiency. The different sources of energy are discussed further below:

- **Electrical Resistance:** This is a standard storage tank style water heater that suffers inefficiencies or losses in energy due to standby loss. As the hot water sits in the tank, heat may escape through the walls of the tank. Therefore, when considering increasing geyser efficiencies, a geyser blanket would be a good addition
- **LPG and Natural Gas:** Water heaters that utilise gas can operate within both a conventional storage tank and tank less application. In the case of storage tanks, they may suffer the same heat losses as experienced with a conventional electric option unless a sealed combustion vent is included.

The purpose of having a high efficiency geyser specified is to reduce the demand for electricity that would otherwise, be required.

2.5.5.4 Solar Photovoltaics: Renewable Energy Generation

Photovoltaics (PV) utilises solar radiation to produced electrical energy. The outputted Direct Current (DC) voltage requires a solar panel array provision of 10m² for 1kWp/day (required for 25% of project annual consumption). The DC can be converted to standard mains Alternating Current (AC) via an inverter for residential consumption. PV has a reduction in cost per kWh a proportion of the difference can be utilised to finance the uplift via alternative financing. It will also reduce the CAPEX associated with upfront electrical connection charges and provide a resilience buffer to power shortages.

2.5.5.5 Internal Lighting – Energy Savings Bulbs

Energy efficient lighting is commonly available in South Africa in the form of Compact Fluorescent Lamps

(CFLs) and these have largely replaced traditional incandescent lighting as the preferred lighting choice due to reduced energy consumption and heat generation and longer life spans. While 75W incandescent bulbs require electrical resistance to heat a metallic element 'white hot', a 13W CFL bulb contains a gas mixture of argon and mercury which is excited by a small electric current. In 4W Light Emitting Diodes (LEDs) electrons are encouraged to 'jump' between energy levels releasing photons.

2.5.5.6 Low Flow Fixtures and Fittings

In order to reduce the water demand per unit, it is recommended that low flow water fixtures and fittings be utilised. This includes low flow showerheads, hand basin taps, water closets and kitchen taps. The difference between these fixtures and normal fixtures would be the application of a flow restrictor that determines the flow rate of the fixture or fitting.

2.5.6 **Infrastructure Alternatives**

The subsections below summarise the options to be considered in terms of sanitation.

2.5.6.1 Sanitation

For the purposes of this project three potential sanitation levels of services will be considered, such as:

- Onsite septic tanks
- Ventilated Improved Pit Latrines
- Waterborne sewage system

A brief description has been provided.

Onsite Septic Tanks (Alternative Option)

The option of an onsite septic tank to treat sewage on site was considered as an option, rather than the construction of a sanitation network to drain/pump the sewage to the WWTW. However, the disadvantage of a septic system is that it poses the risk of ground water contamination. Furthermore, once the tank has reached the end of its life cycle the sludge needs to be pumped out or a new system needs to be constructed.

VIP Sanitation (Alternative Option)

The household latrine used in low income communities varies enormously in design. Improved versions of the traditional pit latrine include a ventilation pipe or a cover plate for the squat hole. The collection chamber

may vary from an unlined pit to a septic tank, a composting chamber or a connection into a sewer. The superstructure may be a crude shelter or an attractive brick or thatch construction with or without a vent pipe and with or without a seat.

Waterborne Sewage System (Preferred Option)

Just as 'the in-home connection is viewed as the ultimate goal for water supply planners, utilities and households, the private sewer connection represents the highest level of service for household sanitation. Waste moves from the household toilet into sewers laid underground, then is discharged into a treatment facility and thereafter to the environment and classified as stream save.

2.5.7 “No-go” alternative

The “no-go” alternative should in all instances be considered as part of the EIA process. It assumes that the activity does not proceed, implying a continuation of the current situation of status quo. Should this development not go through, the following will apply:

- The housing demand will remain the same within the municipality unless there are other housing operations where construction has commenced or has been completed.
- The vacant piece of land will be left vulnerable to illegal occupation, dumping and informal housing.

2.5.8 Motivation for preferred site alternatives

2.5.8.1 Preferred Site

No site alternatives were considered for the proposed since the project area was identified by the Gauteng Department of Human Settlements (Applicant).

2.5.8.2 Preferred Activity

The preferred activity is a housing development consisting of 564 subsidised residential units together with supporting infrastructure. Housing development is preferred as it will assist in reducing the housing backlog within the Gauteng Province.

2.5.8.3 Preferred Layout

The preferred layout for the development is attached as **Appendix C1**. The preferred layout was chosen due the development not encroaching into the wetland that is located to the east of the site.

2.5.8.4 Preferred Technology

The waterborne sewage system connected to the municipal treatment works is considered to be the preferred option.

3 SITUATION ASSESSMENT OF PROJECT AREA AND AFFECTED ENVIRONMENT

3.1 PHYSICAL AND LANDSCAPE CHARACTERISTICS OF THE SITE

The proposed site is currently vacant and is characterised by a relatively flat terrain, with no rocky outcrops or ridges present.

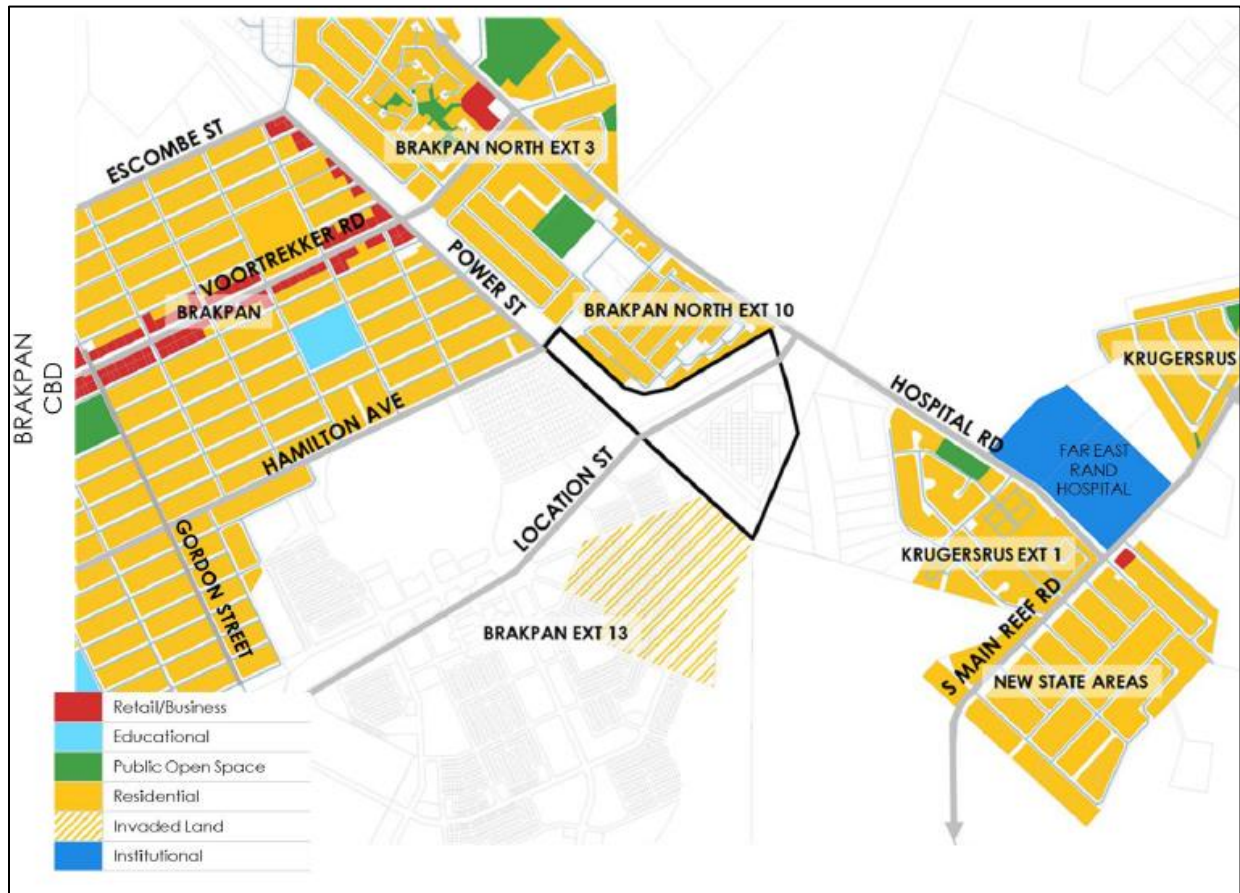
3.2 CLIMATE

According to the City of Ekurhuleni Bioregional Plan, 2020, the climate for the Metropolitan Municipality has been described as subtropical highland climate and highly seasonal rainfall, with most of its annual 650mm to 950mm occurring between November and April. Temperatures experienced in the Municipality vary between mild warm summers and cold winters where frost and sub-zero temperatures are common.

3.3 SURROUNDING LAND USES

The project area is predominantly surrounded by single residential land uses to the north west and the south east. Significant land uses in the vicinity include Retail/Business in Brakpan CBD. Figure 3.1 below illustrates the land uses surrounding the project area.

Figure 3.1: Surrounding Land Uses



3.4 **WETLAND ASSESSMENT**

A Wetland Assessment was undertaken by the Biodiversity Company in March 2020. A copy of the report is attached as **Appendix E**.

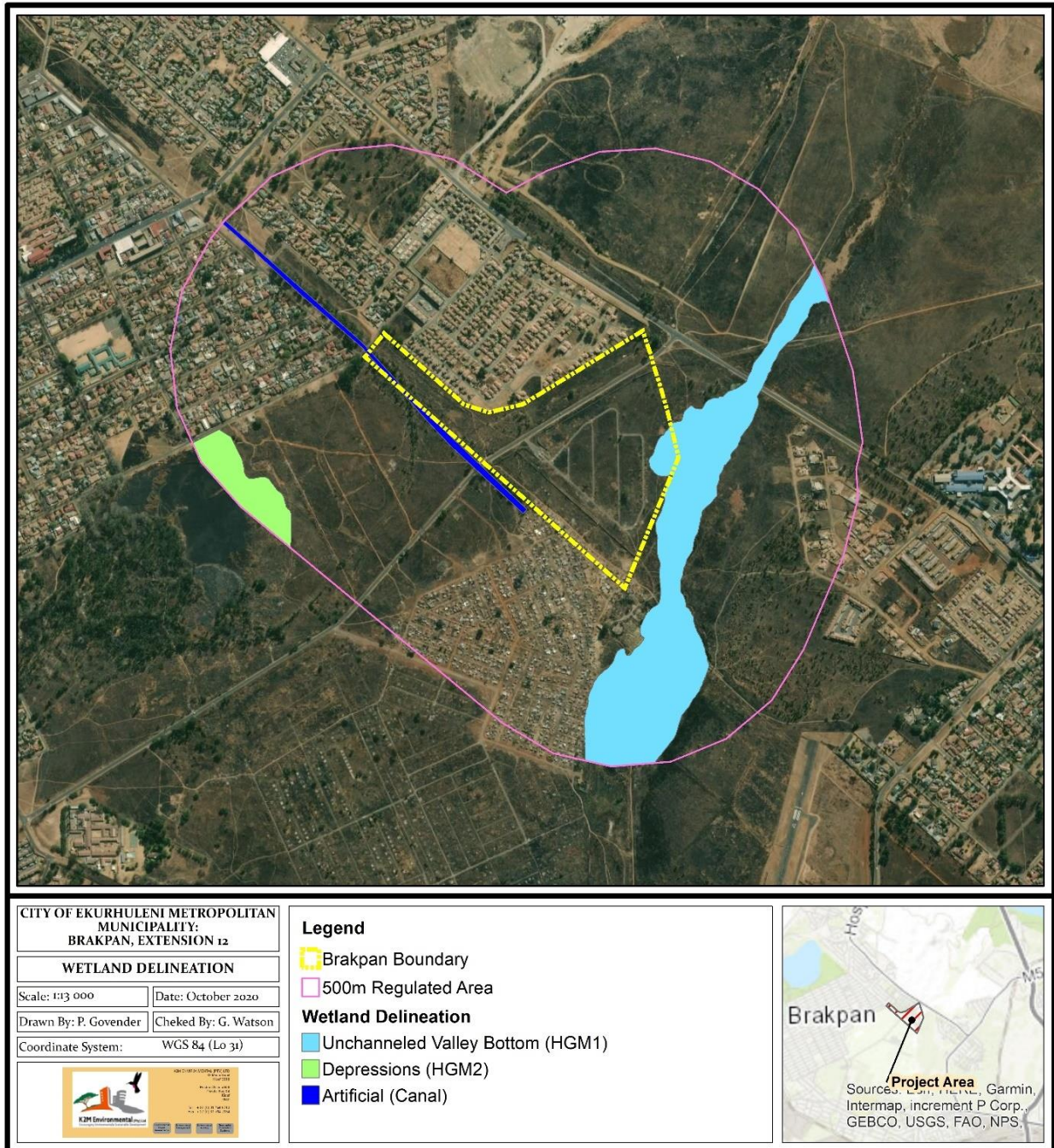
3.4.1 **Wetland Description**

3.4.1.1 **Delineated Wetlands**

The wetlands identified within the 500m regulated area represents two hydrogeomorphic types, namely:

- unchanneled valley bottom (HGM 1) and
- depression wetland (HGM 2)

Map 3.1: Delineated Wetlands



HGM 1 is an unchanneled valley-bottom wetland situated in the upper reaches of its catchment. Its source is situated just 1 km south-west of the project area near Brenthurst. The system has been modified through the creation of dams and by artificially increased inundation levels from the surrounding suburbs.

HGM 2 is depression wetland. This depression has been modified by encroachment by woody alien and invasive species, dumping and point source sewer inputs. Depressions are inward draining basins with an enclosed topography that allows for water to accumulate within the system. Depressions, in some cases, are also fed by lateral sub-surface flows in cases where the dominant geology allows for these types of flows. The depressions in the project area were classified as inward draining (endorheic) systems.

3.4.1.2 Soils

At a broad scale, the site straddles two land types namely Ba₁ to the east and BB₃ to the west. The former is characterised by quartzite, shale, slate, sandstone, diabase and lava of the Witwatersrand Supergroup with scattered chert and dolomite of the Chuniespoort Formation while the latter is characterised by shale, sandstone, clay, conglomerate, limestone and marl of the Eccu Group. In these land types hillcrests / higher up on the catena are comprised mostly of Mispah and Hutton soil forms while those lower down on the catena are characterised by Rensburg, Dundee, Oakleaf and Champagne soil forms.

At a more local scale soil sampling within terrestrial areas revealed relatively shallow dark brown organic soils overlying hard rock which was subsequently classified as a Didema soil.

3.4.1.3 Vegetation

The more temporary zones of HGM 1 were characterised by a disturbed mix of *Themeda triandra* and *Pennisetum clandestinum* while permanent zones were occupied by a homogenous mix of *Typha capensis* and *Phragmites australis*. Alien bushclumps (*Eucalyptus* spp.) have invaded a large portion of HGM 2.

3.4.2 **Wetland Ecosystem Services**

The ecosystem services provided by the wetlands identified on site (HGM₁ and 2) were assessed and rated using the WET-EcoServices method (Kotze et al. 2008). Both systems were rated as having an Intermediate

level of ecosystem service provision although HGM 2 (the depression) is considered slightly more important in this regard. Both systems have a disturbed vegetation community and water quality which has been degraded by organic waste inputs. As such the systems do not provide any appreciable level of direct ecosystem services such as the provision of clean water or harvestable resources nor are they considered important from a cultural perspective with little value (in their current states) for recreation, tourism or educational purposes. The most significant ecosystem services provided by HGM 1 include streamflow regulation and erosion control due to the system’s broad diffuse flows and shallow gradient. HGM 2 in contrast, supports denser cover of hydromorphic vegetation and due to its inward draining nature is considered to have a Moderately High importance in trapping sediments and assimilating nutrients and toxicants. The depression is also considered to have a Moderately High capacity to support wetland dependant biota.

