

# PROPOSED ENHLALAKAHLE PHASE 2 SUBSIDISED HOUSING DEVELOPMENT

## DRAFT BASIC ASSESSMENT REPORT

Reference Number: DC24/0001/2023



MARCH 2023

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## DOCUMENT CONTROL RECORD

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| <b>Project Title:</b>         | Proposed Enhlalakahle Phase 2 Subsidised Housing Development |                        |              |
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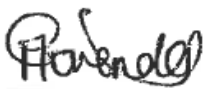
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I, Prisantha Govender declare that this report has been prepared independently of any influence or prejudice as may be specified by the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN DEDTEA). A record will be kept of all comments received from Interested and Affected Parties (I&APs) and will be submitted in the Final Basic Assessment Report to KZN DEDTEA in the form of a Comments and Responses Report.



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Ms. Prisantha Govender  
Registered Environmental Assessment Practitioner  
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March 2023

Date

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K2M Environmental is an established environmental consultancy since 2008. The consultancy has been involved with more than 100 Environmental Impact Assessments and other environmental related projects in KwaZulu Natal, Mpumalanga, Gauteng and the North-West Province over the last 10 years.

### **Independence:**

I, Gert Watson declare that this report has been prepared independently of any influence or prejudice as may be specified by the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN DEDTEA). 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 KZN DEDTEA in the form of a Comments and Responses Report.



---

Mr. Gert Watson  
Registered Environmental Assessment Practitioner  
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K2M Environmental (Pty) Ltd  
Director

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March 2023

Date

## TABLE OF CONTENTS

|          |  |           |
|----------|--|-----------|
| <b>1</b> | <b>BACKGROUND INFORMATION .....</b>  | <b>10</b> |
| 1.1      | INTRODUCTION AND BACKGROUND.....   | 10        |
| 1.2      | ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS.....                           | 13        |
| 1.3      | TERMS OF REFERENCE .....   | 15        |
| 1.4      | APPROACH AND METHODOLOGY.....  | 15        |
| 1.5      | ASSUMPTIONS AND LIMITATIONS .....  | 16        |
| 1.6      | REPORT STRUCTURE .....   | 16        |
| 1.7      | APPLICABLE LEGISLATION, POLICIES AND GUIDELINES .....                      | 19        |
| 1.8      | THE APPLICANT .....  | 20        |
| 1.9      | THE INDEPENDENT ENVIRONMENTAL ASSESSMENT PRACTITIONER.....                 | 20        |
| <b>2</b> | <b>DESCRIPTION OF PROPOSED ACTIVITY.....</b>                               | <b>22</b> |
| 2.1      | PROJECT LOCATION .....   | 22        |
| 2.2      | ZONING OF PROPERTY .....   | 22        |
| 2.3      | ACTIVITY DESCRIPTION.....  | 23        |
| 2.4      | EXISTING AND SURROUNDING LAND USES.....                                    | 26        |
| 2.5      | PHOTOGRAPHIC OVERVIEW OF THE SITE.....                                     | 27        |
| 2.6      | PROJECT PHASING AND CONSTRUCTION PROGRAM .....                             | 28        |
| 2.7      | CONSIDERATION OF ALTERNATIVES .....  | 28        |
| <b>3</b> | <b>SITUATION ASSESSMENT OF PROJECT AREA AND AFFECTED ENVIRONMENT .....</b> | <b>33</b> |
| 3.1      | PHYSICAL AND LANDSCAPE CHARACTERISTICS OF THE SITE .....                   | 33        |
| 3.2      | CLIMATE .....  | 33        |
| 3.3      | GEOTECHNICAL ASSESSMENT .....  | 34        |
| 3.4      | VEGETATION OVERVIEW .....  | 36        |
| 3.5      | WETLAND ASSESSMENT .....   | 41        |
| 3.6      | AGRICULTURAL POTENTIAL ASSESSMENT.....                                     | 56        |
| 3.7      | SITES WITH ARCHEOLOGICAL INTEREST.....                                     | 57        |
| 3.8      | SOCIO ECONOMIC IMPACTS .....   | 58        |

|          |  |           |
|----------|--|-----------|
| <b>4</b> | <b>ENGINEERING SERVICES.....</b>   | <b>64</b> |
| 4.1      | BULK AND LINE SERVICES .....   | 64        |
| 4.2      | INTERNAL ENGINEERING SERVICES .....  | 66        |
| 4.3      | STORMWATER MANAGEMENT PLAN .....   | 74        |
| 4.4      | FLOODLINE ASSESSMENT.....  | 78        |
| <b>5</b> | <b>IMPACT ASSESSMENT.....</b>  | <b>79</b> |
| 5.1      | INTRODUCTION.....  | 79        |
| 5.2      | IMPACT ASSESSMENT CRITERIA .....   | 79        |
| 5.3      | ENVIRONMENTAL IMPACT STATEMENT AND SUMMARY ON NEED AND DESIRABILITY .....                  | 91        |
| <b>6</b> | <b>PUBLIC PARTICIPATION .....</b>  | <b>94</b> |
| 6.1      | REQUIREMENTS OF THE ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS OF 2014 (AS AMENDED) ..... | 94        |
| 6.2      | SUBMISSION OF EIA APPLICATION FORM.....  | 95        |
| 6.3      | NEWSPAPER ADVERTISEMENTS AND SITE NOTICES .....  | 95        |
| 6.4      | PUBLIC CONSULTATION MEETING .....  | 95        |
| 6.5      | COMMENTS RECEIVED FROM THE DEPARTMENTS AND STAKEHOLDERS.....                               | 95        |
| 6.6      | REGISTER OF INTERESTED AND AFFECTED PARTIES .....  | 95        |
| 6.7      | DISTRIBUTION OF DRAFT BASIC ASSESSMENT REPORT .....  | 96        |
| <b>7</b> | <b>SUMMARY RECOMMENDATIONS OF EAP.....</b>   | <b>97</b> |
| 7.1      | RECOMMENDATIONS .....  | 97        |
| 7.2      | OPINION OF EAP .....   | 97        |

**FIGURES:**

|   |    |
|---|----|
| Figure 2.1: Proposed Development Layout .....   | 25 |
| Figure 2.2: Existing situation on the site and surrounding areas .....  | 27 |
| Figure 3.1: Slope Analysis.....   | 33 |
| Figure 3.2: Spider Diagrams illustrating the ecosystem services provided by the valley bottom wetlands and the floodplain within the 500m regulated area .....  | 45 |
| Figure 3.3: The impacts affecting the wetland health scores within the 500m regulated area. A: Cleared areas, B: Erosion, C: Developed areas increasing runoff, D: Alien vegetation, E: Eucalyptus plantations, F: Crossing structures..... | 46 |
| Figure 3.4: Age Profile .....   | 59 |
| Figure 3.5: Gender Profile.....   | 59 |
| Figure 3.6: Housing Profile .....   | 60 |
| Figure 3.7: Household Income .....  | 60 |

|   |    |
|---|----|
| Figure 3.8: Access to Piped Water .....             | 61 |
| Figure 3.9: Access to Sanitation .....              | 62 |
| Figure 3.10: Access to Waste Removal Services ..... | 63 |
| Figure 4.1: Typical Treatment Line .....            | 65 |
| Figure 4.2: Typical Treatment Process.....          | 65 |
| Figure 4.5: 1:100 Year Floodline .....              | 78 |