Table 3.1: Ecosystem Services provided by each HGM Type

| | | | Wetland Unit | HGM 1 | HGM 2 | |
|---|-------------------|------------------------------------|---------------------------------------|------------------------|-------|-----|
| Ecosystem Services Supplied by Wetlands | Indirect Benefits | Regulating and supporting benefits | Flood attenuation | 2.1 | 2.6 | |
| | | | Streamflow regulation | 2.3 | 1.7 | |
| | | | Water Quality enhancement benefits | Sediment trapping | 2.0 | 2.3 |
| | | | | Phosphate assimilation | 2.0 | 2.3 |
| | | | | Nitrate assimilation | 2.0 | 2.0 |
| | | | | Toxicant assimilation | 1.9 | 2.1 |
| | | | | Erosion control | 2.4 | 3.0 |
| | | | Carbon storage | 1.7 | 1.7 | |
| | Direct Benefits | Biodiversity maintenance | | 1.9 | 2.2 | |
| | | | Provisioning benefits | | | |
| | | | Provisioning of water for human use | 1.4 | 1.3 | |
| | | | Provisioning of harvestable resources | 0.2 | 0.2 | |
| | | | Provisioning of cultivated foods | 0.2 | 0.2 | |
| | | Cultural benefits | | Cultural heritage | 0.0 | 0.3 |
| | | | Tourism and recreation | 1.9 | 1.9 | |
| | | | Education and research | 1.0 | 1.0 | |
| | Overall | | | 22.9 | 24.7 | |
| Average | | | 1.5 | 1.6 | | |
| Threats | | | 4.0 | 4.0 | | |
| Opportunities | | | 2.0 | 2.0 | | |

3.4.3 Wetland Health

The present ecological state (PES) of the wetlands identified within the 500 m regulated area is provided in Table 3.2. Overall HGM 1 was assigned a PES rating of Largely Modified (class: D) while HGM 2 was rated as Moderately Modified (class: C).

Table 3.2: Summary of the scores for the wetland PES

| Wetland | Hydrology | | Geomorphology | | Vegetation | |
|-------------------|-----------------------|-------|------------------------|-------|------------------------|-------|
| | Rating | Score | Rating | Score | Rating | Score |
| HGM 1 | E: Seriously Modified | 6.5 | C: Moderately Modified | 3.3 | D: Largely Modified | 4.4 |
| Overall PES Score | 5 | | Overall PES Class | | D: Largely Modified | |
| HGM 2 | D: Largely Modified | 4.0 | C: Moderately Modified | 3.2 | C: Moderately Modified | 3.6 |
| Overall PES Score | 3.7 | | Overall PES Class | | C: Moderately Modified | |

3.4.4 The Ecological Importance and Sensitivity

From a regional perspective one NFEPA wetlands occurs within the 500m regulated area (in HGM 1). The NFEPA Wetveg database recognises Mesic highveld Grassland Group 3 unchanneled valley-bottom and depression wetland types as Critically Endangered and Not Protected (Nel and Driver, 2011).

At a more local scale, HGM Units 1 and 2 are rated as having a High ecological importance and sensitivity (EIS) respectively. Despite their degraded states, both systems retain a moderate habitat diversity and given their connectivity to open, relatively unimpacted land downstream, maintain at least some potential to support conservation important species. The presence of open water in both systems provides habitat for a limited diversity of local and migratory waterfowl, although unlikely to support significant congregations.

3.4.5 Buffer Zones

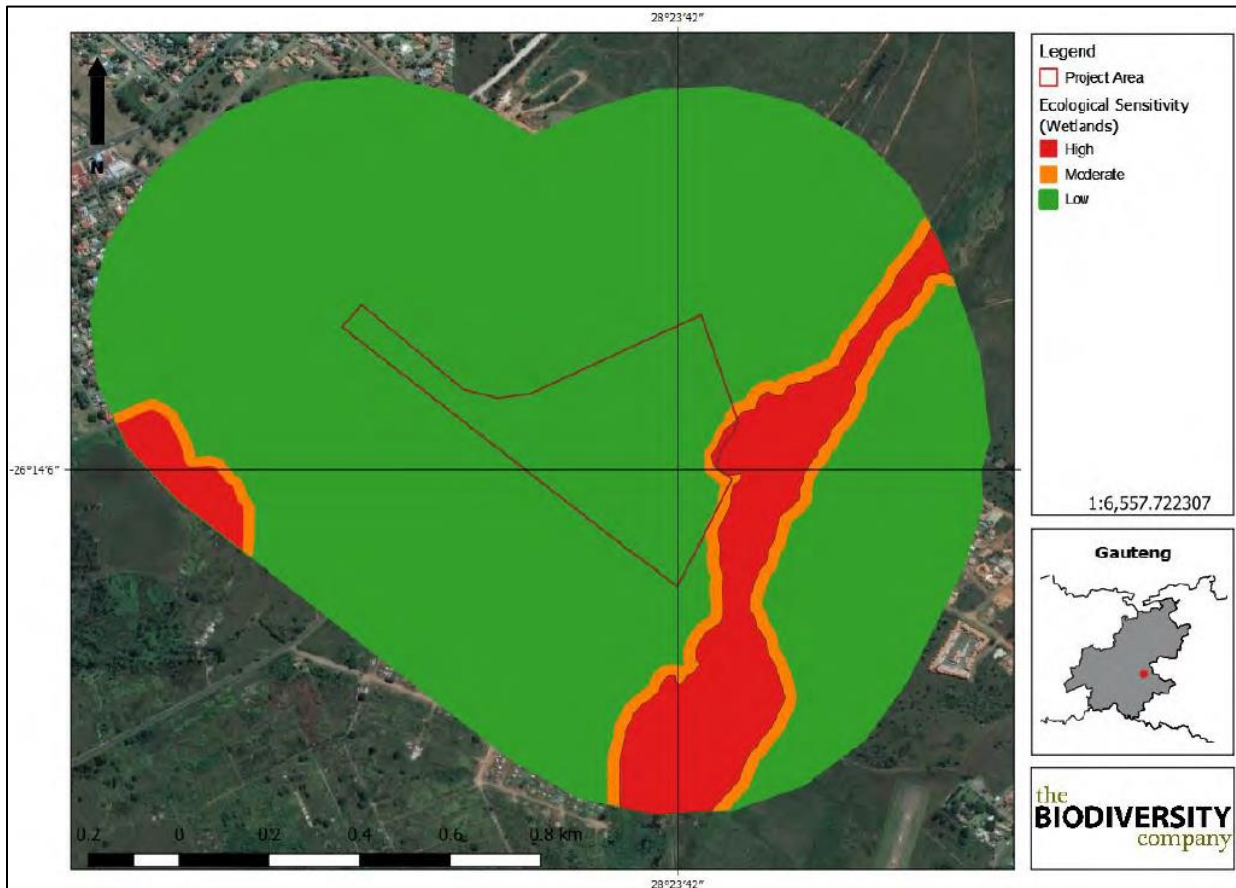
The “Buffer zone guidelines for wetlands, rivers and estuaries” (Macfarlane and Bredin, 2017) was used to determine the appropriate buffer zone for the proposed activity. The model shows that the largest risks posed by the housing development are likely to occur during the construction phase.

For HGM 1 the results of the model give a 26m and 18 m buffer for construction and operation respectively. The post-mitigation buffer for HGM 1 is 25 m for construction and 15 m for operational activities. An overall buffer of 25 m is prescribed to this system except for the portion that overlaps the project area. Here a 15 m buffer is prescribed based on the highly degraded and temporary nature of the wetland which shows signs of longstanding historical disturbance coupled with the presence of existing infrastructure in the form of tar roads. For HGM 2 the results of the model give a 39 m and 17 m pre-mitigation buffer for construction and operation respectively. Following with the effective application of mitigation measures this buffer is reduced to 22 m for construction and 15 m for operational activities.

3.4.6 Sensitivity Assessment

All identified HGM units were classified as having a High sensitivity while their associated buffers were assigned a Moderate sensitivity. All other non-wetland areas within the 500 m regulated area were assigned a Low sensitivity from a wetland perspective. The site for the proposed development currently overlaps High and Moderate wetland sensitivity areas. However, based on the architectural layouts provided in the development proposal it would appear that the project should be capable of excluding these areas with a minor shift of two of its eastern-most two-story Residential 3 blocks (one to the north and one to the south-west). The sensitivity map representing the sensitivity for each HGM unit to the proposed development is illustrated in Map 3.2 below.

Map 3.2: Wetland Sensitivity



Source: Wetland Assessment Report, March 2020

3.4.7 Wetland Impact Risk Assessment

A risk assessment was conducted in line within Section 21 (c) and (i) of the NWA to investigate the level of risk posed by the construction and operation of the proposed housing development.

One of the wetlands, HGM 1 overlaps a small portion of the south-eastern corner of the project area. The most potentially significant risks during both construction and operation centre on an increase in sediment inputs & turbidity as well as organic enrichment of HGM 1 (HGM 2 is unlikely to be impacted to any appreciable level due its distance from the project area and its position upslope of it). Given the need for the installation of a sewer and grey-water infrastructure as well as the proximity of the proposed project area to HGM 1 these risks maintain a residual risk rating of Moderate under the precautionary principle which assumes development of the entire site. Consequently, the project warrants a full water use licence. However, given that only a very small portion of HGM 1 overlaps the far corner of the project area, and

provided that the development remains outside of this wetland (minor shift of the planned two eastern-most two-story Residential 3 blocks to the north and south-west respectively and the prescribed buffer (15 m within the project area for HGM 1) these residual risks, following application of the recommended mitigation have the potential to be of low overall risk to wetlands.

3.4.8 Mitigation Measures

The mitigation measures if implemented effectively, reduce the significance of the anticipated impacts to Low. The most significant mitigation measures are as follows:

- Consider altering the design layout to either exclude or shift the two eastern-most two-story housing blocks outside of the identified wetlands and their associated buffers (e.g. to the north and south-west respectively).
- Ensure that no infrastructure is constructed within wetland habitat.
- Clearly demarcate the construction footprint and restrict all construction activities to within the proposed infrastructure area;
- Use the wetland shapefiles to signpost the edge of the wetlands closest to site. Place the sign 15 m from the edge (this is the buffer zone edge). Label these areas as environmentally sensitive areas, keep out;
- Educate staff and relevant contractors on the location and importance of the identified wetlands through toolbox talks and by including them in site inductions as well as the overall master plan;
- Promptly remove / control all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) must be removed;
- Limit most of the earth-moving activities to winter when rain is least likely to wash concrete and sand into the wetland. Activities can become messy during the height of the rainy season and construction activities should be minimised during these times to minimise unnecessary soil disturbances;
- Appropriately stockpile topsoil cleared from the project area and ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash;
- Do not situate any of the construction material laydown areas within any wetland and do not park machinery in the wetlands or their buffers;
- Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility;
- Design and Implement an effective stormwater management plan;
- Promote infiltration of rainwater into the ground wherever possible (e.g. by minimising the extent of concreted / hardened surfaces and by using permeable paving bricks).
- Release only clean water into the environment;

- Stormwater leaving the site should not be concentrated in a single exit drain but spread across multiple drains around the site each fitted with energy dissipaters (e.g. slabs of concrete with rocks cemented in);
- Where possible minimise the use surfactants to clean paving areas and herbicides to control vegetation within the gardens. If surfactants and herbicides must be used do so well prior to any significant predicted rainfall events; and
- Demonstrate the developments commitment to sustainable development given the close proximity of the wetland, through the implementation of a small-scale and pragmatic wetland rehabilitation project to compensate any potential impacts to the identified wetlands. It is anticipated that through carefully planned rehabilitation efforts the system can be restored to a state where it represents a valuable greenbelt and open space asset, that is actively utilised for land-based recreational purposes. This would involve the compilation of a rehabilitation plan by an appropriately qualified wetland ecologist. Interventions should involve, inter alia, ripping, landscaping and re-vegetating the western bank of the wetland and its buffer with locally indigenous species between Fourie and Hospital roads.

3.5 **GEOTECHNICAL ASSESSMENT**

The Preliminary Geotechnical Investigation was conducted in November 2020 by Geoid Geotechnical Engineers (Pty) Ltd and is attached as **Appendix F**.

3.5.1 **Geology and Soil Profile**

- Regional Geology: Available regional geological mapping indicates that the area of investigation is underlain at surface by Karoo deposits which host an inlier of Malmani Subgroup dolomite (Chuniespoort Group, Transvaal Supergroup) approximately 1km due north which may have a bearing on the local geotechnical conditions. Records from the associated dolomite stability assessment should be consulted to determine the thickness of the Karoo cover soils/rocks and the overall stability of the profile, as these are not discussed within the scope of the present near-surface geotechnical report.
- Anticipated Soil Profile: It is anticipated that the characteristic near-surface profile will comprise of the following:
 - Hillwash/Aeolian
 - Ferruginous Colluvium (Pebble Marker)

- Reworked Residual Sandstone
- Residual Sandstone with Interbedded Residual Shale
- **Rock Profile:** Both of the percussion borehole exposed a thick, deeply weathered Karoo rock profile near-surface, comprising alternating bands of sandstone and shale and/or diamictite (tillite), with local bands of coal. Moreover, in both instances, the boreholes encountered subsurface dolerite / syenite within the Karoo mass - this likely to be a sill rather than dyke formation, given the lateral extent thereof. This dolerite intrusion assimilates a band of chert and dolomite below 40m depth in BH₂, indicative of thick Karoo deposits overlying dolomite, which is not uncharacteristic in this vicinity.
- **Groundwater:** Although groundwater is generally absent from the upper 3m of the profile, with the rest water level in BH₁ only encountered at 4m, the profiles provide evidence of ferruginous activity in the upper 3m, which indirectly indicative of an historic, fluctuating water table (well within the soil profile) beneath most of the site in the distant past.

3.5.2 Anticipated Geotechnical Assessment

- **Anticipated near-surface geotechnical classification:** The geotechnical classification which follows provides a first-order appraisal of the project site from a ground engineering perspective, illustrating the impact of the ground on a characteristic light masonry structure. The classification and geotechnical data appraisal are further expounded to guide the optimal development of the site. On the basis of the pending field profiling and laboratory testing, we are provisionally of the opinion that the project site is characterised by two unique geotechnical zones assigned the following geotechnical designations:
 - **Zone 1:2 [C₂/h₁-h₂]** - This zone, which incorporates the bulk of the high-lying site, comprises characteristic highly compressible / potentially highly collapsible transported profile (either hillwash / aeolian deposits), overlying loose, nodular ferricrete of marginally better densities, generally overlying a potentially slightly to moderately expansive residual Karoo profile.
 - **Zone 2:3 [H₁-H₂ / W(waterlogged)]** - This zone comprises a low-lying area of poor drainage in the vicinity of the two vleis to the east of the site is characterised by potentially waterlogged, potentially moderately expansive alluvial soils overlying the potentially slightly to moderately expansive residual Karoo profile. The zone is mapped on the basis of vlei vegetation, which is indicative of frequent shallow groundwater.

- **Provisional inherent dolomitic hazard classification:** On the basis of an existing preliminary dolomite stability report covering this project site,⁴ the inherent hazard class is judged to be very low, in view of the thick Karoo cover and stabilising presence of the large dolerite intrusion (sill).
- **Provisional dolomite area designation:** On the basis of the aforementioned investigation, the site is provisionally assigned a D2 Dolomite Area Designation, which will need to be confirmed by a more comprehensive footprint-level investigation satisfying the requirements of SANS 1936:2012. If the IHC1 conditions postulated are confirmed, the proposed Res-4 development is unlikely to be rejected. Should the inherent risk be any more than IHC5, however, the proposed development will not be sanctioned.
- **Material Properties:** The provisional materials assessment - in terms of TRH145 - of the soil profile is based on visual-tactile profiling, prior experience and interpretation of a limited laboratory index tests, and is summarised below:

Table 3.3: Provisional Materials Assessment

| Horizon | Estimated TRH14 | Quality for earthworks | Typical Application |
|--------------------------------|-----------------|------------------------|--|
| Hillwash / Aeolian | G8 | Fair to poor | Low quality selected materials |
| Ferruginous Hillwash / Aeolian | G7-G8 | Fair to poor | Medium to low quality selected materials |
| Colluvium | G5*-G7 | Good to fair | Suitable for earthworks* subject to on site crushing and screening |
| Alluvium | G6-G9 | Fair to very poor | Generally unsuitable for earthworks applications |
| Residual Karoo | G8-G10 | Poor to very poor | Not suitable for earthworks applications |

- **Groundwater Occurrence:** Despite the general absence of groundwater in the test pits, the profiles exhibit near-unbiquitous presence of variably developed ferricrete, which is indirectly indicative of an historic, fluctuating water table beneath most of the site in the past. Moreover, as several test pits in Zone 2 exposed alluvial material, shallow groundwater should be anticipated in the wet season, and provision made for dewatering measures during construction.
- **Corrosiveness:** A set basic chemistry tests (pH and conductivity) tests conducted on the representative soil horizons most likely to interact with buried concrete and ferrous services show the soils to exhibit a combination of moderately low pH (moderately acidic) and low through high electrical resistivity, indicating that these soils are relatively benign in the higher lying ground, but become highly corrosive towards concrete and buried ferrous (steel) in the lower-lying southern half of the site, particularly in the vicinity of the quarry and palaeo drainage line.