**TABLES:**

|   |    |
|---|----|
| Table 1.1: Triggered EIA Listed Activities.....                                       | 14 |
| Table 1.2: 2014 EIA Requirements for the Basic Assessment Report .....                | 16 |
| Table 1.3: Applicable Legislation .....   | 19 |
| Table 2.1: Co- ordinates of the projects area .....                                   | 22 |
| Table 2.2: Surveyor General Code .....  | 22 |
| Table 2.3: Propose Land Uses .....  | 24 |
| Table 2.4: Advantages and Disadvantages of Development Layouts.....                   | 29 |
| Table 3.1: Summary of the scores for HGM 1 PES (channelled valley bottom) .....       | 46 |
| Table 3.2: Summary of the scores for the HGM 2 PES (unchannelled valley bottom) ..... | 47 |
| Table 3.3: Summary of the scores for HGM 3 PES (floodplain) .....                     | 47 |
| Table 3.4: EIS results for the delineated HGM Units .....                             | 47 |
| Table 3.5: Pre-mitigation buffer requirement.....                                     | 48 |
| Table 3.6: Post-mitigation buffer requirements.....                                   | 48 |
| Table 3.7: DWS Risk Impact Matrix for the proposed development .....                  | 50 |
| Table 3.8: DWS Risk Impact Matrix for the proposed development (continued) .....      | 51 |
| Table 3.9: DWS Risk Impact Matrix for the proposed development (continued) .....      | 52 |
| Table 3.10: DWS Risk Impact Matrix for the proposed development (continued) .....     | 53 |
| Table 4.1: Sanitation Flow Units.....   | 67 |
| Table 4.2: Sanitation Design Guidelines .....   | 67 |
| Table 4.3: System Demand .....  | 68 |
| Table 4.4: Water Supply Unit Demands .....  | 70 |
| Table 4.5: Water Design Guidelines .....  | 71 |
| Table 4.6: Annual Average Daily Demand (AADD) – Residential Units.....                | 72 |
| Table 4.7: Annual Average Daily Demand (AADD) – Non-residential Land Uses .....       | 72 |
| Table 4.8: Length of internal road network.....                                       | 74 |
| Table 4.9: Proposed Stormwater Drainage Design Standards .....                        | 75 |
| Table 5.1: Advantages and Disadvantages of the proposed development .....             | 91 |
| Table 5.2: Need and Desirability .....  | 92 |

**MAPS:**

|  |    |
|--|----|
| Map 1.1: Project Area .....  | 11 |
| Map 1.2: Phase 1 Housing Project in relation to the proposed eNhlalakahle Housing Development Area ..... | 12 |
| Map 2.1: Environmentally sensitive area with preferred development layout .....                          | 26 |
| Map 3.1: NFEPA Wetlands within the 500m regulated area.....  | 41 |
| Map 3.2: Delineated Wetlands .....   | 43 |
| Map 3.3: Extent of pipelines within wetlands and wetland buffers .....                                   | 49 |
| Map 4.1: Proposed Sewer Reticulation .....   | 69 |
| Map 4.2: Proposed Internal Water Reticulation .....  | 73 |
| Map 4.3: Proposed and Existing Stormwater Infrastructure (Post Development) .....                        | 77 |

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## **LIST OF APPENDIXES:**

|              |   |
|--------------|---|
| Appendix A:  | Draft Environmental Management Programme                            |
| Appendix B1: | Locality Map  |
| Appendix B2: | Location and co-ordinates of structures within 32m of a watercourse |
| Appendix C1: | Application Form  |
| Appendix C2: | DEDTEA Acknowledgement Letter                                       |
| Appendix D1: | Preferred Development Layout  |
| Appendix D2: | Alternative Layout 1  |
| Appendix D3: | Alternative Layout 2  |
| Appendix E:  | Environmental Sensitivities overlaid by Development Layout Map      |
| Appendix F:  | AMAFA Interim Comments  |
| Appendix G1: | Geotechnical Report   |
| Appendix G2: | Wetland Assessment Report   |
| Appendix G3: | Agricultural Potential Assessment Report                            |
| Appendix G4: | Heritage Impact Assessment Report                                   |
| Appendix H1: | Engineering Design Report   |
| Appendix H2: | Stormwater Management Plan  |
| Appendix H3: | Floodline Assessment Report   |
| Appendix H4: | Letter from uMzinyathi District Municipality                        |
| Appendix I1: | Wording of English and IsiZulu Newspaper Advert                     |
| Appendix I2: | Site Notice Boards (in English and IsiZulu)                         |
| Appendix I3: | Background Information Document (BID)                               |
| Appendix J:  | CV of Prisantha Govender  |
| Appendix K:  | CV of Gert Watson   |

# 1 BACKGROUND INFORMATION

## 1.1 INTRODUCTION AND BACKGROUND

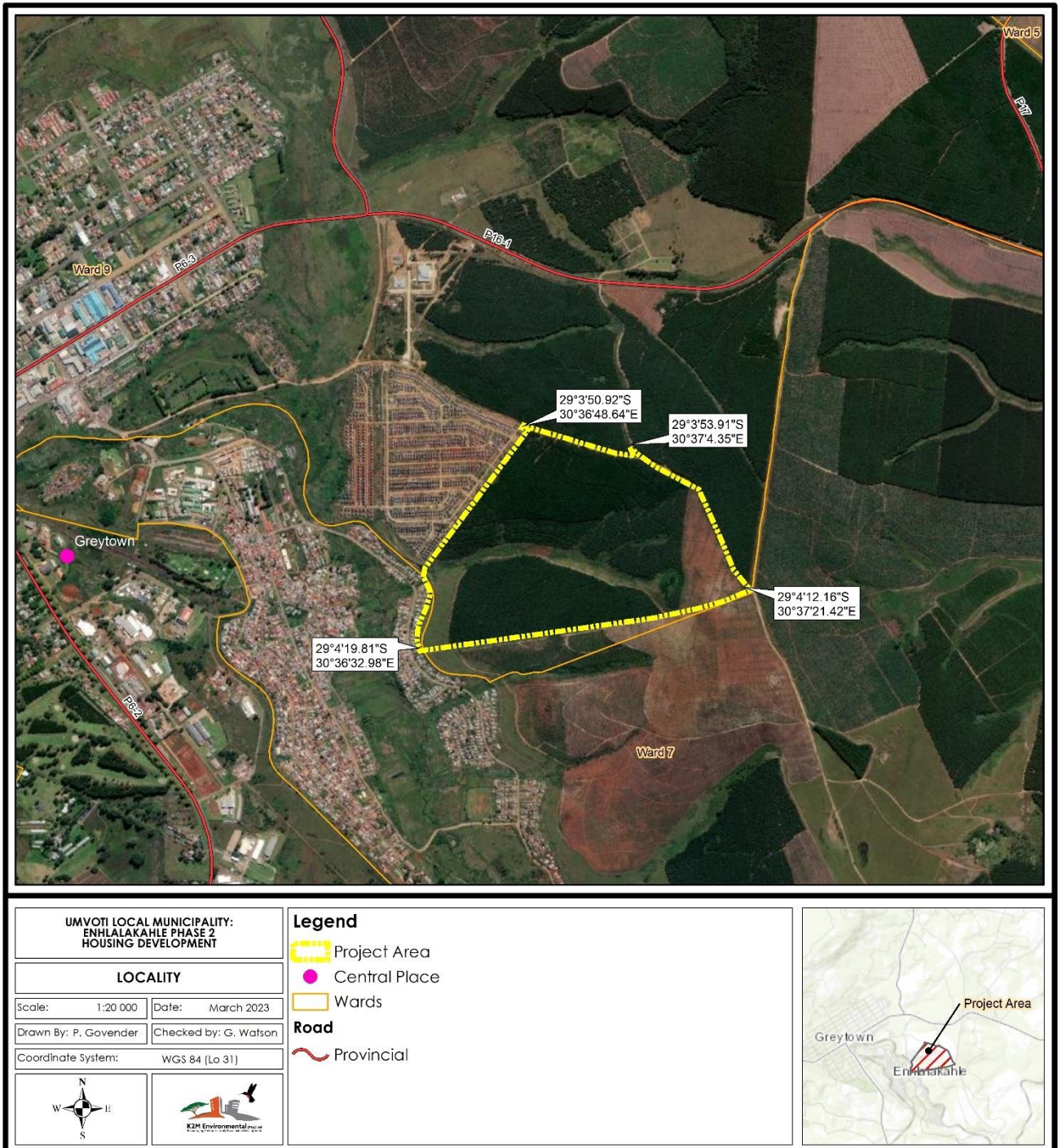
The Umvoti Local Municipality has, through its IDP process and extensive consultation with respective communities residing within the Municipality, identified the need to provide a housing development within its area of jurisdiction. This process was initiated to address the Municipality's housing need due to the growth of the population in the area.