- **Slope Stability:** Given the relatively flat and featureless site, there is no apparent need for terracing of individual structures, nor any need for significant cut and fill operations to render it suitable for development - other than large scale bulk earthworks to reinstate the original ground levels of Zone 2, to deal with the inherent drainage challenges.
- **Dolomite Stability:** On the basis of the present feasibility level report, the site is deemed to be a D2 zone, which will support the proposed Residential 3 Scheme. If however, worse conditions are those already encountered in the pending more detailed footprint-level dolomite stability investigation, D3 conditions may prevail which reduce the allowable densities to 80 units per hectare and a population not exceeding 400 people. One of the major outcomes of the footprint level dolomite stability investigation is to finalise the hazard class and determine the loss of support required for the structural design of all foundations. This tends to have a superordinate impact on the foundation design and limits the appropriate solutions which can be employed. It is through this lens that the foundation recommendations which follow are provided.

3.5.3 Recommendations

- **Foundation:** Foundation solutions in dolomitic terrain are essentially dictated by the inherent hazard class determined by the dolomite stability assessment. In this case, where a D2 Designation is anticipated (i.e. IHC1-IHC2), dolomite stability restrictions are unlikely to be superordinate. As such, Table 3.4 below provides guidance on the appropriate foundation solution - or combination solution. This must, however, be checked against the loss-of-support requirements of the footprint-level dolomite stability investigation:

Table 3.4: Suitable Foundation Solutions for the Proposed Structures

| Foundation Solution | | Suitability | Notes on the Application of Foundation Solution |
|------------------------|--|-------------|---|
| | Normal (Strip footing / slab on the ground) | ✘ | Inappropriate for this full site. |
| Structural Solutions | Modified Normal (Reinforced Strip Footing) | ✘ | Inappropriate for this full site. |
| | Grillage of Ground Beams or Cellular Raft | ✓ | Unsupported spans to accommodate random loss of support to be determined from the formal footprint-level dolomite stability investigation - but provisionally set at 2m, based on the existing feasibility-level dolomite stability report. Beams / rafts should be taken through the loose aeolian deposits, and placed on compacted ferricrete / colluvium, failing which these soils should be pre-collapsed or improved through impact rolling as a minimum to improve the overall bearing capacity, which is presently extremely low in the case of the aeolian deposits. |
| | Pad and pier foundations | ✘ | Inappropriate for this full site in view of the dolomite stability requirements. |
| Geotechnical Solutions | Compaction of Soil Below Individual Footings | ✘ | Inappropriate for this full site. |
| | Deep Strip Foundations | ⚠ | No advantage gained in any of the zones, except where very competent hardpan ferricrete is proven. Strip footings to be replaced with <i>ground beams</i> to meet the requisite loss of support criterion. |
| | Engineered Soil Raft / Soil Mattress (By an earthworks specialist) | ✓/✓ | Zone 1: In the absence of any high quality material on site, all earthworks materials will need to be imported, rendering this an expensive option. Zone 2: In the absence of any high quality material, this an expensive but mandatory option to elevate all structure above the expansive alluvium and deal with the inherent groundwater risk. For purposes of design, a deep box cut to 1.58 depth (or the surface of any hardpan pedogenic horizon) to fully remove these weak transported soils. These would need to be replaced with imported engineered fill material - of nominally G5/G6 standards - compacted in 150mm layers to no less than 95% Mod AASHTO. Given the inconsequential dolomite stability requirements, the near-surface geotechnics are likely dictate the structural solution. Provision should provisionally be made for the structures to span a nominal 2m loss of support anywhere beneath the footprint, as the dolomite stability investigation is still pending. |
| KEY | | | |
| ✓ | Appropriate foundation solution. | | |
| ✓ | Appropriate but insufficient in isolation, necessitating additional structural solutions. | | |
| ⚠ | Not incorrect, but poorly suited to this application due to inherent problems, with high cost implications. | | |
| ✘ | Foundation solution is either not appropriate for this geotechnical site class or not recommended given the observed conditions on site. | | |

- **Material Usage:**
 - **Zone 1** - In view of the generally poor-quality soil profile in this zone, in situ densification through conventional compaction is likely to be unsuccessful in improving the soils to a sufficient standard for reuse in soil mattress construction. Any ground improvements contemplated for this site to mitigate the dolomite risk profile and reduce the structural spans required will mandate high quality engineered fill being imported from commercial sources, which is appropriately internally reinforced. In this regard, crushed chert rubble or colluvial deposits - which are commonly available in Zone 2 - provides an excellent quality material source (typically meeting G5 standards) which can be compacted to high densities in excess of 95% Mod AASHTO.
 - **Zone 2** - In view of the generally very poor-quality soil profile in this zone, in situ densification through conventional compaction is likely to be unsuccessful in improving the soils to a sufficient standard for reuse in soil mattress construction. As such, these upper transported soils would need to be removed and replaced with high quality imported materials from commercial sources.
- **Surface Beds:** Surface beds should be constructed on no less than 450mm of granular fill of nominally G5/G6 quality, compacted to 95% Mod AASHTO density to provide adequate and consistent support, failing which floor slabs should be reinforced but discontinuous with the walls of the structure and allowed to move independently to avoid cracking.
- **Slope Stability:** In general, other than the eastern perimeter of Zone 2, the site does not warrant any special attention to slopes, other than those artificially induced in deep services trenches. These should be formed no steeper than 1V:1H to lower the risk of sidewall collapse, or alternatively fully supported during construction. Moreover, the surcharging of cut sidewalls by way of spoil heaps, construction materials and equipment (including those with outrigger jacks) should be strictly avoided as being highly detrimental to cut stability, particularly when workers are present in trenches / box excavations in excess of 1.5m deep.
- **Drainage Precautions:** Given general absence of shallow groundwater and the gentle slope of the site which promotes runoff of surface water, subsurface soil drains are not considered mandatory. Given the dolomitic nature of the site, however, SANS 1936:2012 Code of Practice dictates the minimum standards that services must comply with in order to mitigate the risk of sinkhole development. These standards are mandatory and must be enforced by the appointed professional team.

3.6 SITES WITH ARCHEALOGICAL INTEREST

3.6.1 Phase 1 Heritage Impact Assessment

Documentation pertaining to the Brakpan Extension 12 Housing Development was submitted to the South African Heritage Resource Agency (SAHRA) for comment. In their interim comment (**Appendix G1**), SAHRA required a Phase 1 Heritage Impact Assessment and Paleontological Desktop Assessment be undertaken.

A Phase 1 Heritage Impact Assessment was undertaken in November 2020 by A Pelsers Archaeological Consulting and is attached as **Appendix G2**.

The findings from the Phase 1 HIA Report are summarised below:

- No known Stone Age sites or material (stone tools) were identified in the study area during the November 2020 fieldwork.
- No Iron Age occurrences were identified in the study area during the assessment.
- No historical sites, structures or remains were identified in the study and development area during the fieldwork.
- The general and specific study area has been impacted in the recent past through various developments, including historical agricultural activities and urban related developments. Recent (abandoned) development in the study & proposed new development area has also had major impacts and the original natural and historical landscape has been nearly completely altered. As a result, if any sites, features or material of cultural heritage (archaeological and/or historical) origin or significance did exist here it would have been extensively disturbed or destroyed.
- Although all efforts are made to locate, identify and record all possible cultural heritage sites and features (including archaeological remains) there is always a possibility that some might have been missed as a result of grass cover and other factors. The subterranean nature of these resources (including low stone-packed or unmarked graves) should also be taken into consideration. Should any previously unknown or invisible sites, features or material be uncovered during any development actions then an expert should be contacted to investigate and provide recommendations on the way forward.
- From a Cultural Heritage point of view, it is recommended that the proposed housing development should be allowed to continue taking into consideration the recommended measures above.

3.6.2 Paleontological Desktop Assessment

A Palaeontological Desktop Assessment was undertaken in November 2020 by Dr Heidi Fourie and is attached as **Appendix G3**.

The findings from the Paleontological Desktop Assessment are summarised below:

- All the land involved in the development was assessed and none of the property is unsuitable for development.
- There is no objection to the development, however it may be necessary to request a Phase 1 Palaeontological Impact Assessment: Field Study to determine whether the development will affect fossiliferous outcrops if a chance fossil is found as the palaeontological sensitivity is “High”.
- The following should be conserved: if any palaeontological material is exposed during clearing, digging, excavating, drilling or blasting, SAHRA must be notified. All construction activities must be stopped, a 30 m no-go barrier constructed, and a palaeontologist should be called in to determine proper mitigation measures.

3.7 MINERAL DEPOSITS

There are no mining activities that were identified within the project area, however mining activities are being conducted to the north of the site.

3.8 SOCIO ECONOMIC IMPACTS

A Socio-Economic Impact Study for Brakpan North Extension 12 was undertaken in April 2020 by Urban Econ Development Economists (Pty) Ltd and is attached as **Appendix H**.

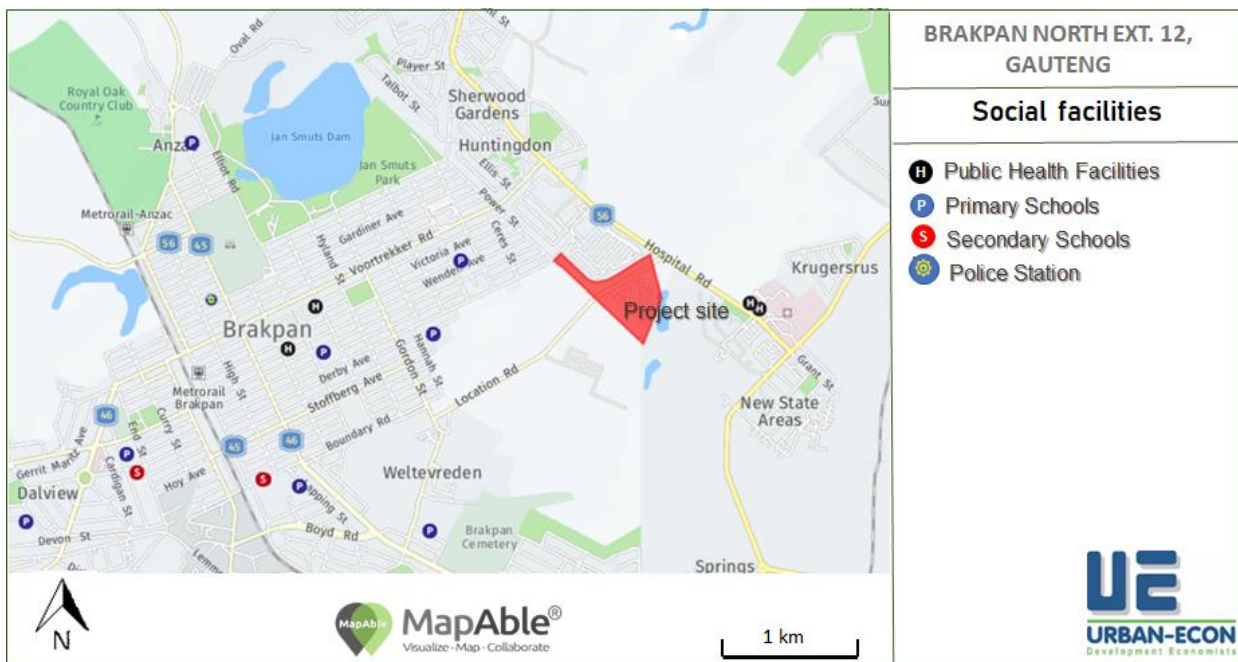
3.8.1 Study area’s composition and location factors

The proposed site is situated approximately 34.2km east of Johannesburg Central Business District (CBD) and roughly 3km east of the local Brakpan CBD. In the immediate study area, the land use is limited to residential and open land. The immediate area north and south east of the project site is constituted of

residential estates, while the south western parts comprise of a new residential area. A Google Earth aerial view suggests that the residential estates located north and south east of the project site are middle – high income areas while, the new residential area on the south west is a low-income area.

Map 3.3 below illustrates the social facilities in the primary study area. Approximately 1 km east of the project site is the Far East Rand Hospital which lies on the border of Brakpan and Springs. The far East Rand Hospital is a regional hospital that provides health care services to Springs, Brakpan, Daveyton, Etwatwa, Duduza, Benoni, Kwa-Thema and the neighbouring Informal Settlements. The closest school is Laerskool Brakpan-Oos, which is located 1.28 km north west of the project site. Accordingly, there are several other public and private schools in the primary study area. Also, the Brakpan Police Station is located in the Brakpan CBD and is approximately 3.0 km east of the project site. Other amenities within the primary study area include filing stations and shopping centres.

Map 3.3: Social Facilities



Source: Socio-Economic Study, April 2020

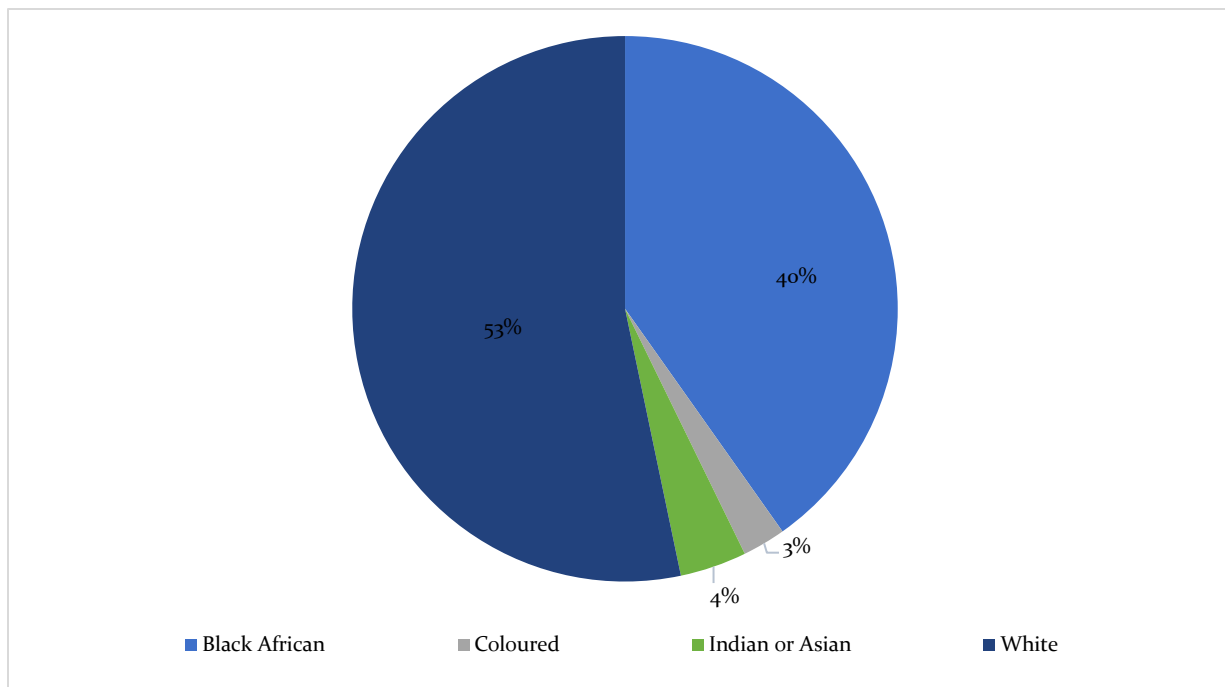
3.8.2 Sense of place, history and cultural aspects

Brakpan was named in 1886 and began to grow after the discovery of coal and gold in 1888 and 1905 respectively. Brakpan forms part of the mining and industrial complex of the East Rand, which is located within the Witwatersrand.

Notably, the 1940s was a period of economic depression and this resulted in the influx of people who had become landless and homeless into Brakpan. The influx of people created severe housing shortages which created a surge in the growth of informal settlements and backyard squatting. Furthermore, the resulting population increase in Brakpan added stress on the existing healthcare services. When it became costly to mine in Brakpan and surrounds, many residents are believed to have emigrated during the apartheid era, which began in 1948, and the area became inhabited by Afrikaner farmers who were no longer practising farming.

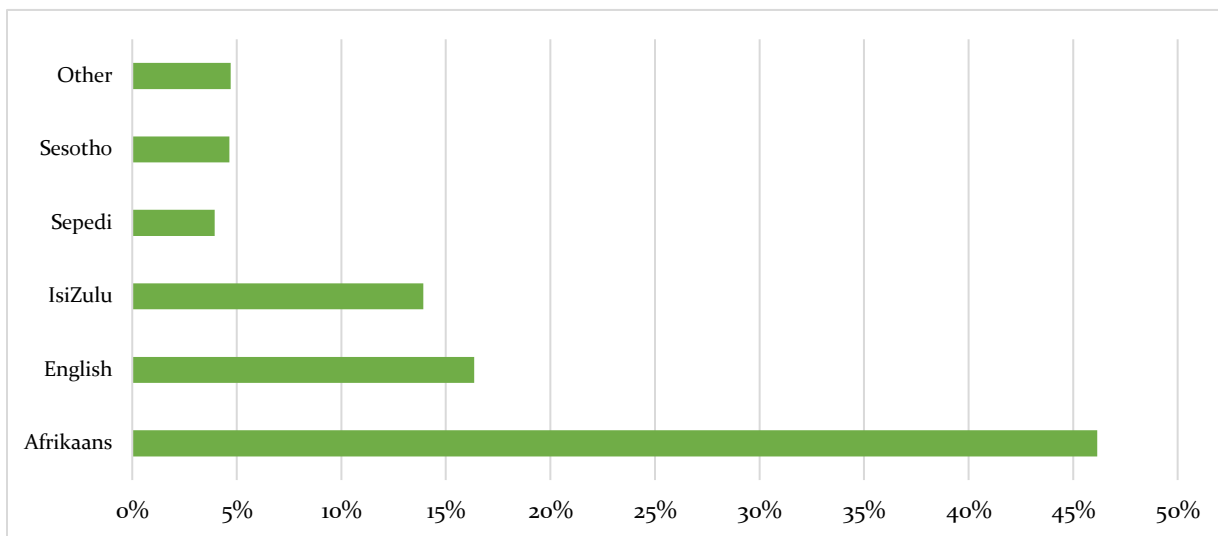
The Figure 3.2 and Figure 3.3 below illustrate who the current inhabitants of Brakpan are with regards to race and language.

Figure 3.2: Social Group Distribution in 2011 (Quantec, 2019)



Source: Socio-Economic Study, April 2020

Figure 3.3: Language Distribution in 2011 (Quantec, 2019)



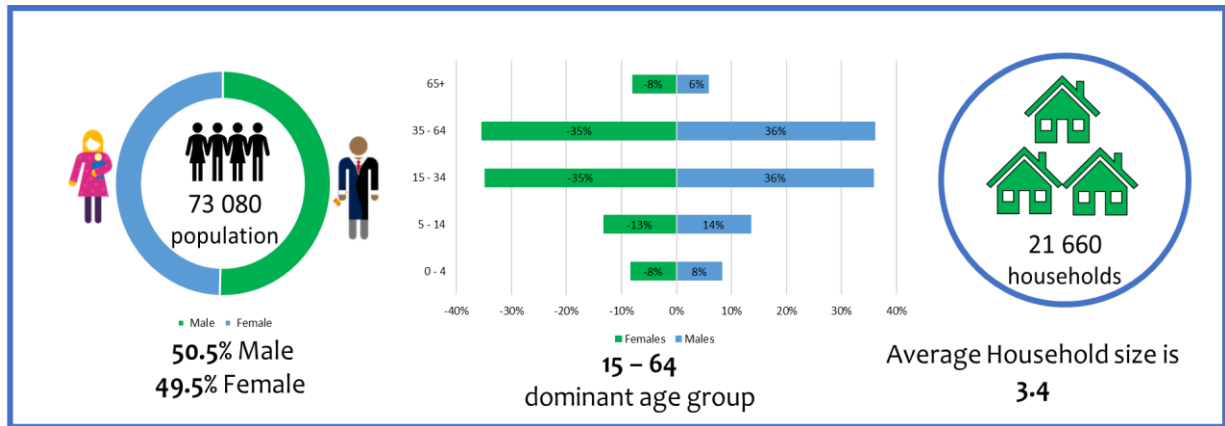
Source: Socio-Economic Study, April 2020

The population of Brakpan is comprised largely of white people (53%) and black people (40%). Furthermore, the predominantly spoken language in Brakpan is Afrikaans. However, a significant number of people speak English and IsiZulu. It is evident that the population distribution patterns of Brakpan still reflects the town's history. Currently, Brakpan maintains a strong sports and recreation culture.

3.8.3 Demographic Profile

In 2011, the total population of Brakpan was 73 080 and the dominant age group was 16 – 34 years, while the age group 0 – 4 and 65+ comprised the smallest population composition. Further, the population of Brakpan consists of equal number of males and females. Figure 3.4 below graphically illustrates the above information.

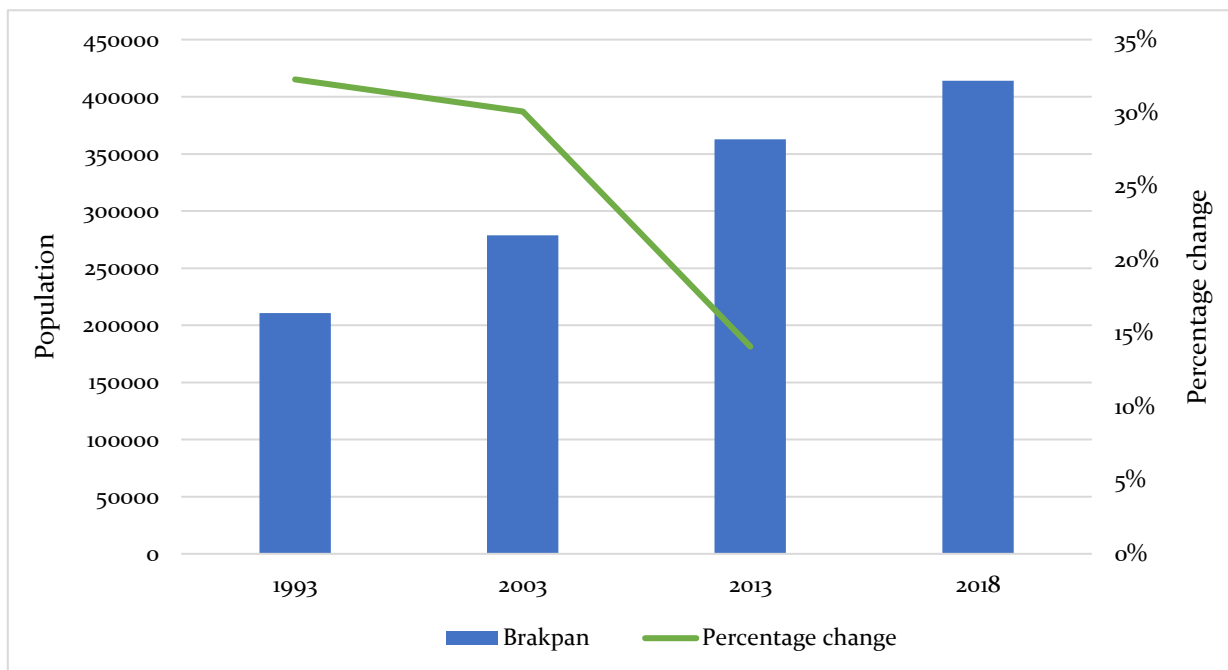
Figure 3.4: Demographic Profile (Quantec, 2019)



Source: Socio-Economic Study, April 2019

Figure 3.5 below illustrates the population change in the entire region, that is, the secondary study area, between 1993 and 2018. This can be used to extrapolate the population change in the primary study area. As demonstrated, between 1993 and 2018 the regional population has been increasing steadily. Between 1993 and 2003, there was a 32% increase in the region’s population and, between 2003 and 2013, the population of Brakpan grew by 30%. However, between 2013 and 2018, a 14% population increase was observed in the region.

Figure 3.5: Population change in Brakpan region between 1993 and 2018 (Quantec, 2019)



Source: Socio-Economic Study, April 2020

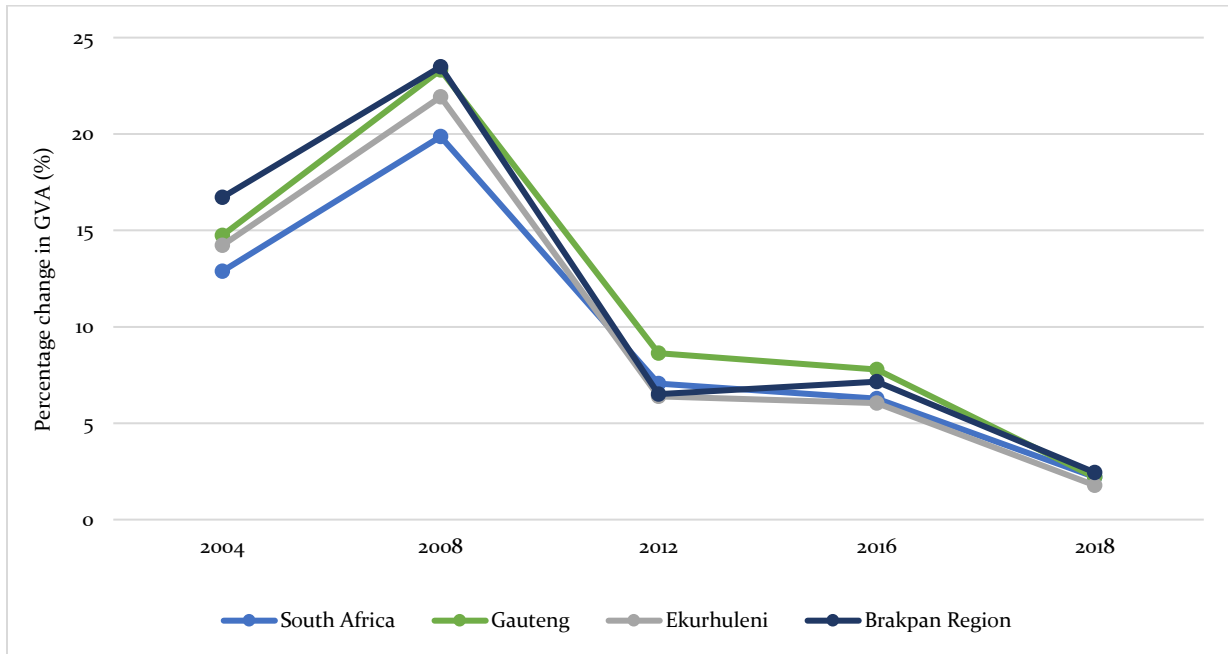
The population of Brakpan can be classified as being youthful, thereby indicating that the majority of the population is potentially economically active and could potentially receive an income should employment opportunities be available. Furthermore, a significant proportion (13.5%) of the population consists of children aged between 0 – 14 years. The correlation of the dominant potentially economically active population and the population aged below 15 years indicates the potentially significant number of young families in Brakpan. Furthermore, the population of an area is affected by migration. Empirical evidence suggests that a minute 5% of Brakpan's population had migrated into Brakpan from other countries in 2011.

3.8.3.1 Size and Composition of local economy

In the SDF, Brakpan is classified as region D together with Benoni and Springs. Figure 3.6 below illustrates the GVA for the Brakpan region, encompassing the secondary study area. Overall, the GVA for South Africa, Gauteng, EMM and the Brakpan region follow the same trends. Between 2004 and 2008, a steady increase in the GVA can be noted. Between 2008 and 2012, a sharp decline in GVA was experienced, followed by a slight increase between 2012 and 2016, and another decline between 2016 and 2018.

In 2018 the GVA for South Africa and Gauteng was 2.2% each, 1.8% for the EMM and 2.4% for the Brakpan region. The higher regional GVA suggests that there is high economic activity in the region. Furthermore, since 2004, it is clear that the Brakpan region has had a consistently higher economic output proportion in contrast to South Africa and the EMM. However, there were periods when the Gauteng performed better.

Figure 3.6: Percentage change in GVA for the period 2004 – 2018 (Quantec, 2019)



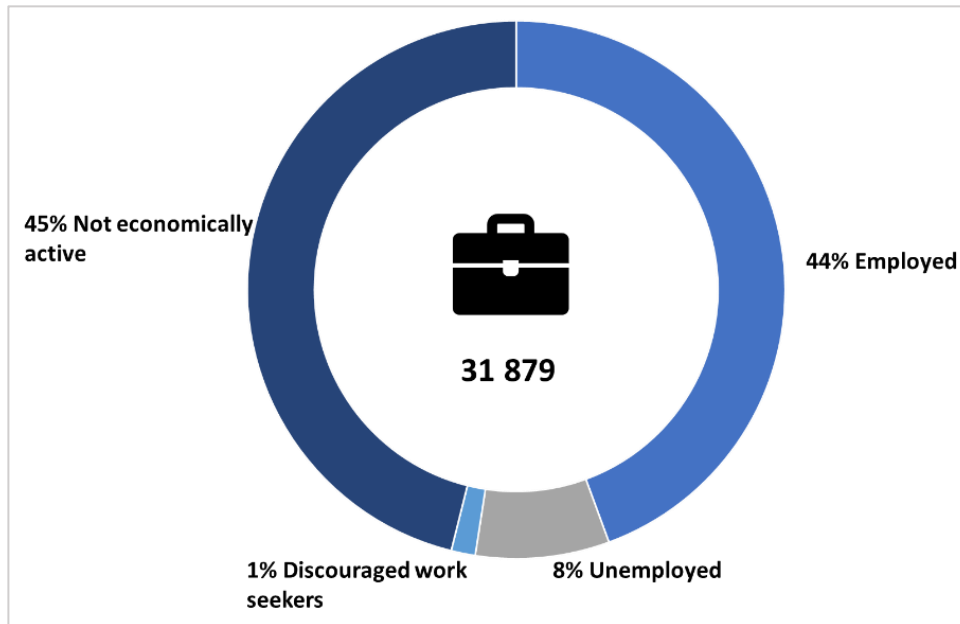
Source: Socio-Economic Study, April 2020

3.8.3.2 Labour Force and Employment Structure

Employment is the primary means by which individuals who are of working age may earn an income that will enable them to provide for their basic needs and improve their standard of living. As such, employment and unemployment rates are important indicators of socio-economic well-being.

Figure 3.7 below indicates that the majority (45%) of the population in Brakpan is not economically active, that is, they are able and available to work but cannot work nor actively look for work or start a business. Another 44% was employed, 8% was unemployed and 1% were discouraged work seekers.