The Umvoti Local Municipality has appointed Bigen Africa as the Project Managers for the proposed eNhlalakahle Phase 2 Subsidised Housing Development which is located within Ward 9 of the Umvoti Local Municipality. Subsequently, Bigen Africa appointed K2M Environmental (Pty) as the independent Environmental Assessment Practitioner (EAP), to undertake the Environmental Impact Assessment for the proposed housing project.

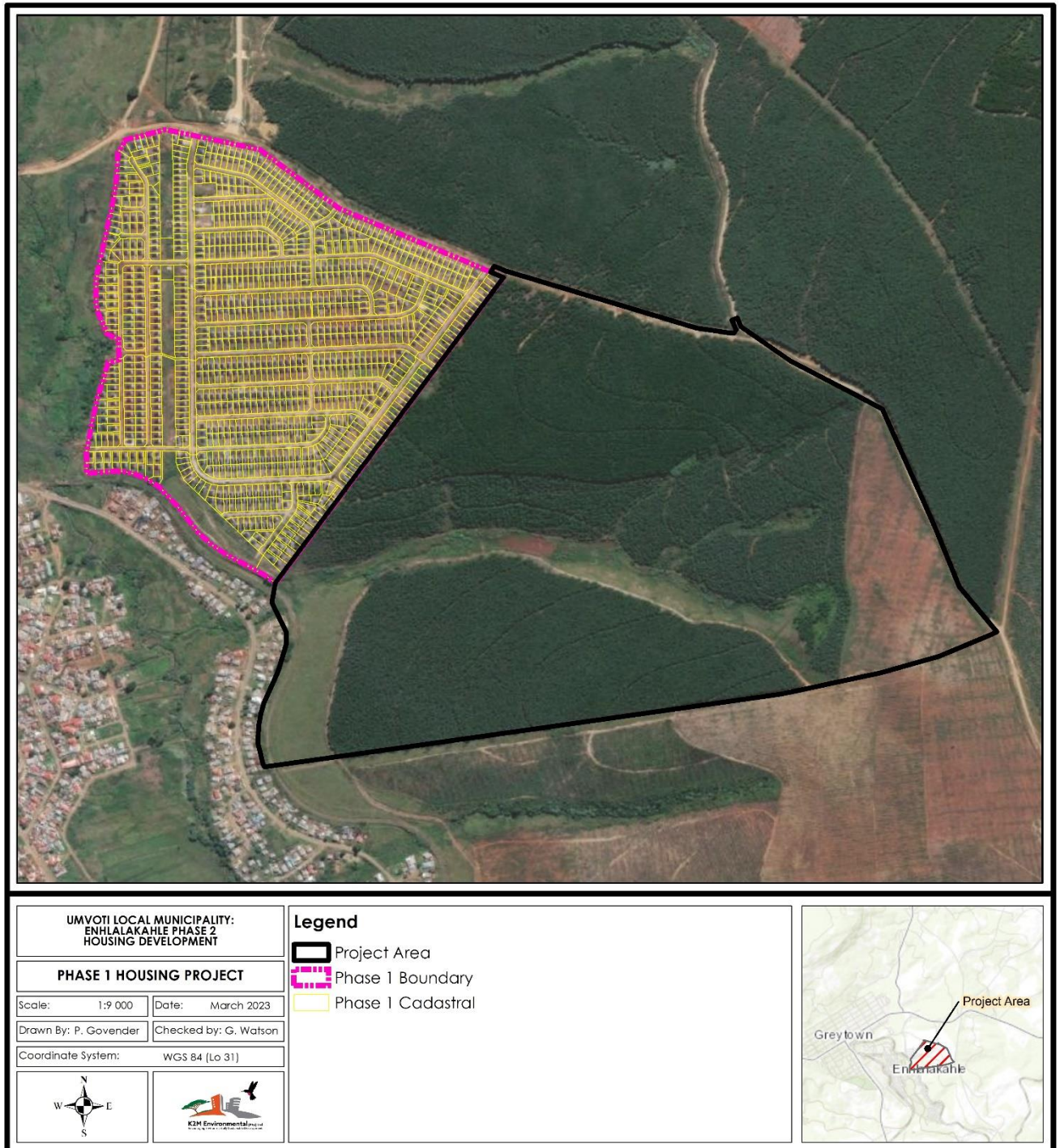
The proposed property, made up of a Portion of the Remainder of Erf 1455 of Greytown, is currently under the ownership of the Umvoti Local Municipality. The proposed site has a total extent of approximately 74 hectares and is situated approximately 1.5km east of Greytown. The project area is currently covered by dense tree plantations with a valley bottom wetland that runs through the site from the west. The land was leased to Mondi for a timber plantation; however, Mondi will remove the timber trees to accommodate the proposed housing project. It should also be noted that there is a housing project (Phase 1) taking place to the west of the proposed site (see Map 1.2 below).

The locality map of the project area in relation to the Municipal Wards is illustrated in Map 1.1 below and is attached as **Appendix B1**.

**Map 1.1: Project Area**



**Map 1.2: Phase 1 Housing Project in relation to the proposed eNhlalakahle Housing Development Area**



The proposed development will entail the removal of vegetation for the purpose of constructing the following:

- **778 BNG Housing Units**

BNG Housing is government subsidy housing that will be built by the government and given to qualifying beneficiaries (low -income families earning less than R3 500).

- **Pipelines for the transportation of water supply and construction of a 35kl elevated water storage tank**

Due to the position of the proposed development, some areas in the eastern section of the site lies higher than the existing 5Ml concrete reservoir. It is therefore proposed that a 35kl elevated storage tank be constructed on the most north-eastern stand (proposed land use is Municipal on the Development Layout Plan (**Appendix D1**)) to supply adequate pressure and water flow. A pump station would also need to be constructed at the existing concrete reservoir site to pump portable water via a 160mm diameter uPVC pipeline to the proposed elevated tank site. The proposed internal water reticulation network will consist of 75mm diameter pipelines with a length of 4 388.11m, 160mm diameter pipelines with a length of 3 815.81m, 200mm diameter pipelines with a length of 986.95m and 250mm diameter pipelines with a length of 14.490m. Pipelines will be located within the road reserve.

- **Pipelines for the transportation of waterborne sewage and construction of an on-site wastewater package treatment plant**

The uMzinyathi District Municipality has indicated that the existing Umvoti Wastewater Treatment Works has reached maximum treatment capacity and cannot accommodate any further effluent inflow (see Letter from District attached as **Appendix H4**). As such, a wastewater package treatment plant is proposed to be constructed as part of the development. The capacity of the proposed wastewater treatment plant will have a daily throughput of 500m<sup>3</sup>/day. The proposed internal sewage reticulation will consist of 160mm and 200mm diameter uPVC pipelines with a total length of 12 861m. Pipelines will be located within the road reserve.

- **Internal roads and stormwater infrastructure**

- Stormwater will be managed and controlled by surface drainage within road reserves. Stormwater drifts will be used to allow water to flow across roads at key points and discharge via channels. Stormwater will be discharged into the natural watercourse, and discharged via the existing 1.8m culvert. The proposed internal stormwater pipelines will have a minimum diameter of 160mm and will be located within the road reserve. The internal road network will have a road reserve ranging between 6-12m and a road width ranging from 3-4m wide.

- **Erven will be set aside for commercial, municipal, place of worship land uses, a creche, a conservation area, public open spaces and a secondary school. It should be noted that recreational field as part of the secondary school will be shared with the community.**

## 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 (KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs (KZN DEDTEA)) for activities listed in Government Notices R324, R325 and R327. Table 1.1 below identifies the activity that has been triggered for the proposed development.

**Table 1.1: Triggered EIA Listed Activities**

| Activity No.             | Description of Activity   | Relevance to Project  |
|--------------------------|---|---|
| Activity 12 of GN.R. 327 | <p>The development of –</p> <ul style="list-style-type: none"> <li>(i) dams or weirs, where the dam or weir, including infrastructure and water surface area, exceeds 100 square metres; or</li> <li>(ii) infrastructure or structures with a physical footprint of 100 square metres or more;</li> </ul> <p>Where such development occurs –</p> <ul style="list-style-type: none"> <li>(a) within a watercourse</li> <li>(b) in front of a development setback; or</li> <li>(c) if no development setback exists, within 32 metres of a watercourse; -</li> </ul> <p>excluding –</p> <ul style="list-style-type: none"> <li>(aa) the development of infrastructure or structures within existing ports or harbours</li> <li>(bb) where such development activities are related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies;</li> <li>(cc) activities listed 14 in Listing Notice 2 of 2014 or activity 14 in Listing Notice 3 of 2014, in which case that activity applies;</li> <li>(dd) where such development occurs within an urban area;</li> <li>(ee) where such development occurs within existing roads, road reserves or railway line reserves; or</li> <li>(ff) the development of temporary infrastructure or structures where such infrastructure or structures will be removed within 6 weeks of the commencement of development and where indigenous vegetation will not be cleared.</li> </ul> | <p>The proposed development will entail the construction of 6 residential units and the onsite wastewater package treatment plant will be constructed within 32m of a watercourse (Refer to <b>Appendix B2</b> for location and list of co-ordinates of these units). Furthermore, the proposed development will entail construction of a sewage pipeline across the valley bottom wetland located within the project area.</p> |
| Activity 27 of GN.R. 327 | <p>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 –</p> <ul style="list-style-type: none"> <li>(i) the undertaking of a linear activity; or</li> <li>(ii) maintenance purposes undertaken in accordance with a maintenance management plan.</li> </ul>   | <p>The proposed development will entail the removal of approximately 1.34 ha of degraded vegetation located within the western portion of the site.</p>   |
| Activity 28 of GN.R. 327 | <p>Residential, mixed, retail, commercial, industrial or institutional developments where such land was used for agriculture, game farming, equestrian purposes or afforestation on or after 01 April 1998 and where such development:</p> <ul style="list-style-type: none"> <li>(i) will occur inside an urban area, where the total land to be developed is bigger than 5 hectares; or</li> <li>(ii) will occur outside an urban area, where the total land to be developed is bigger than 1 hectare;</li> </ul>   | <p>The proposed development entails the construction of residential units on land that was used for agricultural purposes.</p>  |

| Activity No.             | Description of Activity   | Relevance to Project   |
|--------------------------|---|--|
|                          | Excluding where such land has already been developed for residential, mixed, retail, commercial, industrial or institutional purposes.  |  |
| Activity 12 of GN.R. 324 | <p>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.</p> <p><u>d. KwaZulu Natal</u></p> <p>iv. Within any critically endangered or endangered ecosystems listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment, 2004.</p> | The proposed development will entail clearance of 1.34 ha of degraded vegetation that falls under the Midlands Mistbelt Grassland vegetation type which is classified as endangered. |

### 1.3 TERMS OF REFERENCE

Regulation 19 of the Environmental Impact Assessment Regulations of 2014 (as amended) 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) 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 has submitted the completed Application Form for Environmental Authorisation to the KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs (KZN DEDTEA) (see **Appendix C1** for the Application Form). KZN DEDTEA registered the project with Reference Number: **DC24/0001/2023** in their letter dated 09<sup>th</sup> March 2023 (see **Appendix C2** for Letter of Acknowledgement from DEDTEA). This reference number is to be quoted in all correspondence with KZN DEDTEA for ease of reference.

### 1.4 APPROACH AND METHODOLOGY

The overall approach to this assignment included the following activities:

- Apply for Environmental Authorisation to the KZN DEDTEA regarding the proposed Subsidised 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 KZN DEDTEA 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-<br>(i) the EAP who prepared the report; and<br>(ii) the expertise of the EAP, including a curriculum vitae;   | Just after cover page, <b>Appendix J &amp; Appendix K</b> |
| The location of the activity, including:<br>(i) the 21-digit Surveyor General code of each cadastral land parcel;<br>(ii) where available, the physical address and farm name;<br>(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-<br>(i) a linear activity, a description and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or<br>(ii) on land where the property has not been defined, the coordinates within which the activity is to be undertaken;  | Section 2.1 & <b>Appendix D1</b>                          |
| A description of the scope of the proposed activity, including<br>(i) all listed and specified activities triggered and being applied for; and<br>(ii) a description of the activities to be undertaken including associated structures and infrastructure;   | Sections 1.2 & 2.3  |
| A description of the policy and legislative context within which the development is proposed including-<br>(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<br>(ii) how the proposed activity complies with and responds to the legislation and policy context, plans, guidelines, tools frameworks, and instruments;   | Section 1.7   |
| A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location;   | Section 5.3.2   |
| A motivation for the preferred site, activity and technology alternative;   | Section 2.5   |
| A full description of the process followed to reach the proposed preferred alternative within the site, including:<br>(i) details of all the alternatives considered;<br>(ii) details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs;<br>(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;<br>(iv) the environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects;<br>(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-<br>(aa) can be reversed;<br>(bb) may cause irreplaceable loss of resources; and<br>(cc) can be avoided, managed or mitigated;<br>(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;<br>(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;<br>(viii) the possible mitigation measures that could be applied and level of residual risk;<br>(ix) the outcome of the site selection matrix;<br>(x) if no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and | Sections 2.5, 3, 5 & 6.                                   |

| Information Required   | Document Section             |
|--|------------------------------|
| (xi) a concluding statement indicating the preferred alternatives, including preferred location of the activity;   |                              |
| 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-<br>(i) a description of all environmental issues and risks that were identified during the environmental impact assessment process; and<br>(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;                                   | Section 5                    |
| An assessment of each identified potentially significant impact and risk, including-<br>(i) cumulative impacts;<br>(ii) the nature, significance and consequences of the impact and risk;<br>(iii) the extent and duration of the impact and risk;<br>(iv) the probability of the impact and risk occurring;<br>(v) the degree to which the impact and risk can be reversed;<br>(vi) the degree to which the impact and risk may cause irreplaceable loss of resources; and<br>(vii) the degree to which the impact and risk can be avoided, managed or mitigated; | Section 5                    |
| 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-<br>(i) a summary of the key findings of the environmental impact assessment;<br>(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<br>(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 EMP;  | 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:<br>the correctness of the information provided in the reports;<br>(ii) the inclusion of comments and inputs from stakeholders and I&APs;<br>(iii) the inclusion of inputs and recommendations from the specialist reports where relevant; and<br>(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               |

| Information Required  | Document Section |
|---|------------------|
| 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.   |
| KwaZulu-Natal Heritage Act (No. 4 of 1998)   | This Act has been put into place to conserve, protect and conserve heritage resources within KwaZulu Natal. Documentation was submitted to AMAFA for their comment. In their interim comment, AMAFA indicated that a HIA is required for the proposed eNhlalakahle Phase 2 Housing Development. See <b>Appendix F</b> for interim comments from AMAFA and <b>Appendix G4</b> for the HIA Report, respectively. |
| Agricultural Land Act (Act 70 of 1970)   | The land for the proposed development belongs to the Umvoti Local Municipality; therefore, Act 70 of 1970 does not apply to this project.  |
| National Environmental Management: Waste Act (No. 59 of 2008)                            | The overall purpose of the Waste Act is to manage waste in a manner that can protect the health of people as well as the environment (plants, animals, land, air, water etc). The management of waste during the construction phase has been taken into consideration and included into the Environmental Management Programme.  |
| National Environmental Management: Air Quality Act and National Dust Control Regulations | Mitigation measures have been included into the EMPR which provides recommendations on how to manage pollution and dust during the construction phase.   |
| Noise Regulations R2544  | The EMPR provides recommendations on how to manage noise during the construction phase of the proposed development.  |
| National Building Regulations and Building Standards Amendment Act no 45 of 1995         | The purpose of this Act is to provide for the promotion of uniformity in the law relating to the erection of buildings in the areas of jurisdiction of local authorities.  |
| 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.  |

| Legislation   | Relevance to the development  |
|---|---|
| Provincial Growth and Development Plan  | The proposed development is aligned with the PGDP as it addresses the first goal of the PGDP which is that of job creation, which will take place during the construction phase and operational phase.  |
| Polluters Pay Principal   | The Polluters Pay Principal has been included into the preparation the EMPr.  |
| Umvoti Local Municipality Integrated Development Plan (2022/2023 - 2026/2027) | Human settlement provision has been identified as a key challenge in the Umvoti Municipality's IDP. Furthermore, the eNhlalakahle Phase 2 Subsidised Housing Development has been identified in the Municipal IDP as a prioritised planned urban housing project. As such, the proposed development is aligned with the Municipality's IDP as it entails the construction subsidised residential units together with provision of infrastructure for water and sanitation.  |
| Umvoti Local Municipality Spatial Development Framework (2022-2023)           | The proposed eNhlalakahle Housing Development is aligned to the Municipal SDF as it will assist in achieving the objective of sustainable human settlements within the Local Municipality.  |
| Umvoti Local Municipality Housing Sector Plan (2022 - 2027)                   | According to the Municipal Housing Sector Plan, the overall housing backlog within the Municipality in 2022 was 25 538. In addition, the demand for low income housing (BNG units) will be 5 131 by 2027. As such, once construction of the proposed development is completed, it will assist in reducing the municipal housing backlog / demand.<br><br>Furthermore, the eNhlalakahle Phase 2 Subsidised Housing Development has been identified in the Municipal Housing Sector Plan as an urban housing project. |