Figure 3.7: Employment Status (Quantec, 2019)

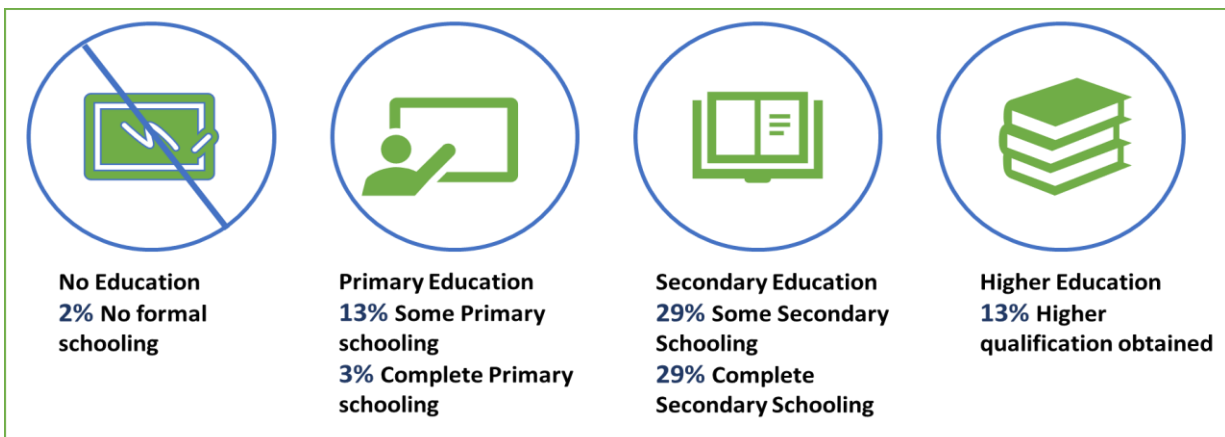


Source: Socio-Economic Study, April 2020

3.8.3.3 Income and Education

In 2011 Brakpan’s highest level of education was mainly secondary education. Around 29% of the population had acquired some secondary education and another 29% had completed secondary school. Thirteen (13%) of the population had obtained a higher qualification, a minute 2% had no formal schooling and 16% had some primary education.

Figure 3.8: Brakpan’s Education Levels



Source: Socio-Economic Study, April 2020

Table 3.5 below shows the annual income levels of Brakpan’s population. Most (36%) of the population in Brakpan receive no income. This is due to various factors, including the high number of the population that is not economically active. Furthermore, a significant number of people in Brakpan are unemployed (8%) and are discouraged work seekers (1%). Also, there is a significant number of people who are not part of the working force due to age. Of the employed population, the majority of Brakpan’s employees receive a low income. This could be attributed to the low levels of education in the area.

Table 3.5: Brakpan’s Income Levels

| Annual Income Category (2011 prices) | Brakpan | Proportion | Income level |
|---|---------------|---------------|---------------|
| No income | 26 313 | 36,0% | Low income |
| R 1-R 4 800 | 2 259 | 3,1% | |
| R 4 801-R 9 600 | 1 406 | 1,9% | |
| R 9 601-R 19 200 | 4 596 | 6,3% | |
| R 19 201-R 38 400 | 5 199 | 7,1% | |
| R 38 401-R 76 800 | 5 991 | 8,2% | |
| R 76 801-R 153 600 | 7 054 | 9,7% | Middle income |
| R 153 601-R 307 200 | 5 864 | 8,0% | |
| R 307 201-R 614 400 | 2 053 | 2,8% | High income |
| R 614 401-R 1 228 800 | 413 | 0,6% | |
| R 1 228 801-R 2 457 600 | 145 | 0,2% | |
| R 2 457 601 or more | 106 | 0,1% | |
| Unspecified | 11 681 | 16,0% | |
| Total | 73 080 | 100,0% | |

Source: Socio-Economic Study, April 2020

3.8.4 Property Trend Analysis

This section considers the secondary study area, unless otherwise stated. A drive of 15 minutes was used to demarcate the area of consideration. The sub-places within the secondary study area are indicated below:

Table 3.6: Sub-places within the secondary study area

| Places within a 15-minute drive of the project site | | | | | | | |
|---|--------------------------|----|----------------|----|--------------------|----|--------------------|
| 1 | Lindelani Village SP | 14 | Mackenzie Park | 27 | Paul Krugersoord | 40 | Dalview |
| 2 | Gov Gold Mine Areas Cons | 15 | Rynsoord | 28 | Geduld | 41 | Kenleaf |
| 3 | Sherwood Gardens | 16 | Modder East | 29 | Oranjehof | 42 | Rand Collieries AH |
| 4 | Huntingdon | 17 | Kingsway | 30 | Springs Central | 43 | Dalpark |
| 5 | Anzac | 18 | Dersley | 31 | New Industrial Era | 44 | Sonneveld |

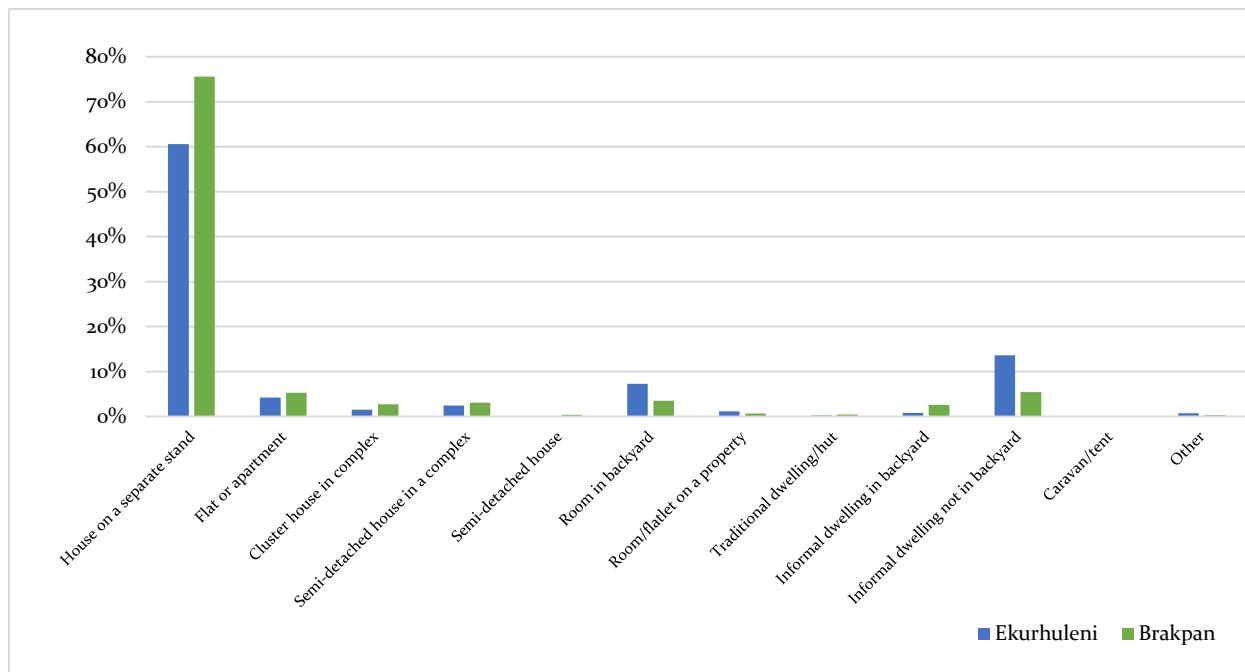
| | | | | | | | |
|----|--------------------------------|----|----------------|----|------------------|----|---------------------|
| 6 | Brakpan CBD | 19 | Presidentsdam | 32 | Springs Airfield | 45 | Denneoord |
| 7 | Weltevreden | 20 | Krugersrus | 33 | New State Areas | 46 | Witpoort Estates AH |
| 8 | Brenthurst | 21 | Rowhill | 34 | Dal Fouche | 47 | Sallies Village |
| 9 | Vulcania | 22 | East Geduld | 35 | Wright Park | 48 | Ergo Squatters |
| 10 | Modderfontein Deep Levels Mine | 23 | Everest | 36 | Reedville | 49 | Minnebron |
| 11 | New Modder | 24 | Petersfield | 37 | Fulcrum | 50 | Sunair Park |
| 12 | Maryvlei | 25 | Vulcania South | 38 | Tornado | 51 | Kwa-Thema SP |
| 13 | Riverside | 26 | Phomolo | 39 | Overline | 52 | 700 Scheme |

Source: Socio-Economic Study, April 2020

3.8.4.1 Housing Typology Analysis

This subsection aims to provide an overview of the various dwelling typologies and their prominence within the primary study area. Figure 3.9 represents the dwelling typologies within the delineated market area.

Figure 3.9: Housing Typologies, 2011 (Quantec, 2019)



Source: Socio-Economic Study, April 2020

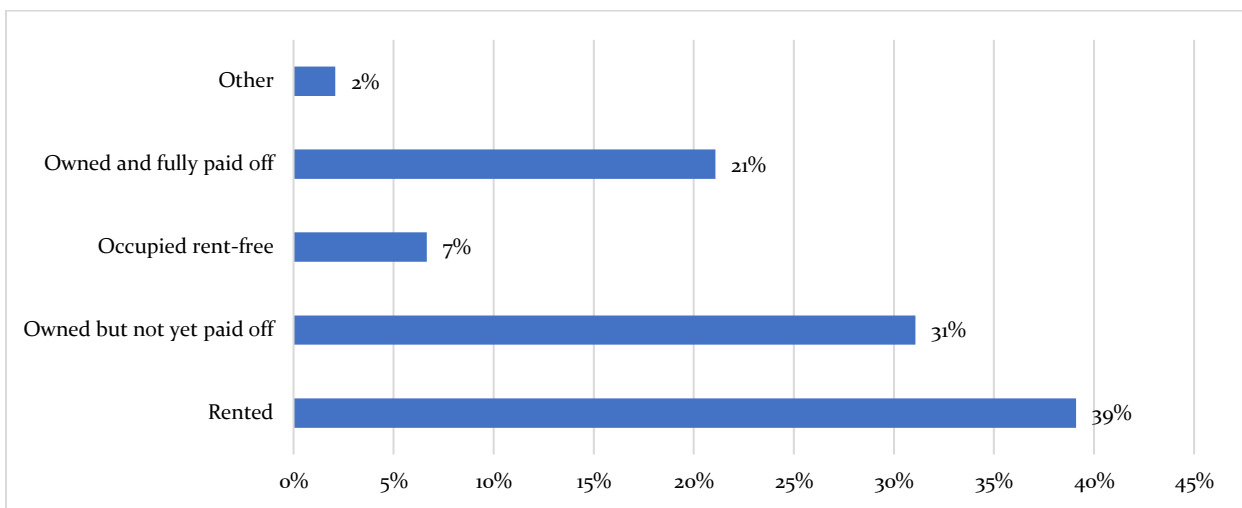
The most prominent dwelling typology in Brakpan is a house on a separate stand, which comprises 76% in Brakpan and 61% in the EMM, i.e. the secondary study area. It should be noted that there are a significant number of informal dwellings not in backyards in the EMM (14%) as well as in the Brakpan (5%). The

prominence of informal dwellings indicates the shortage and demand for residential units in Brakpan to accommodate the population appropriately.

3.8.4.2 Tenure Status

Tenure status refers to home ownership within the study area. The tenure profile aims to present the distribution of tenure in Brakpan. Figure .10 illustrates the tenure profile of Brakpan.

Figure 3.10: Tenure Status



Source: Socio-Economic Study, April 2020

Figure 3.10 above indicates that the majority of people in Brakpan (52%) generally prefer to own their homes as opposed to renting. However, 31% who own their homes have not fully paid them off while the remaining 21% have fully paid them off. Furthermore, a sizeable amount of the population in Brakpan (39%) rent their homes.

It is evident from the data that the residents of Brakpan own their houses. However, a significant proportion of the population rent their homes as well. This indicates that the proposed residential development could be optimized with a mixed tenure residential development. A mixed tenure will accommodate both sets of potential tenants/residents in the delineated market area within the respective income categories. Furthermore, this will accommodate those who could potentially fail to complete paying off their bonds and resort to monthly rentals and those who can afford to pay for a bond and acquire their own home.

3.8.5 Access to Services and State of Local Built Environment

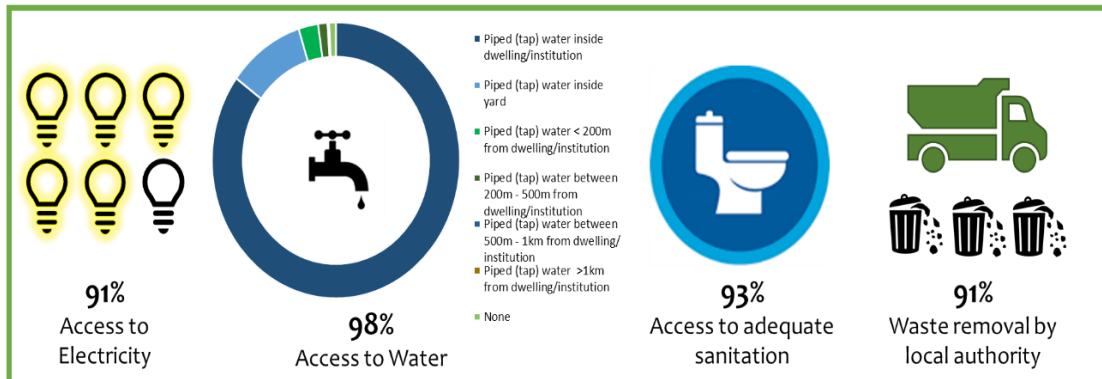
Access to shelter, water, electricity, sanitation, and other services are indicators that assist to determine the standard of living of the people in the area under investigation. Infrastructure and the state of local infrastructure is another indicator to contemplate when considering living standards. The availability of social and economic infrastructure including roads, educational facilities, and health facilities further indicates the nature of the study area, which is valuable in developing a complete profile of the circumstances in which communities are living. These measurements create a baseline against which the potential impacts of the proposed project can be assessed.

3.8.5.1 Access to Basic Services

The degree to which the community of Brakpan has access to services is illustrated in the diagram below. As it can be seen, in 2011:

- Approximately 90.9% of the households had access to electricity for lighting, 8.7% used alternative sources of energy including gas, paraffin, candle and solar and, the remaining 0.4% had no access to any form of energy for lighting.
- Approximately 84% of Brakpan's population had piped water inside their household and 9.9% had piped water inside their yard. A further 3.9% travelled some distance to obtain piped water from a communal tap. A minute 0.9% had no access to piped water.
- Approximately 93% of population had access to a flush toilet, most (91.5%) of which were connected to the sewerage system and some used a septic tank. A minute 1% had no access to toilets while the rest (4.3%) of the population used a chemical toilet, pit latrines and bucket latrines.
- Approximately 91% of Brakpan's households had their domestic refuse removed by a local authority.

Figure 3.11: Access to services, 2011 (Quantec, 2019)



Source: Socio-Economic Study, April 2020

3.8.6 Specialist Conclusions

- In particular, the Brakpan regional SDF supports and prioritises a mixed land use development in the Brakpan region due to the associated several benefits which include creating a local sense of place, creating an all-day active area, increasing housing options for diverse types of households, reducing private vehicle dependence and increasing travel options.
- The key concerns and negative impacts are largely anchored around the anticipated influx of migrant labour and job seekers, increase in local crime incidents, increased pressure on service delivery, and increased traffic congestion. However, various mitigation measures have been proposed, including prioritising local skills and businesses, facilitating skills transfers between skilled labour and low-skilled local labour, strict site access control, and involving the municipality in the project so that it can plan on its service delivery accordingly.
- Generally, the recommended mitigation measures should address the anticipated negative impacts. On the other hand, positive impacts such as job creation, skills transfer, and stimulation of local and regional economies, should also ensue from the proposed mixed-use high-density development.
- Overall, the above positive socio-economic impacts should outweigh the associated negative impacts, thus, making the proposed project socio-economically justifiable.

4 ENGINEERING SERVICES

The Bulk Services Availability Report was prepared in September 2019 and the Civil Engineering Services Outline Scheme Report was prepared in May 2020 by Phumaf and is attached as **Appendix I** and **Appendix J**, respectively.

4.1 BULK WATER SUPPLY AND RETRICULATION

4.1.1 **Authority and Provider Arrangements**

The proposed development area falls within the Ekurhuleni Water jurisdiction and the Municipality serves as both the Water Services Authority as well as the Water Services Provider.

The content of this section is based on information obtained from the GLS Water Master Plan, titled Master Plan Water System “Brakpan Retic”, dated April 2019.

4.1.2 **Bulk Services and Bulk Supply Services**

The proposed development falls within the Master Plan Water System “Brakpan Retic”, that is supplied by the Sallies Water Tower which is supplied by Brakpan Municipal reservoir that is supplied by Rand Water. A detailed GLS will be required to determine not only the spare capacity of the Sallies Water Tower and the Brakpan municipal reservoir but if there is adequate pressure available for the proposed development.