## 1.8 THE APPLICANT

The details of the applicant are as follows:

Applicant Name : Umvoti Local Municipality  
 Contact Person : Mr Lungelo Chiliza  
 Tel : (033) 413 9208  
 Email : [lungelo.chiliza@umvoti.gov.za](mailto:lungelo.chiliza@umvoti.gov.za)  
 Address : 41 King Dinuzulu Street, Greytown, 3250

## 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 or Ms. Prisantha Govender  
 Telephone: 031 764 6743

Fax: 086 622 7276  
E-mail: [gert@k2m.co.za](mailto:gert@k2m.co.za) / [prisantha@k2m.co.za](mailto:prisantha@k2m.co.za)  
Postal Address: PostNet Suite #509, Private Bag X4, Kloof, 3640

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## 2 DESCRIPTION OF PROPOSED ACTIVITY

### 2.1 PROJECT LOCATION

#### 2.1.1 CO-ORDINATES

Table 2.1 below provides the co-ordinates of the perimeter of the proposed site.

**Table 2.1: Co- ordinates of the projects area**

| Latitude /Longitude | Degrees | Minutes | Seconds |
|---------------------|---------|---------|---------|
| South               | 29°     | 3'      | 50.92'' |
| East                | 30°     | 36'     | 48.64'' |
| South               | 29°     | 3'      | 53.91'' |
| East                | 30°     | 37'     | 4.35''  |
| South               | 29°     | 4'      | 12.16'' |
| East                | 30°     | 37'     | 21.42'' |
| South               | 29°     | 4'      | 19.81'' |
| East                | 30°     | 36'     | 32.98'' |

#### 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 |
|--|-------------------------|
| A Portion of the Remainder of Erf 1455 of Greytown | NOFT01250000145500000   |

### 2.2 ZONING OF PROPERTY

As per the Umvoti Local Municipality's Land Use Management Scheme, the property for the development area is currently zoned as "Agriculture".

## 2.3 ACTIVITY DESCRIPTION

### 2.3.1 EXTENT OF DEVELOPMENT

The total project area is approximately 74 ha in extent with a development footprint of approximately 52.98 ha. The proposed development layout was prepared by K2M Technologies (Pty) Ltd in January 2023.

### 2.3.2 DESCRIPTION OF THE PROPOSED ACTIVITY

The proposed property, made up of a Portion of the Remainder of Erf 1455 of Greytown, is currently under the Umvoti Local Municipality. The proposed site has a total extent of approximately 74 hectares and is situated approximately 1.5km east of Greytown. The project area is currently covered by dense tree plantations with a valley bottom wetland that runs through the site from the west. The land was leased to Mondi for a timber plantation; however, Mondi will remove the timber trees to accommodate the proposed housing project. It should also be noted that there is a housing project (Phase 1) taking place to the west of the proposed site.

The proposed development will entail the removal of vegetation for the purpose of constructing the following:

- **778 BNG Housing Units**

BNG Housing is government subsidy housing that will be built by the government and given to qualifying beneficiaries (low -income families earning less than R3 500).

- **Pipelines for the transportation of water supply and construction of a 35kl elevated storage tank**

Due to portions of the proposed development lying higher than the existing 5Ml concrete reservoir, it is proposed that a 35kl elevated storage tank be constructed to supply adequate pressure and water flow. A pump station would also need to be constructed at the existing concrete reservoir site to pump portable water via a 160mm diameter uPVC pipeline to the proposed elevated tank site. The proposed internal pipelines will have a minimum diameter of approximately 75mm and a maximum diameter of approximately 250mm. The total length of the proposed water pipeline will be approximately 9 205.36m.

- **Pipelines for the transportation of waterborne sewage and construction of an onsite wastewater package treatment plant**

The uMzinyathi District Municipality has indicated that existing Umvoti Wastewater Treatment Works has reached maximum treatment capacity and cannot accommodate any further effluent inflow. As such, a wastewater package treatment plant is proposed to be constructed as part of the development. The capacity of the proposed wastewater treatment plant will have a daily throughput of 500kl/day. The proposed internal sewage pipelines will be uPVC Class 34 pipelines with a diameter ranging from 110mm to 315mm.

- **Internal roads and stormwater infrastructure**

- Stormwater will be managed and controlled by surface drainage within road reserves. Stormwater drifts will be used to allow water to flow across roads at key points and discharge via channels.

Stormwater will be discharged into the natural watercourse and discharged via the existing 1.8m culvert. The proposed internal stormwater pipelines will have a minimum diameter of 160mm and will be located within the road reserve. The internal road network will have a road reserve ranging between 6-12m and a road width ranging from 3-4m wide.

- Erven will be set aside for commercial, municipal, place of worship land uses, a creche, a conservation area, public open spaces and a secondary school. It should be noted that recreational field as part of the secondary school will be shared with the community.

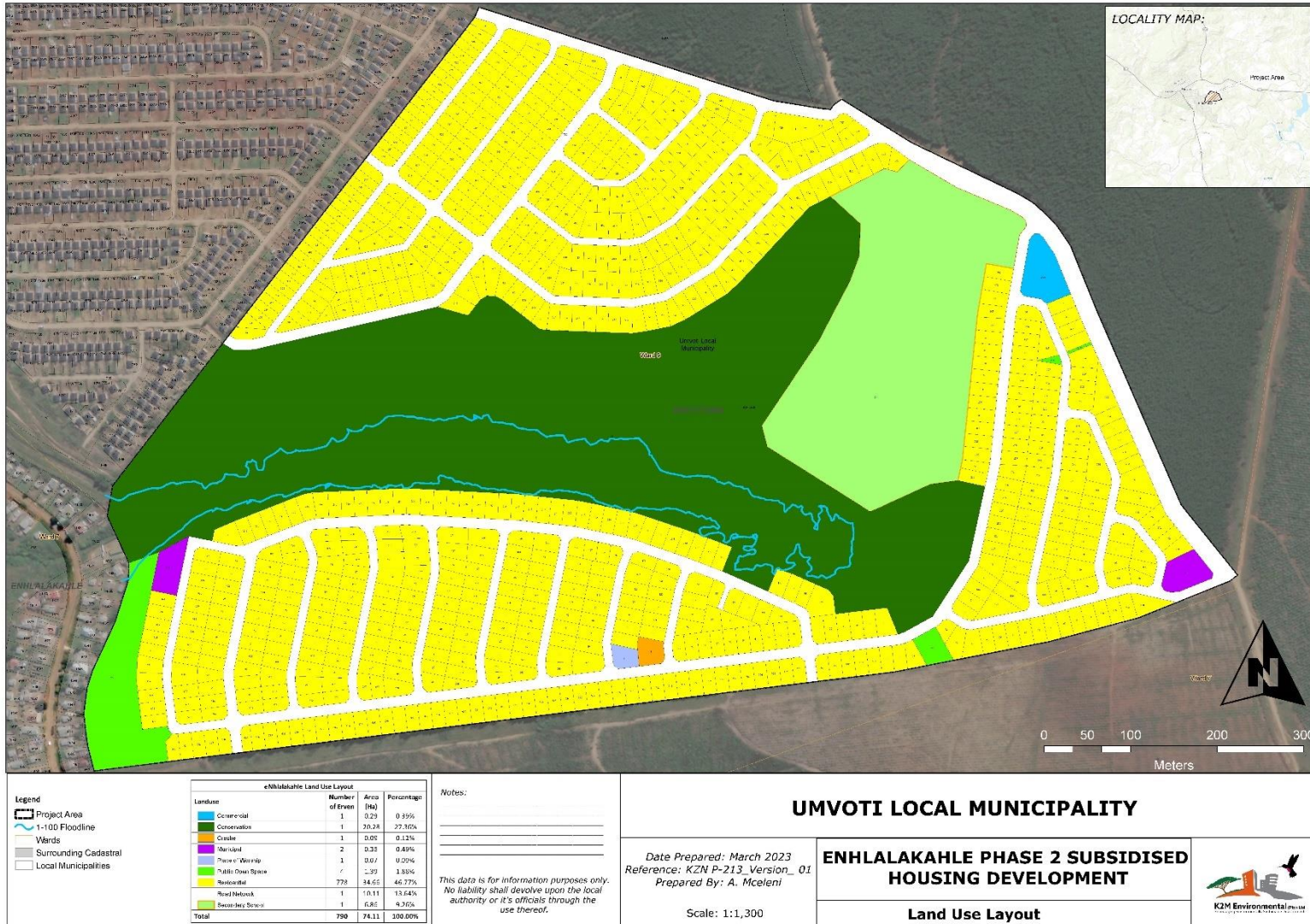
The proposed development layout plan for the eNhlalakahle Phase 2 Subsidised Housing Development was prepared by K2M Technologies (Pty) Ltd in March 2023 and is attached as **Appendix D1** and depicted in Figure 2.1. The area of each of the proposed land uses are tabulated in Table 2.3.

**Table 2.3: Propose Land Uses**

| Land Uses         | Erven      | Area (ha)    | Percentage (%) |
|-------------------|------------|--------------|----------------|
| Commercial        | 1          | 0.29         | 0.39%          |
| Conservation      | 1          | 20.28        | 27.36%         |
| Creche            | 1          | 0.09         | 0.12%          |
| Municipal         | 2          | 0.36         | 0.49%          |
| Place of worship  | 1          | 0.07         | 0.09%          |
| Public open space | 4          | 1.39         | 1.88%          |
| Residential       | 778        | 34.66        | 46.77%         |
| Road Network      | 1          | 10.11        | 13.64%         |
| Secondary School  | 1          | 6.86         | 9.26%          |
| <b>TOTAL</b>      | <b>790</b> | <b>74.11</b> | <b>100.00%</b> |

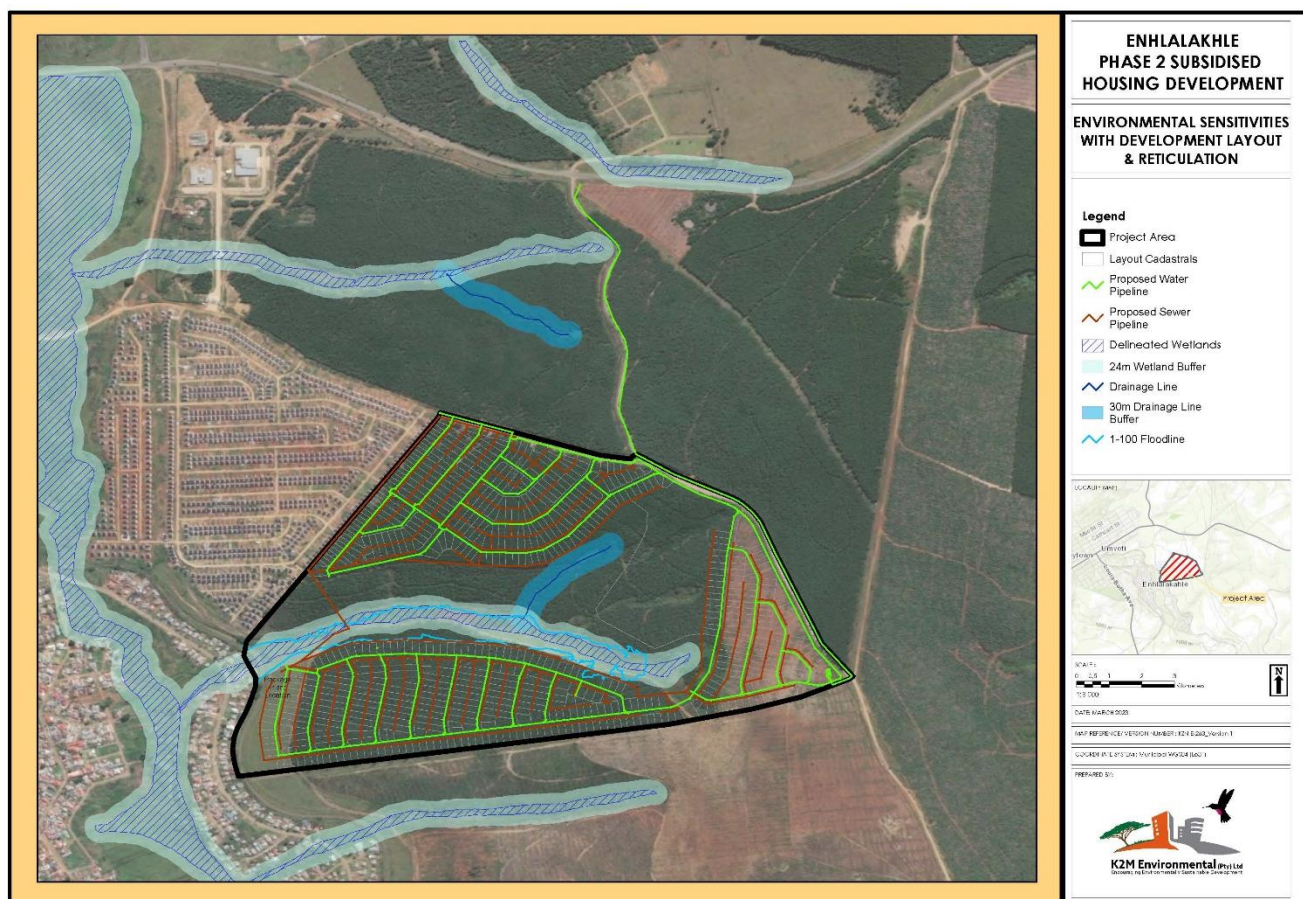


**Map 2.1: Proposed Development Layout**



Map 2.2 below and **Appendix E** illustrates the environmentally sensitive areas within the project area overlain with the development layout plan and proposed water and sanitation pipelines. The environmental sensitive areas has been accommodated within the development layout as conservation. Due to the constraints the municipality is experiencing at the Municipal Sewage Treatment Works, the development will be utilising a sewage package plant on site. As a result of the package plant location the northern portion of the development's effluent will gravitate to the southern most point and then cross the wetland to connect to the package plant.

**Map 2.2: Environmentally sensitive area with preferred development layout**



### 2.3.3 ACCESS TO THE PROPOSED DEVELOPMENT

Travel on the N3 towards Pietermaritzburg. Take Exit 81 for R33 towards Greytown. After approximately 400m, turn right onto Dr Chota Motala Road / M70 and then after 1.3km turn right onto Bhambatha Road / R33. Travel for a further 69.2km and then turn right onto Durban Street / R33 / R74. After approximately 2.9km turn right, after approximately 1.3km, the site will be on the left.

### 2.4 EXISTING AND SURROUNDING LAND USES

As illustrated in Figure 2.1 below, the development area is currently occupied by dense tree plantations with the valley bottom wetland extending from the west through the site. It can also be

seen that tree plantations extends to the northern, eastern and southern surrounding areas of the site whilst the construction of the Phase 1 housing project is taking place to the west of the site.