4.1.3 **Design Norms and Standards**

The design parameters that were utilised to calculate the demand and requirements for the civil services for this report as per the Guidelines for Human Settlement Planning and Design compiled by the Department of Housing and Construction Technology (2000) and other approved design specifications.

Table 4.1: Design parameters and design standards for water supply

| PARAMETER | DETAIL | SPECIFICATION |
|-----------------|----------------------------------|---|
| Pressure | Maximum (Static) | 90m |
| | Minimum (at peak flow) | 24m |
| AADD | High rise flats according to FSR | 0,6 km per unit/50m ² /day |
| Peak Factor | Entire Development | 4,0 |
| Flow Velocity | Supply mains (max) | 1,5 - 2,5 m/s |
| | Supply mains (recommended) | 1,0 m/s |
| | Network pipe maximum | 1,2 m/s |
| | Network pipe recommended | 0,6 m/s |
| | At fire flow | 3,5 m/s * |
| Piping | Sizes | Min - 110mm dia ND |
| | Material | HDPE |
| Valves | Spacing | Maximum 600m |
| Pipe Location | All Areas | 1.5m from the erf Boundaries where possible |
| Hydrant Spacing | Maximum Spacing | 120m apart |
| Fire flow: | Flow per hydrant (High Risk) | 25 ℓ/s |
| | Minimum pressure: | 15 m |
| | Maximum Spacing: | 120m apart |
| Cover to Pipes | Minimum Cover | 1 000mm |

Source: Civil Engineering Services Outline Scheme Report, May 2020

It should be noted that the above standards have been utilised to obtain an indication of the size of the services only and they must, therefore, be confirmed through a preliminary and final design process.

4.1.4 Water Demands

The peak water demand (excluding fire flow) is calculated during the preliminary designs. The summarised AADD and peak flows calculated during the preliminary designs are summarised in Table 4.2 below.

Table 4.2: Water demand (Annual Average Daily Demand)

| Zoning | No of Stands | No of Dwellings | Area m ² | AADD per Unit (l/day) | Unit | Average Water Demand (l/day) | Average Water Demand (l/s) | Peak Factor | Peak Demand (l/s) |
|--|--------------|-----------------|---------------------|-----------------------|--------------|------------------------------|----------------------------|-------------|-------------------|
| Residential Zone 4 Mixed-Use | 1 | 595 | | 700 | Res Dwelling | 416500 | 4,820 | 3,6 | 17,35 |
| Social @ 600 l/d per 100 m ² | | | 2732,28 | | Social | 16390 | ,190 | 3,3 | ,063 |
| TOTAL | | | | | | 432890 | 5,01 | | 17,41 |
| PLUS UAW (20% OF TOTAL AADD) | | | | | | | | | 519,47 kl/day |
| TOTAL AVERAGE DEMAND (AADD) | | | | | | | | | 432,89 kl/day |
| PEAK DEMAND inc. 20% UAW (exc. Fire flow) PF = 4 | | | | | | | | | 20,89 l/s |
| FIRE FLOW PER HYDRANT (X4) - High risk | | | | | | | | | 33,33 l/s |

Source: Civil Engineering Services Outline Scheme Report, May 2020

Total Instantaneous Peak Demand = Average Daily Demand X Instantaneous Peak = 17.41 l/s

Instantaneous Peak Factor = 3.6

Limited calculations to determine the demand for the various services were prepared to obtain an indication of the size of the services. The actual sizes of the services will have to be determined through a final design process after the relevant details have been finalised.

4.1.5 Existing Water Pipe Network

Information received from the City of Ekurhuleni (IMQS) / GIS master planning and the topographical survey indicates that there are existing water services in the area and within the proposed site. There are various existing 75mm diameter pipes adjacent to the site on the northern side and 100mm diameter water pipes adjacent to the proposed site on the eastern side running along Hospital Road (see **Appendix K** for the Ekurhuleni Water Distribution Water System drawing no. AL62 and AL63). However, the proposed layout plan / site development plan (SDP) is currently being prepared to establish the suitability and capacity of the services for the connection point.

Additional studies such as the GLS masterplan will be required to determine the capacity analysis of the existing pipes once an SDP has been completed and approved.

4.1.6 Capacity analysis of the network pipes

The topographical survey done shows that one water valve was detected and no other signs of other existing water pipes within the proposed site. According to Ekurhuleni, there are no as-builts or records of the internal water network for the proposed development. It is therefore recommended that a GLS Masterplan report be requested to analyse the effect on the existing network pipes and determine the required upgrades.

4.1.7 Proposed Water Network

The current draft proposed layout can only provide the total length of water reticulation within the road reserves since the SDP for the proposed development is not yet completed. It must be noted that the total pipe length and the correct pipe sizes of the water services will, therefore be confirmed through a preliminary and final design process when the proposed layout is completed and approved.

The pipe sizes, materials and class will be Type PE 100, PN 12.5. The water mains will be installed 1.5m from the erf boundary forming a loop. Isolating valves will be placed at the reticulation nodes to provide effective isolation of loops.

The length of the internal water pipelines as per the current proposed draft layout showing pipelines that will be installed inside the road reserves for this project is approximately 1.4km. The proposed designs were done according to the yield provided from the draft proposed layout. The water reticulation layout for the proposed development is attached as **Appendix L** and indicated in Figure 4.1 below.

4.1.8 Proposed Link Upgrades

Land use was changed from “agricultural” to “residential 4” therefore upgrading of link infrastructure will be required for this project.

4.2 **BULK SEWER SYSTEM AND RETICULATION**

4.2.1 **Authority and Provider Agreements**

The proposed development falls within the Ekurhuleni Water jurisdiction and the Municipality serves as both the Sanitation Service Authority as well as the Sanitation Service Provider.

The contents of this section is based in information obtained from a GLS Water Master Plan, titled “Master Plan Sewerage System, Welgedacht”, dated April 2019.

4.2.2 **Bulk Sewer System**

The new development will fall under the “Master Plan Sewerage System, Welgedacht”. There is spare capacity at the Welgedacht WWTP however, a detailed GLS will be needed to determine the impact the new development will have on the WWTP and if this development drains to Daveyton WWTP which had no spare capacity at the moment and will ultimately be abandoned or directly to Welgedacht WWTP.

4.2.3 **Design Norms and Standards**

The design parameters utilised to calculate the demand and requirements for civil services are per the Guidelines for Human Settlement Planning and Design compiled by the Department of Housing and Construction Technology (2000) and other approved design specifications.

It must be noted that these standards have been utilised to obtain an indication of the size of the services only and they must, therefore be confirmed through a preliminary and final design process.

Table 4.3: Design standards and design parameters for sewerage reticulation design

| PARAMETER | ELEMENT | GUIDELINES |
|------------------------------------|----------------------------------|---|
| Average dry weather Flow (ADWF) | High rise flats according to FSR | 0,4/kl/erf/day |
| Minimum Pipe diameter | Gravity sewers | 160 mm |
| Minimum Velocity at full flow | Gravity sewers | 0,7 m/s |
| Peak Factor | Entire Development | 2.5 |
| Minimum Slopes for Pipes Diameters | 100 mm | 1: 120 |
| | 150 mm | 1: 200 |
| | 200 mm | 1: 300 |
| | 225 mm | 1: 350 |
| | 250 mm | 1: 400 |
| | 300 mm | 1: 500 |
| Pipe Material | Underground | HDPE - PE 100, PN 10 |
| Location of Sewers | In road reserves | 2,5 m from erf boundaries in a road reserve |
| | Midblock | 1,3 m from erf boundaries or where possible |
| Manholes | Spacing | 80 m maximum |
| | Material | HDPE manhole /Pre-cast concrete rings |

Source: Civil Engineering Services Outline Scheme Report, May 2020

4.2.4 Sewage Flow

The following are assumed:

- Demand rates are according to the Guidelines for Human Settlements
- “Guidelines and Standards for the Planning and Design of Water and Sanitation Services” published by the City of Ekurhuleni Water and Sanitation Department

Table 4.4: Sewer Flow (Annual Average Daily Flow)

| Zoning | No of Stands | No of Dwellings | Area m ² | ADWF per Unit (l/day) | Unit | Average Sewage Outflow (l/day) | Average Sewage Outflow (ADWF)(l/s) | Peak Factor | PWWF (l/s) |
|---|--------------|-----------------|---------------------|-----------------------|--------------|--------------------------------|------------------------------------|-------------|--------------|
| Residential Zone 4 Mixed-Use | 1 | 595 | | 600 | Res Dwelling | 357000 | 4,13 | 2,5 | 10,33 |
| Social @ 400 l/day per 100 m ² | | | 2732,28 | | Social | 10929,12 | 0,13 | 2,5 | 0,32 |
| TOTAL | | | | | | 336426,12 | 4,26 | | 10,65 |
| | | | | | | Total Incl.15% Extraneous flow | | | 12,24 |

Source: Civil Engineering Services Outline Scheme Report, May 2020

Sewer design flow is estimated at approximately 80% of the water consumption plus 15% stormwater infiltration.

The total sanitation demand calculated for the proposed development is approximately 12.24 l/s.

The chosen design standards used for the calculations above:

Peak Flow Rate = Average Daily Flow Rate X Peak Factor

Peak Factor = 2.5

4.2.5 Existing Sewer Pipe Network

Information received from the City of Ekurhuleni (IMQS) / GIS mater planning and the topographical survey indicates that there are existing sewer services in the area and within the proposed site but since the layout has changed and existing sewer was midblock, a new sewer reticulation design within the erfs and in the road reserves will be required. There are existing 160mm diameter sewer pipes adjacent to the proposed site on the eastern side (see **Appendix M** for the Ekurhuleni Sewer Distribution System drawing no. AL62 and AL63). However, the proposed layout plan / site development plan (SDPo) is currently being prepared to establish the suitability and capacity of the services to for the connection point.

Additional studies such as the GLS master plan will be required to determine the capacity analysis of the existing pipes once an SDP has been completed and approved.

4.2.6 Capacity Analysis of Network Pipes

The topographical survey done shows that there is existing sewer reticulation within the proposed development which was designed as a midblock sewer. The current proposed layout shows that the existing sewer within the site will run below the proposed buildings. According to Ekurhuleni, there are as-builts or records of the existing internal sewer network within the proposed development so the conditions of existing sewer within the site is unknown. It is therefore recommended that a GLS Master Plan report be requested to analyse the effect on the existing sewer network pipes and determine the required upgrade.

4.2.7 Proposed Sewer Network

The current draft proposed layout can only provide the total length of water reticulation within the road reserves since the SDP for the proposed development is not yet completed. It must be noted that the total pipe length of the entire layout plan and correct pipe size of the sewer will therefore be confirmed through preliminary and final design process when the proposed layout is completed and approved.

The length of internal sewer pipelines as per the current proposed draft layout showing pipelines that will be installed inside the road reserves for this project approximately 0.7km. The proposed designs were done according to the yield provided from the draft proposed layout. The proposed internal sewer reticulation network is attached as **Appendix N** and Figure 4.2 below.

The pipes will be 160 mm diameter Type PE 100 or higher, PN 10, SDR and the manholes will be 1000 mm to 1500 mm diameter HDPE manhole/precast concrete rings with concrete covers.

4.2.8 Proposed Upgrades

The proposed development lies within a serviced area with the existing sewer network consisting of pipes 160 mm diameter. Most of the pipes in the network have sufficient capacity to accommodate the current sewer discharge. An upgrade to the existing sewer network will therefore be necessary to accommodate the proposed development. The extent of such a upgrade will be determined during the design stages of the project.

A new internal sewer reticulation network for the proposed development will be designed in line with the approved site development plan. This will connect to the existing sewer network in line with the City of Ekurhuleni Water and Sanitation Guidelines.

4.3 **ROADS**

4.3.1 **Authority and Provider Arrangements**

The City of Ekurhuleni is responsible for the provision and maintenance of roads and stormwater infrastructure in its area of jurisdiction.

4.3.2 **Traffic Impact Study**

A traffic impact will be conducted. In the existing 2020 scenario, the future 2025 scenario on the existing geometry and the 2025 future scenario on the upgraded geometry will be analysed.

The purpose of this report is to assess the traffic impact at the intersections surrounding the development due to the additional traffic that the development will generate together with measures to mitigate the impact.

4.3.3 **Access**

The Brakpan North Extension 12 Development will gain access to north from existing Location Street and Hospital Road. This access route leads to Germishuis Street which forms part of the internal street within the development.

4.3.4 Design Standards

The design parameters that will be utilised for geometric design and pavement structures and requirements for civil services are per the Guidelines for Human Settlement Planning and Design compiled by the Department of Housing and Construction Technology (2000) and other approved design specifications.

It must be noted that these standards have been utilised to obtain an indication of the size of the services only and they must therefore be confirmed through a preliminary and final design process.

Table 4.5: Design Parameters and Design Standards for Roads

| | |
|---------------------|--|
| Class | 4a, 4b, 5a, 5b and 5c |
| Road Width | 7.5m, 7m, 6m, 5.5m, and 5m |
| Road Reserve | 22m, 20m, 16m, 13m, and 12m |
| Pavement Layers | No layer within the pavement structure shall be less than 125mm |
| Cross fall/Camber | Single cross fall (3%) |
| Longitudinal Slope | Minimum: 0.5% |
| Kerbing | Fig 3 or Fig 7 barrier or type Fig 8b Mountable |
| Pedestrian Walkways | No pedestrian walkway shall be less than 1.2m when paved |
| Verges | Minimum verge width shall be 2.7m |
| Access to Erven | Minimum stacking distance at entrances is to be between 4.5m edge of road and gate |

Source: Civil Engineering Services Outline Scheme Report, May 2020

The classification of roads is indicated in Table 4.6 below.

Table 4.6: Classification of Road

| CLASS NAME | DESIGN TYPOLOGY | CLASS NO. |
|--------------------------------|-----------------------------|-----------|
| Collector Street, commercial | Commercial Major Collector | 4a |
| Collector Street, Residential | Residential Minor Collector | 4b |
| Local Street, Commercial | Commercial access Street | 5a |
| Local Street, Residential | Local Residential Street | 5b |
| Walkway Non-Motorised Priority | Pedestrian only | 6a and 6b |

Source: Civil Engineering Services Outline Scheme Report, May 2020

4.3.5 External Road and Intersection Upgrades Required

Brakpan Extension 12 is bordered by Hospital Road and can be accessed via Location Road (see **Appendix O** for Existing Roads and Stormwater Layout).

4.3.6 Internal Roads

There is an existing internal road networks but a conditional assessment through tests is required to determine the conditions of the road pavement layers and to confirm if the designs were done according to the recommended City of Ekurhuleni design norms and standards. The decision to rebuild or rehabilitate will be taken after the results of the road tests are available.

4.4 **STORMWATER MANAGEMENT**

4.4.1 Authority and Provider Arrangements

The Ekurhuleni Roads Agency is responsible for the provision and maintenance of roads and stormwater infrastructure in its area of jurisdiction.

4.4.2 Design Norms and Standards

The design criteria will be derived from the following:

- The Guidelines for Human Settlement Planning and Design (Red Book)
- SANRAL Drainage Manual 5th Edition

The Rational Method will be used to calculate the stormwater runoff for this site. The stormwater will be drained along the road reserve, mainly open, unlined V-drain channels, with underground piped systems only where surface drainage is not possible to deemed to be impractical.

Designs will be such that the 1:5-year minor storm and the 1:25 year major storm are accommodated in the canals and the road structures without overtopping.

Table 4.7: Design parameters and design standards for stormwater

| | |
|---|-------------------------------|
| Major system design frequency | 25 year |
| Minor system design frequency | 5 year |
| Minimum Pipe size within road reserves | 450mm diameter |
| Maximum manhole spacing | 100m |
| Minimum pipe class for 450mm and 525mm diameter | 100D |
| All other classes to be designed | |
| Maximum velocity to be not more than | 5m/s in pipes 3m/s in road |
| Slope to be not less than | 1% to self-clean |
| No hidden junction box will be allowed | |
| Pipe Material | Concrete interlocking |

Source: Civil Engineering Services Outline Scheme Report, May 2020

4.4.3 Existing Stormwater Systems

There is current information available from the topographical survey regarding existing stormwater infrastructure within the proposed development. The available survey information will assist tie in positions since the additional or new proposed stormwater pipes will connect to the existing stormwater system on site.

In order to tie into these existing systems, the positions, levels of these existing systems need to be confirmed from the topographical survey to confirm functional designs. There are two wetland areas to the southern direction of the proposed site, in which the existing stormwater discharging into the wetland.

4.4.4 Proposed Internal Stormwater

A conceptual stormwater management plan for the development will be required. Stormwater will be managed on the proposed site and the outlet onto the roads. Stormwater run-off from the roads will be collected using an underground pipe system and be conveyed to the nearest outlets or watercourse (See **Appendix P** and Figure 4.3 below for the proposed Stormwater Reticulation and Roads Layout).

Stormwater pipe capacities must be able to cater to minor storms of 1 in 5 years whilst both roads and stormwater pipes should cater to major storms 1 in 25 years. The stormwater master plan must provide for a level of attenuation and pollution control should stormwater outlets be conveyed to the natural watercourse.

DOMESTIC SOLID WASTE

Domestic solid waste will be collected by the Municipality which will be established as part of this project. It is further envisaged that this will be an on-street collection system operating once a week using a Municipal Waste collection truck.

Disposal of collected waste will be via the City of Ekurhuleni Municipal Waste Disposal who collects generated waste at pre-determined locations on the site and disposes it at their Landfill/Waste Disposal facility on a weekly basis.

Waste reduction through recycling at source will be encouraged to reduce the waste pile (bottles, tins, paper and cardboard) however, given the nature of the development, it is not expected that there will be a huge reduction in volume.

4.5 ELECTRICAL SERVICES

The Bulk Electrical Services Report was prepared in September 2019 and the Electrical Engineering Outline Scheme Report was prepared in May 2020 by Phumaf is attached as **Appendix Q** and **Appendix R**, respectively.

4.5.1 Existing Infrastructure

The project area falls under the jurisdiction of the City of Ekurhuleni. The area generally has adequate electricity supply, but the City has advised that the bulk capacity that is currently available will be allocated on a first come first serve basis. Internal LV reticulations will therefore be required in line with the approved Township Layout or Spatial Development Plan.

4.5.2 Demand Calculations

The electrical demand was estimated as per SANS 204:2011 – Energy Efficiency in Buildings and the National Rationalized Specifications (NRS) 034-1:2007. Individual dwelling units have been allocated an average load based on Urban Residential II Consumer (LSM 7 and 8), with a load of 3,54kVA ADMD. Since this is an Eskom area of supply the relevant tariff will be the Home light 80 with the provision of an 80A supply circuit breaker for each dwelling unit.

The average 3,7kVA per housing unit is the 7-year projected load ADMD and this is in line with the National Rationalized Specifications (NRS) 034-1:2007 assuming that the development will consist of LSM 7 and 8 consumer classes. In order to estimate the total load requirements for other consumers which are not housing units stands, the following kVA/m² figures were adapted based on load densities in volt-ampere per meter squared as stipulated by the NRS 069:2004 Guidelines.

- Business or office equivalent 0.08kVA/m²
- Light industrial or equivalent 0.04 kVA/m²
- Industrial or equivalent 0.10 kVA/m²

The estimated total electricity supply bulk requirement is indicated in Table 4.8.

Table 4.8: Demand Calculations

| Item | Description | Quantity / Area | Total Load (KVA) |
|-------|--------------------------------|---------------------|------------------|
| 1 | Dwelling Units (@ 2.5kVA ADMD) | 581 | 1,452.5 |
| 2 | Internal Street/Area Lighting | 1 | 100 |
| 3 | Business / retail nodes | 0 | 0 |
| 4 | Social | 3,000m ² | 120 |
| 5 | Educational | 0 | 0 |
| TOTAL | | | 1,672.5 |

The total bulk electricity requirements for the project is 1 672.5 kVA and is available from the existing network which is being currently run and maintained by the City of Ekurhuleni. The required firm capacity will be supplied via two 1 000kVA mini substations.

4.5.3 Energy Efficiencies

The design of all electrical services will be premised on the need to minimise the total electrical demand of the development. Energy saving measures (electrical and non-electrical) will be recommend for the development. Active and passive measure will be considered:

- Use of solar heating and lighting wherever possible
- Energy efficient lighting e.g., LED Lamps
- Proper thermal insulation as required
- Optimal alignment of building structures

5 IMPACT ASSESSMENT

5.1 INTRODUCTION

The impact assessment aims at identifying potential environmental impacts (both positive and negative impacts) and evaluating these impacts in terms of its significance. This assessment is provided in the form of a systematic analysis framework to evaluate the nature, extent, duration, intensity, probability and significance of the various impacts are considered both without and with mitigation and management measures.

5.2 IMPACT ASSESSMENT CRITERIA

The assessment of the potential impacts of the envisaged development is undertaken in accordance with the broad criteria required by the integrated environmental management procedure and includes the following:

5.2.1 Nature of impact

A brief description of the type of impact the proposed development will have on the affected environment.

5.2.2 Extent/Scale

The physical extent of the impact.

- i. Footprint
The impacted area extends only as far as the actual footprint of the activity.
- ii. Site
The impact will affect the entire or substantial portion of the site/property.

- iii. Local
The impact could affect the area including neighbouring properties and transport routes.
- iv. Regional
Impact could be widespread with regional implication.
- v. National
Impact could have a widespread national level implication.

5.2.3 Duration

The duration of the impact.

- i. Short term
The impact is quickly reversible within a period of one year, or limited to the construction phase.
- ii. Medium term
The impact will have a medium term lifespan (project lifespan 1 – 10 years).
- iii. Long term
The impact will have a long term lifespan (project lifespan > 10 years).
- iv. Permanent
The impact will be permanent beyond the lifespan of the development.

5.2.4 Intensity

These criteria evaluate intensity of the impact and are rated as follows:

- i. Minor
The activity will only have a minor impact on the affected environment in such a way that the natural processes or functions are not affected.
- ii. Low
The activity will have a low impact on the affected environment

iii. Medium

The activity will have a medium impact on the affected environment, but function and process continue, albeit in a modified way.

iv. High

The activity will have a high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

v. Very high

The activity will have a very high impact on the affected environment which may be disturbed to the extent where it temporarily or permanently ceases.

5.2.5 Probability

This describes the likelihood of the impacts actually occurring.

i. Improbable

The possibility of the impact occurring is highly improbable (less than 5% of impact occurring).

ii. Low

The possibility of the impact occurring is very low, due either to the circumstances, design or experience (between 5% to 20% of impact occurring).

iii. Medium

There is a possibility that the impact will occur to the extent that provision must be made therefore (between 20% to 80% of impact occurring).

iv. High

There is a high possibility that the impact will occur to the extent that provision must be made therefore (between 80% to 95% of impact occurring).

v. Definite

The impact will definitely take place regardless of any prevention plans, and there can only be relied on migratory actions or contingency plans to contain the effect (between 95% to 100% of impact occurring).

5.2.5.1 Determination of significance

Significance is determined through a synthesis of the various impact characteristics and represents the combined effect of the extent, duration, intensity and probability of the impacts.

i. No significance

The impact is not substantial and does not require any mitigatory action.

ii. Low

The impact is of little importance, but may require limited mitigation.

iii. Medium

The impact is of importance and therefore considered to have a negative impact. Mitigation is required to reduce the negative impacts to acceptable levels.

iv. High

The impact is of great importance. Failure to mitigate, with the objective of reducing the impact to acceptable levels, could render the entire development option or entire project proposal unacceptable. Mitigation and management is essential.

The following assessment scale is used to determine the significance of the identified potential impacts on the environment.

Significance = (probability + duration + scale) x intensity

Probability: 1 – 5

Extent: 1 – 5

Duration: 1 – 4

Intensity: 1 – 10

Significance rating criteria

| | |
|---------|-----------------------------------|
| >75 | High environmental significance |
| 50 – 75 | Medium environmental significance |
| <50 | Low environmental significance |

5.2.5.2 Abbreviations for tables listed below:

WOM: Without Mitigation

WM: With Mitigation

O: Operational

C: Construction

5.2.6 Assessment of Potential Impacts

5.2.6.1 Physical and landscape characteristics

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|--|-------|----------|--------|----------|-----------|-------------|--------|--|-----|
| 1. Impact of development on natural drainage patterns, caused by surface clearance and associated decrease of vegetation cover, leading to increased surface runoff and erosion. | C/O | Negative | Local | Short | Medium | Medium | Medium | 1. Construction activities must be restricted to the construction site to minimize the impacts of the construction phase on the wetland area. | Low |
| 2. Degradation, destruction and fragmentation of portions of sensitive habitats, if construction work or waste material is allowed to penetrate these habitats. | C | Negative | Local | Long | Medium | Medium | Medium | 1. No construction activity should be undertaken within sensitive habitats such as wetlands. 2. Sensitive areas must be clearly demarcated and regarded as a 'no-go' area. 3. Areas to be developed should be demarcated so that during the construction phase, only the demarcated areas be impacted upon and preventing movement of workers into sensitive surrounding environments. | Low |

5.2.6.2 Ecological characteristics

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|---|-------|----------|--------|-----------|-----------|-------------|--------|--|-----|
| 1. Introduction of pest species as a result of the increase in waste and new habitats that are created in the area. | C/O | Negative | Local | Permanent | Medium | High | Medium | 1. Promptly remove all alien and invasive plant species that may emerge during construction (i.e. weedy annuals and other alien forbs) 2. Limit soil disturbance 3. The use of herbicides is not recommended in or near wetlands (opt for mechanical removal). 4. Appropriately stockpile topsoil cleared from the transmission line footprint. 5. Minimize unnecessary clearing of vegetation beyond the infrastructure footprints. | Low |

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|---|-----|----------|-------|-------|--------|------|--------|---|--------|
| <p>2. Spilling of hazardous chemicals and stormwater runoff into the surrounding habitats and sensitive areas</p> | C/O | Negative | Local | Long | High | High | Medium | <ol style="list-style-type: none"> 1. Make sure all excess consumables and building materials / rubble is removed from site and deposited at an appropriate waste facility. 2. Appropriately contain any generator diesel storage tanks, machinery spills (e.g. accidental spills of hydrocarbons oils, diesel etc.) or construction materials on site (e.g. concrete) in such a way as to prevent them leaking and entering the wetlands. 3. Mixing of concrete should not take place within the wetlands. 4. Check for oil leaks, keep a tidy operation, and promptly clean up any spills or litter. 5. Provide appropriate sanitation facilities for workers during construction and service them regularly. 6. The contractor should supply sealable and properly marked domestic waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility; 7. The contractor must be in possession of an emergency spill kit that must be complete and available at all times on site. 8. Any possible contamination of topsoil by hydrocarbons must be avoided. Any contaminated soil must be treated in-situ or be placed in containers and removed from the site for disposal in a licensed facility;. | Medium |
| <p>3. Impact on surrounding vegetation during construction (e.g. collection of firewood, veld fires, etc.)</p> | C | Negative | Local | Short | Medium | Low | Low | <ol style="list-style-type: none"> 1. No harvesting of firewood from the site or from the areas adjacent to it. 2. Under no circumstances are the staff allowed to start a fire. | Low |
| <p>4. Development impacts on the wetland area may influence the functioning of the wetland system.</p> | C | Negative | Local | Long | High | High | Medium | <ol style="list-style-type: none"> 1. Keep all disturbances, clearance and developments outside of the identified wetland areas and associated buffers (15 m buffer on HGM 1 and 22 m buffer on HGM 2). 2. Demarcate and signpost these wetland areas as an environmentally sensitive keep all construction activities out. 3. Attempt to complete the bulk of earthmoving activities during winter when flow volumes are lowest. Construction activities near wetlands can become messy following high rainfall events, damaging the wetland and increasing | Low |

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| | | | | | | | | | sediment loads through vehicles getting stuck and general poaching of the soils. | |
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5.2.6.3 Soil characteristics and geology

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|--|-------|----------|--------|----------|-----------|-----------------|--------|--|-----|
| 1. Soil erosion | O | Negative | Local | Long | Medium | Moderately High | Medium | <ol style="list-style-type: none"> Keep scraping / excavation in the footprint area to a minimum and keep soil heaps neat and tidy. Place soil heaps and concrete on western side of project area. Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. Scrape the area where mixing and storage of sand and concrete occurred to clean and re-grass once finished. | Low |
| 2. Soil pollution (cement powder, diesel, oil etc.) during construction. | C | Negative | Site | Short | Medium | Medium | Medium | <ol style="list-style-type: none"> Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site. No dumping of construction material on-site may take place. | Low |
| 3. Dust pollution due to exposure to loose soils. | C | Negative | Site | Short | Low | Medium | Medium | <ol style="list-style-type: none"> Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil. | Low |
| 4. Soil stockpiles that are left unattended during construction. | C | Negative | Site | Short | Medium | Medium | Medium | <ol style="list-style-type: none"> All removed soil and material must not be stockpiled within the watercourse and buffer. Stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds. | Low |

5.2.6.4 Ground and surface water

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|-----------------------------|-------|----------|--------|----------|-----------|-------------|--------|--|-----|
| 1. Increase in water inputs | C/O | Negative | Local | C/O | High | Medium | Medium | <ol style="list-style-type: none"> Ensure that leaks are promptly fixed to avoid artificially increasing inputs to and the potential for erosion within the Hillslope Seep. | Low |

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|--|-----|----------|-------|-------|--------|--------|--------|---|-----|
| <p>2. Nutrient enrichment of wetlands with organic wastes due to inappropriate sewer and greywater management.</p> | C | Negative | Local | Short | Medium | Medium | Medium | <ol style="list-style-type: none"> 1. It is assumed that the development will make use of the municipal sewer system. 2. If not, and instead a conservancy tank is planned to be installed then this risk rating will need to be revised. 3. Ensure that all blockages in drains are promptly fixed. 4. Ensure that all sewerage is contained on site and not allowed to flow, whether by accidental spill / blockage or any 'other means into the nearby wetlands. If a leak does occur it must be reported to DWS. 5. Do not discharge any liquids particularly grey or sewerage water into the wetlands unless treated to acceptable standards and approved by the relevant authorities at DWS. | Low |
| <p>3. Water quality impacts (sedimentation and turbidity) on wetland system</p> | C/O | Negative | Local | Long | Medium | Medium | Medium | <ol style="list-style-type: none"> 1. Place soil heaps and concrete on western side of project area. 2. Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash. 3. Mixing of concrete should not take place within the identified wetlands. 4. Scrape the area where mixing and storage of sand and concrete occurred to clean and re-grass once finished. 5. Do not situate any of the construction material laydown areas within any wetland. 6. No machinery should be allowed to parked overnight in the wetlands | Low |

5.2.6.5 Archaeological, historical and cultural significance

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|---|-------|----------|--------|----------|-----------|-------------|-----|---|-----|
| <p>1. Impact on sites with valuable archaeological, history and cultural significance</p> | C | Negative | Site | Short | Minor | Low | Low | <ol style="list-style-type: none"> 1. Should any archaeological artifacts be exposed during excavation, work on the area where the artifacts were found, shall cease immediately and the ECO and SAHRA should be notified as soon as possible. | Low |

5.2.6.6 Socio-economic impacts

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|---|-------|----------|--------|----------|-----------|-------------|--------|------------------------|-------------------|
| 1. Direct employment creation, including construction workers, architects, draughtsmen, land surveyors, plumbers, electricians etc. | C | Positive | Local | Short | Minor | High | Medium | No mitigation required | Medium (Positive) |
| 2. Indirect job creation (e.g. building suppliers) and induced job creation (broader local economy). | C/O | Positive | Local | Short | Minor | High | Medium | No mitigation required | Medium (positive) |
| 3. Job creation during operation phase (domestic workers, maintenance, etc.). | O | Positive | Local | Long | Minor | Medium | Medium | No mitigation required | Medium (positive) |