**Figure 2.1: Existing situation on the site and surrounding areas**

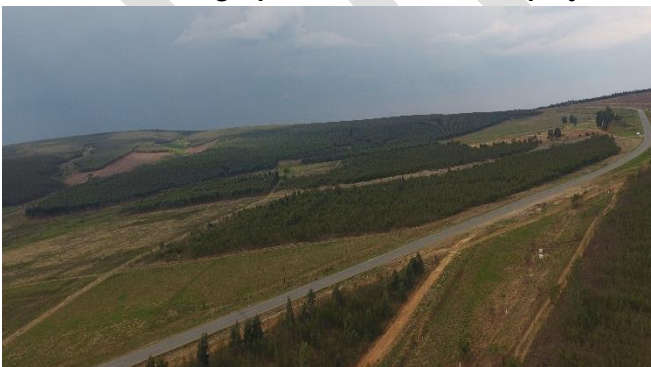


Source: Google Earth Imagery, 2022

## 2.5 PHOTOGRAPHIC OVERVIEW OF THE SITE

The photos below illustrate the proposed project area.

**Photo 2.1: Photographic overview of the project area**





## 2.6 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.

## 2.7 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.

### 2.7.1 ACTIVITY ALTERNATIVES

Due to the high demand for formal housing within the Umvoti Local Municipality, the preferred activity is to provide housing, together with supporting facilities and infrastructure (such as water and sewerage pipelines). Should the preferred activity not be granted, the housing demand will remain high within the Municipality.

Activity alternatives refer to the consideration of alternatives requiring a change in the nature of the proposed activity to be undertaken. One alternative is to leave the site in its current status quo,

however this will lead to the site being vulnerable to illegal occupancy as well as potential encroachment of alien invasive plant species as well as illegal dumping.

## 2.7.2 LOCATION ALTERNATIVES

The location for the proposed housing development was identified by the Applicant (the Umvoti Local Municipality) prior to commencement with the EIA Process. It should be noted that the proposed development is suitable to surrounding the landuse, especially to the west of the site, as the predominant land use in this area is residential.

## 2.7.3 LAYOUT ALTERNATIVES

An initial layout for the proposed eNhlalakahle Phase 2 Subsidised Housing Development was prepared in March 2021 by K2M Technologies (Pty) Ltd. The layout was then amended in July 2022 to increase the number of free-standing BNG units and propose additional land uses. Subsequently, once the 1:100 year floodline was calculated and available, the layout was amended for the second time to remove the residential units proposed within the 1:100 year floodline. The advantages and disadvantages of the Preferred Layout, Alternative Layout 1 and Alternative Layout 2 is provided in the Table below.

**Table 2.4: Advantages and Disadvantages of Development Layouts**

| Layout                                | Advantages   | Disadvantages  |
|---------------------------------------|--|--|
| Preferred Layout<br>(Appendix D1)     | No development is proposed within the 1:100 year floodline.                              | A fewer number of free-standing residential units proposed.                                |
|                                       | More proposed land uses such as education and place of worship and commercial land uses. |  |
| Alternative Layout 1<br>(Appendix D2) |  | No commercial erven have been allocated.   |
|                                       |  | High density residential land use proposed directly adjacent to the valley bottom wetland. |
|                                       |  | A fewer number (325 units) of free-standing residential units proposed.                    |
| Alternative Layout 2<br>(Appendix D3) | A larger number of free-standing residential units proposed.                             | Residential units proposed within the 1:100 year floodline.                                |
|                                       | More proposed land uses such as education and place of worship and commercial land uses. |  |

## 2.7.4 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 Municipality 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.

## 2.7.5 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*.

### 2.7.5.1 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-.

### 2.7.5.2 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/m<sup>2</sup>K). 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.

### 2.7.5.3 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.

#### 2.7.5.4 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 10m<sup>2</sup> 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.

#### 2.7.5.5 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.

#### 2.7.5.6 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.

### 2.7.6 **INFRASTRUCTURE ALTERNATIVES**

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

#### 2.7.6.1 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, which adds to the maintenance cost.

### **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 and On-site Wastewater Package Treatment Plant (Preferred Option)**

Due to the existing WWTW currently operating above its design capacity, a waterborne level of service providing treatment of raw sewage by means of an onsite wastewater package treatment plant is the preferred option. The sewer reticulation from the development will tie into a proposed package treatment plant which will be situated to the southwestern portion of the site (demarcated as Municipal on the preferred development layout plan (**Appendix D1**)). The proposed wastewater package treatment plant will be a Turnkey-Modular Activated Sludge Treatment Plant above ground and will have a capacity of 500m<sup>3</sup>/day (2 x lines – each calculated at 250m<sup>3</sup>). Once the municipal WWTW has been sufficiently upgraded, the onsite package plant will be decommissioned and the effluent will then be piped to the municipal works. Existing municipal infrastructure is available to the southwest of the development.

## **2.7.7 “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 site will be left vulnerable to illegal occupation, dumping and informal housing.
- The will continue to become encroached by alien and invasive plant species

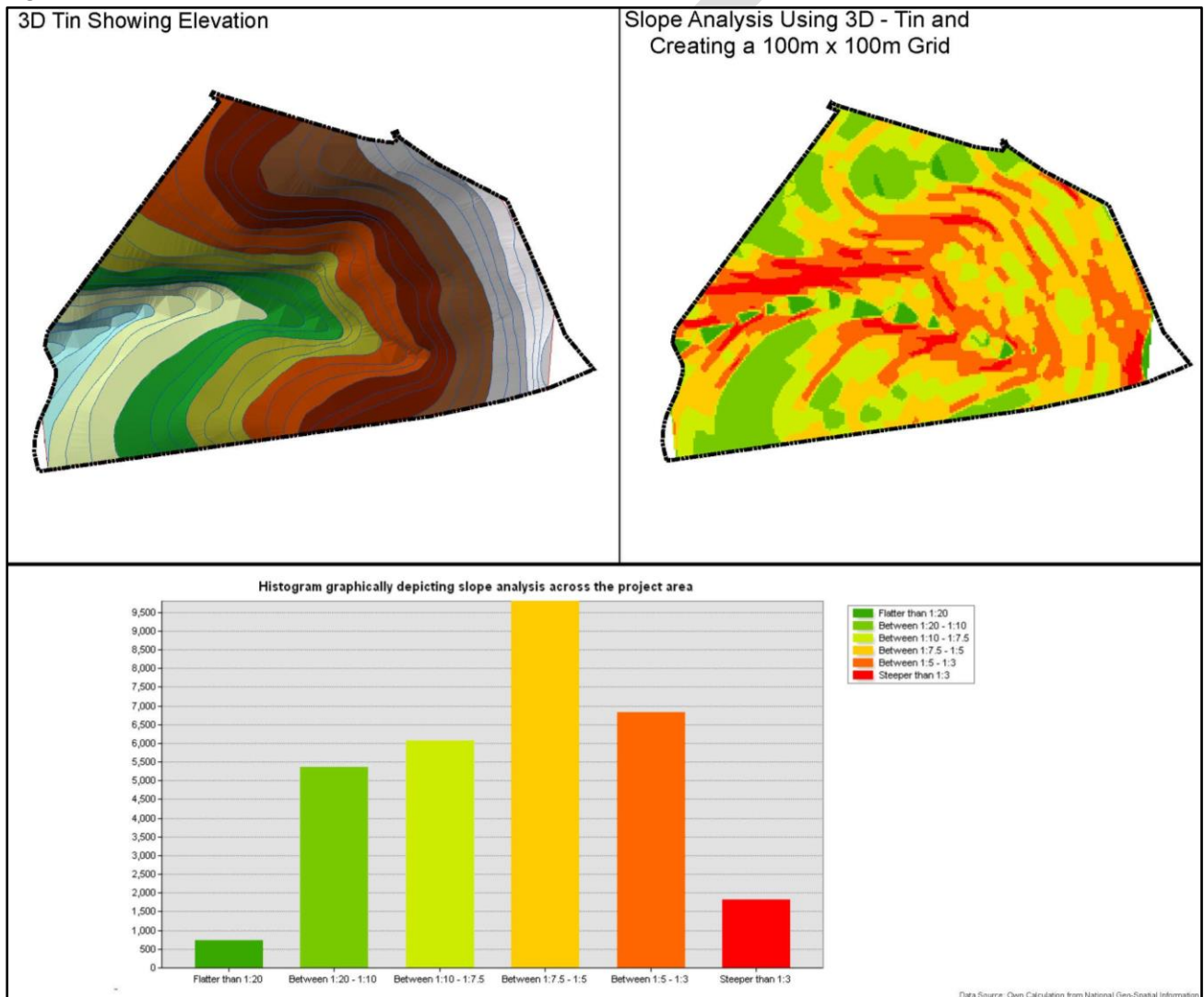


### 3 SITUATION ASSESSMENT OF PROJECT AREA AND AFFECTED ENVIRONMENT

#### 3.1 PHYSICAL AND LANDSCAPE CHARACTERISTICS OF THE SITE

The overall topography of the development area is graphically depicted in Figure 3.1 below. It can be seen that development area has steep slopes (illustrated by red and orange shading) on either side of the channelled valley bottom wetland.