5.2.6.7 Safety and Security

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|--|-------|----------|--------|----------|-----------|-------------|--------|--|-----|
| 1. The construction phase of the proposed development may result in an increased security risk to adjacent properties and the residents thereof. | C | Negative | Local | Short | Medium | Low | Medium | 1. Staff should be informed that access to adjacent properties is strictly off-limits and that it will be deemed a serious offence (i.e. no fences should be jumped at any time and no gates are to be opened without permission from the relevant landowner). | Low |
| 2. Construction activities on the proposed development may pose various risks to workers safety. | C | Negative | Local | Short | Medium | Medium | Medium | 1. The site and crew are to be managed in strict accordance with the Occupational Health and Safety Act, 1993 (Act No.85 of 1993) and the National Building Regulations. | Low |

5.2.6.8 Engineering Services

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|--|-------|----------|--------|-----------|-----------|-------------|--------|--|-----|
| 1. Capacity of road network to handle additional traffic generated from the proposed development. | C/O | Negative | Local | Permanent | High | High | Low | 1. It must be ensured that a backlog of traffic does not develop at access points during peak hours, through the implementation of an efficient and effective access control system. | Low |
| 2. Possibility of increased number of road accidents due to increased traffic volumes. Accident risk may be highest at | C/O | Negative | Local | Long | Medium | Medium | Medium | 1. Employ people to help alert oncoming traffic and regulate the traffic during construction hours so that residents and visitors know about the construction taking place. | Low |

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| the point where the site is accessed from. | | | | | | | | | 2. The transportation of infrastructure should be limited, and equipment should be stored on site, thus mitigating the number of trips. | |
| 3. The area will be covered with impermeable surfaces (paving, roofs, parking areas), leading to an increase in stormwater volume and intensification of stormwater peak flow. | C/O | Negative | Local | Permanent | Medium | Medium | Medium | | 1. A Stormwater Management Plan will be prepared. The Plan will be included as part of the EMPr wherein conditions will be provided for the proposed development with regards to run-off and stormwater management. | Low |
| 4. Increased soil erosion due to increased quantity and flood peak intensity of stormwater flow, most significantly at stormwater outlets. | C/O | Negative | Site | Long | Medium | Medium | Medium | | 1. A Stormwater Management Plan will be prepared. The Plan will be included as part of the EMPr wherein conditions will be provided for the proposed development with regards to run-off and stormwater management | Low |

5.2.6.9 Potential Environmental Impacts

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation | WM |
|--|-------|-----------------------|--------|----------|-----------|-------------|--------|---|-----|
| 1. Increase in air pollution (dust) during construction (e.g. construction vehicles, excavation, earthworks, burning of waste products etc.). 2. Some phases of construction may cause odours that are detectable over some distance (e.g. burning of plastic containers and bags). 3. Impact on the ambient air quality due to vehicle tailpipe emissions from increased traffic volumes. | C/O | Negative | Local | Short | Medium | High | Medium | 1. Air filters on all mechanized equipment must be properly designed and maintained. 2. Onsite burning of waste is not permitted. 3. A dust suppression programme should be implemented by means of periodic water sprinkling. 4. All industrial activities are subject to operating within the conditions of national legislation, including the National Environmental Management: Air Quality Act No. 39 of 2004. | Low |
| 1. Increase in ambient noise level affecting surrounding properties during construction. | C/O | Negative | Local | Short | Low | High | Medium | 1. Silencers on diesel-powered equipment must be properly designed and maintained. 2. Construction activities should be limited to normal office hours. 3. Adjacent landowners should be notified of extremely noisy activities at least 24 hours prior to such activities commencing. 4. Construction should take place between 07:00- 17:00. Mondays to Fridays. | Low |
| 1. Visual impact of development on landscape ("sense of place"). | C/O | Negative/ Positive | Local | Long | Medium | High | Medium | 1. Ensure that the Architectural design is sympathetic to the surrounding areas. 2. All construction material must be stored in one place out of the direct eyesight of pedestrians. | Low |

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|---|-----|----------|-------|------|--------|------|--------|--|-----|
| | | | | | | | | 3. The Architectural code must be adhered to during construction. | |
| 1. Impact of lighting on surrounding properties, including light trespass and over-illumination. Apart from being a visual impact, over-illumination is also a waste of energy. | C/O | Negative | Local | Long | Medium | High | Medium | <ol style="list-style-type: none"> 1. Avoid shiny metals in structures. If possible shiny metal structures should be darkened or screened to prevent glare. 2. Night-time light sources must be directed away from residential areas. 3. Incorporate measures for visual screening (e.g. using shade cloth) in the EMPr. 4. Avoid construction activities outside of normal working hours. | Low |

5.3 ENVIRONMENTAL IMPACT STATEMENT AND SUMMARY ON NEED AND DESIRABILITY

5.3.1 Environmental Impact Statement

The major environmental impacts, which are likely to result from this development, may be assessed according to the potential impacts of the proposed development on the surrounding land uses. Such impacts therefore include visual, noise, and biophysical impacts. The proposed project may result in short term negative impacts to the wetlands and surrounding landowners; however, these negative impacts are only expected during the construction phase. Whilst these impacts can be rated as significant especially on the watercourses, they can be reduced to an acceptable level provided that the mitigation measures as proposed in this Draft BAR, Wetland Report and EMPr are effectively implemented.

Through the implementation of suitable mitigation measures associated with each of the possible impacts on surrounding land uses the effect thereof can to a large extent be mitigated to acceptable levels. Table 5.1 considers both the advantages and disadvantages of the proposed development.

Table 5.1: Advantages and Disadvantages of the proposed development

| Advantages | Disadvantages |
|---|--|
| The proposed housing development will assist in reducing the housing backlog of the City of Ekurhuleni Metropolitan Municipality. | Possibility of increased runoff into the wetland if proper Storm Water Management is not in place. |
| The proposed development will assist in reducing the establishment of informal settlements within the Municipality through the provision of affordable housing opportunities. | |
| Basic services such as water and sanitation will be provided. | |
| The Brakpan CBD is relatively closed to the proposed development for those individuals working in the CBD. | |
| Employment opportunities during the construction phase. | |
| Optimal development on the site will reduce security risks and prevent illegal dumping. | |

5.3.2 Need and Desirability

The need and desirability for the Brakpan North Extension 12 Housing Development is evident in the City of Ekurhuleni IDP whereby Brakpan has been identified as an area for housing development. Furthermore, the proposed development is aligned with the City’s IDP as one of the strategic objectives of the IDP is to promote integrated human settlements through massive infrastructure and services roll out. The implementation of the housing development will reduce the housing backlog within the municipality as the proposed land for development can include approximately 564 residential units. Apart from reducing the housing backlog, the proposed development will enable the provision of water networks and proper sanitation infrastructure. By providing water and sanitation services to the proposed housing development, it will indirectly assist in reducing surface water and groundwater pollution.

Table 5.2 below was adapted from the 2014 BAR Template of the Department of Environmental Affairs. This table was inserted to motivate for the need and desirability of the proposed development.

Table 5.2: Need and Desirability

| | | |
|--|-----|----|
| 1. Is the activity permitted in terms of the property’s existing land use rights? | | NO |
| The property is currently zoned as “Agriculture” as per the City of Ekurhuleni Town Planning Scheme, 2014 and will therefore be rezoned to Residential to accommodate the high-density housing development. | | |
| 2. Will the activity be in line with the following? | | |
| (a) Provincial Spatial Development Framework (PSDF) | YES | |
| The proposed development addresses two spatial principles, namely the Principal of Sustainable Communities and the Principal of Spatial Concentration. The proposed development will provide subsidised housing units which will include municipal services such as water and sanitation. Furthermore, the proposed development lies in close proximity to the Brakpan CBD which means that individuals can seek employment in the CBD or surrounding areas. | | |
| (b) Urban edge / Edge of Built environment for the area | YES | |
| The site form part of the City of Ekurhuleni Town Planning Scheme, 2014. | | |

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| <p>(c) Integrated Development Plan (IDP) and Spatial Development Framework (SDF) of the Local Municipality (e.g. would the approval of this application compromise the integrity of the existing approved and credible municipal IDP and SDF?).</p> | <p>YES</p> | |
| <p>The proposed housing project is in line with the City of Ekurhuleni IDP, as it has been included as one of the City's Housing Projects. The City's RSDF identifies Brakpan as an urban node which is in need of maintenance and upgrade. The proposed development will therefore not compromise the integrity of the IDP and SDF but would rather enhance the objectives of the policies.</p> | | |
| <p>(d) Approved Structure Plan of the Municipality</p> | | <p>To be determined</p> |
| <p>(e) An Environmental Management Framework (EMF) adopted by the Department (e.g. Would the approval of this application compromise the integrity of the existing environmental management priorities for the area and if so, can it be justified in terms of sustainability considerations?)</p> | | <p>To be confirmed</p> |
| <p>(f) Any other Plans (e.g. Guide Plan)</p> | <p>YES</p> | |
| <p>Please refer to the specialist studies undertaken for the proposed development.</p> | | |
| <p>3. Is the land use (associated with the activity being applied for) considered within the timeframe intended by the existing approved SDF agreed to by the relevant environmental authority (i.e. is the proposed development in line with the projects and programmes identified as priorities within the credible IDP)?</p> | <p>YES</p> | |
| <p>Please see above (2c).</p> | | |
| <p>4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)?</p> | <p>YES</p> | |
| <p>The implementation of the housing development will assist in reducing the establishment of informal settlements and reduce the housing backlog within the City of Ekurhuleni Metropolitan Municipality. The proposed development will also include the construction of water networks and proper sanitation infrastructure.</p> | | |
| <p>5. Are the necessary services with adequate capacity currently available (at the time of application), or must additional capacity be created to cater for the development?</p> | | <p>YES</p> |
| <p>There is existing pipelines within the site, however these may require upgrading.</p> | | |

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|---|------------|-----------|
| <p>6. Is this development provided for in the infrastructure planning of the municipality, and if not what will the implication be on the infrastructure planning of the municipality (priority and placement of services and opportunity costs)?</p> | <p>YES</p> | |
| <p>The municipality has provided for the infrastructure planning of the development as it has been identified in the Municipal IDP. The Department of Human Settlements will be responsible for the construction of the subsidised housing units.</p> | | |
| | | |
| <p>7. Is this project part of a national programme to address an issue of national concern or importance?</p> | <p>YES</p> | |
| <p>Throughout the country, there are many people without proper housing structures and access to basic services. The aim of this development is therefore to reduce the establishments of informal settlements and construct houses that's can be utilised by low income earners.</p> | | |
| | | |
| <p>8. Do location factors favour this land use (associated with the activity applied for) at this place? (This relates to the contextualisation of the proposed land use on this site within its broader context.)</p> | <p>YES</p> | |
| <p>Majority of the land for the proposed development is vacant. All environmentally sensitive areas will be demarcated and included into the development layout. Furthermore, the proposed development will be adjacent to existing housing units. The location of the site to the Brakpan CBD is relatively close, especially for those that will be working in the CBD.</p> | | |
| | | |
| <p>9. Will the benefits of the proposed land use/development outweigh the negative impacts of it?</p> | <p>YES</p> | |
| <p>The purpose of this development is to address the City's housing backlog and need for more houses due to the expanding population and urbanisation.</p> | | |
| | | |
| <p>10. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?</p> | <p>YES</p> | |
| <p>There are many other proposed housing developments in the City.</p> | | |
| | | |
| <p>11. Will any person's rights be negatively affected by the proposed activity/ies?</p> | | <p>NO</p> |
| <p>This development will not infringe on any person's rights, as the proposed development will entail the construction of subsidised housing which can meet the needs of low income earners.</p> | | |
| | | |

12. What will the benefits be to society in general and to the local communities?

- Provision of housing opportunities
- Access to municipal services such as water and sanitation.
- Job creation during the construction phase
- Prevent illegal occupation of the land which will affect the surrounding communities
- Prevention of illegal dumping
- Prevention of informal settlements

6 PUBLIC PARTICIPATION

6.1 REQUIREMENTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS OF 2014 (AS AMENDED)

Table 6.1 below outlines the requirements for the public participation process set out in Section 41 of the Environmental Impact Assessment Regulations as well as the actions that will be taken by the Environmental Assessment Practitioners (EAP).

Table 6.1: Public Participation Process

| 2014 EIA requirements (as amended) | Action taken by EAP |
|--|---|
| <p>a. Fixing a notice board at a place conspicuous to the public at the boundary or on the fence or along the corridor of-</p> <p>i. the site where the activity to which the application relates is or is to be undertaken; and</p> <p>ii. any alternative site;</p> | <p>Notice boards in English will be placed along the site boundary to ensure that it is visible (See Appendix S1 for site notice board).</p> |
| <p>b. Giving written notice, in any of the manners provided for in Section 47D of the Act, to –</p> <p>i. the occupiers of the site and, if the proponent or applicant is not the owner or person in control of the site on which the activity is to be undertaken, the owner or person in control of the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;</p> <p>ii. owners, persons in control of, and occupiers of land adjacent to the site where the activity is or is to be undertaken or to any alternative site where the activity is to be undertaken;</p> <p>iii. the municipal councillor of the ward in which the site or alternative site is situated and any organisation of</p> | <p>A Background Information Document will be distributed to the people living adjacent to the site. A copy of the BID is included in Appendix S2. The BID included some project background details of the Independent Environmental Assessment Practitioner as well as the process to be followed during the EIA. An invitation to become involved in the project and to register as a stakeholder was also included in the Background Information Document.</p> <p>A copy of the Draft BAR will be submitted to the following:</p> <ul style="list-style-type: none"> • Gauteng Department of Agriculture and Rural Development • Department of Water and Sanitation • Department of Transport • City of Ekurhuleni Metropolitan Municipality • Ward Councillor 20 • South African Heritage Resource Agency (SAHRA) |

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| <p>ratepayers that represents the community in the area;</p> <p>iv. the municipality which has jurisdiction in the area;</p> <p>v. any organ of state having jurisdiction in respect of any aspect of the activity; and</p> <p>vi. any other party as required by the competent authority.</p> | |
| <p>c. Placing an advertisement in –</p> <p>i. one local newspaper; or</p> <p>ii. any official Gazette that is published specifically for the purpose of providing public notice of applications or other submissions made in terms of these Regulations; and</p> | <p>An advert will be published in the Brakpan Herald on the 29th of January 2021 (See Appendix S3 for a copy of the Advert).</p> |

6.1.1 Comments received from the Departments and Stakeholders

The comments received from the Department and stakeholders regarding the Draft Basic Assessment Report will be included into the Final BAR, in the form of a Comments and Response Report.

6.1.2 Register of interested and affected parties

According to the Environmental Impact Assessment Regulations of 2014 (as amended), a register of interested and affected parties must be kept during the EIA process. A copy of the register of interested and affected parties will be included into the Final BAR.

7 SUMMARY RECOMMENDATIONS OF EAP

7.1 RECOMMENDATIONS

- Consider altering the design layout to either exclude or shift the two eastern-most two-story housing blocks outside of the identified wetlands and their associated buffers (e.g. to the north and south-west respectively).
- A Water Use Licence will be required.
- A wetland rehabilitation plan may need to be considered.
- A Footprint Level Dolomite Stability Assessment is required to confirm the D2 Designation.

7.2 OPINION OF EAP

It is the opinion of the Environmental Assessment Practitioner that the project can be supported on condition that the Mitigation and Management measures described in Section 5 and in the Draft Environmental Management Programme (EMPr) (**Appendix A**) be strictly adhered to as well as provided that sensitive planning, design and good environmental management be carried out by the proponent during construction.

A variety of mitigation measures have been identified in the Draft EMPr that will serve to mitigate the scale, intensity, duration or significance of the impacts which have a medium to high significance rating. These include guidelines to be applied during the construction phase of the development. The proposed mitigatory measures, if implemented, will reduce the significance of the majority of the identified impacts to "low", and allow for the proposed project to precede with minimal effect to the environment, local community and surrounding land use practices. The recommendations made within Specialist Reports conducted for the proposed project must also be adhered to so as to ensure that the proposed project imposes as minimal an impact as possible.

Any decision regarding the granting of authorization of this activity should also be subject to the implementation of all the management recommendations as contained in the Draft EMPr.

It is the opinion of the EAP that the information contained in the Draft Basic Assessment Report, and the Specialist studies which have been compiled to address specific areas of concern, provided sufficient information to undertake a sound assessment of the proposal and provide an informed recommendation with a sufficient degree of confidence.