**Figure 3.1: Slope Analysis**



#### 3.2 CLIMATE

This region is characterised by summer rainfall, with MAP of 915 mm, range 730–1 280 mm. Heavy and frequent occurrence of mist provides significant amounts of additional moisture. Some of the rain is in the form of cold frontal activity, mainly in winter, spring and early summer. Thunderstorms are common

in summer and autumn. MAT 15.8°C, absolute minimum temperature was recorded in this region in June (-10.8°C). Further climatic conditions include short-term drought spells, hail and hot north western berg winds occurring particularly in spring and early summer (Wetland Assessment Report, 2019).

### 3.3 GEOTECHNICAL ASSESSMENT

A Geotechnical Investigation was undertaken in January 2019 by Davies, Lynn and Partners and is attached as **Appendix G1**.

#### 3.3.1 SITE GEOLOGY

Weathered Pietermaritzburg Formation Shale bedrock and derived expansive clayey soils are prevalent beneath the major sector of the project area. Intrusions of dolerite in the form of sills or sheets occur beneath the north eastern sector of the study area.

##### 3.3.1.1 Pietermaritzburg Formation

###### Shale Cover

The soil cover comprises an upper, thin colluvium layer typically 0,3m thick overlying expansive silty clays derived from the insitu decomposition of the shale bedrock. The soil cover is typically shallow to moderately deep (approximately 0,5m to 1,5m below e.g.l.) along the convex hillsides. Beneath the hill crests the soil cover seldom exceeds 0,5m in thickness.

###### Shale Bedrock

The shale bedrock comprises a uniform succession of dark grey, laminated silty shales containing occasional indurated bands. Jointing is generally in all azimuths causing the shale to break into slabs or blocks according to joint spacing and bedding. Relatively hard, indurated shale bedrock is exposed on the crests of the high ground in the central southern sector of the site. Highly weathered very soft to soft shale occurs beneath the convex hillside slopes becoming progressively less highly weathered and more competent with depth. The depth to bedrock generally increases beneath the valley head areas and lower slopes.

##### 3.3.1.2 Dolerite

Reddish brown firm to stiff silty clays comprise the residual dolerite soils that underlie the northeastern portions of the site. These soils exhibit poor geotechnical characteristics, with clay fractions typically exceeding 27 percent, linear shrinkage at 9 percent and a plasticity index of 19. Accordingly, the soils are active and subject to cyclical shrinkage and heave related movements in response to moisture fluctuations. As such, allowance is required in the design and construction stages to cater for the anticipated conditions in the clayey soils as outlined above.

##### 3.3.1.3 Subsoil Variance

In general, the derived subsoil cover capping the bedrock is thin to moderately deep, thickening along the convex slopes of the hills and Hillside. Shallow soils occur above the weathered bedrock

on the hilltop and high ground areas. The typical subsoil profile comprises an upper medium to dark brown sandy silty CLAY horizon varying between 0.2m and 0.7m in thickness (colluvium). The majority of the project area tends to be underlain by residual dolerite bedrock and residual reddish brown silty sandy CLAYS.

#### 3.3.1.4 Groundwater Seepage

The Hilltops, Hillsides and Steep Hillsides are generally well drained with an absence of seepage activity, the exception being in an area in the western sector of the site, immediately above the Greytown stream, where perched seepage activity was noted following a period of heavy rainfall.

The groundwater level is controlled in main by the water levels in the Greytown stream and accordingly seepage activity is only anticipated along the valley axes and lower slopes.

Seasonal seepage activity can be expected within the valley bottoms and to lesser extent, within the valley head areas following prolonged rainfall events.

No seepage was recorded in the elevated hilltop regions; however, seepage is anticipated along valley lines and geological contacts across the site.

Groundwater often develops as "perched" or elevated seepage for extended periods along poorly drained concave landforms usually underlain by deeper subsoils such as valley heads and valley bottoms.

In certain instances, saturation may render soil profiles and completely weathered bedrock unstable requiring precautions including shoring, dewatering and/or battering back of the slope faces to prevent collapse.

#### 3.3.1.5 Development Recommendations

- The ease of development across the site is related to the landforms and underlying geology. In general, the areas of development are confined along the main road routes where variable topography occurs as well as hilltop areas. Steeper slopes, valley heads and valley lines provide only moderate development potential requiring more extensive earthworks and more elaborate founding measures.
- Precautions are required during construction in material selection and placement within platforms ensuring optimum moisture levels and compaction densities.
- Earthworks requiring cut to fill platform are likely to be prevalent across much of the area.
- Any potential cut embankment exceeding 2,0m in height should be reported to the Geotechnical Engineer.
- The option of either a stiffened reinforced concrete (RC) raft (preferred) or RC strip footings/ground beam foundation bearing onto intact bedrock to Engineer's design in certain localities is recommended to cater for the range in prevailing subsoil conditions. To counteract the effects of active clays and differential conditions arising on cut to fill platforms, the strategic use of concrete pads is recommended at this site.

- Disposal of stormwater and wastewater by subsoil percolation methods would require specialized design. Adequate stormwater control of the erven should be planned.
- In order to obviate any potential for slope instability at the site a maximum cut height of 2,0m is recommended. Fill heights not exceeding 1,5m are similarly indicated.
- The NHBRC foundation design criteria identified for the various soil types and lithologies across the study area indicate Class S2, C2, H2 and H3 type conditions where use of an intermediate to heavy reinforced Raft foundation type is recommended. In the areas underlain by shallow Shale bedrock a light reinforced Raft foundation is applicable.

## 3.4 VEGETATION OVERVIEW

### 3.4.1 VEGETATION TYPE

The project area falls within the Midlands Mistbelt Grassland vegetation unit. The Midlands Mistbelt Grassland is found in KwaZulu-Natal Midlands—scattered in broad belt in the form of several major patches including Melmoth-Babanango area, Kranskop and Greytown, Howick Lions River, Karkloof, Balgowan, Cedara, Edendale, Hilton, Richmond, the Ixopo-Mooi River Highland Grassland: Patch of Sub-Escarpment Grassland near Mooi River (western KwaZulu-Natal) dominated by grasses such as *Themeda triandra*, *Harpochloa falx*, *Tristachya leucothrix* and *Hyparrhenia hirta* supporting a rich herb flora. Highflats area, Mount Malowe in the Umzimkhulu enclave of the Eastern Cape Province and the Harding-Weza area.

According to Mucina & Rutherford (2006) and the *National Environmental Management: Biodiversity Act (2004)- The Revised National List of Ecosystems that are threatened and in need of protection, 2022*, this vegetation type is classified as Endangered. More than half of this vegetation type is already transformed for plantations, cultivated land or by urban sprawl. Uncontrolled fires and poorly regulated grazing by livestock add to threats to this unique grassland. Some aliens (including *Solanum mauritanum*, species of *Rubus*, *Acacia*, *Pinus* and *Eucalyptus*) are of concern in places. The total extend of the project area is currently an active forestry plantation (Wattle-trees).

### 3.4.2 HISTORICAL BACKGROUND

The series of images below provide an illustration of the proposed site since the year 2005. It can be seen that the proposed site had contained agricultural tree plantations since prior to 2005 (Image 3.1). Between years 2005 and 2010, portions of the trees plantations began to be harvested (Image 3.2). In 2012, the plantation began to grow again (Image 3.3). It can be seen in Image 3.4 that in year 2017, a dense plantation occurred within the project area. Image 3.4 also shows the commencement of the construction phase the Phase 1 housing project located to the north west of the site. In year 2018, the portions of the plantation on site were harvested once again and had grown again by September 2022 (see Images 3.5 and 3.6, respectively).

**Image 3.1: Project Area in year 2005**



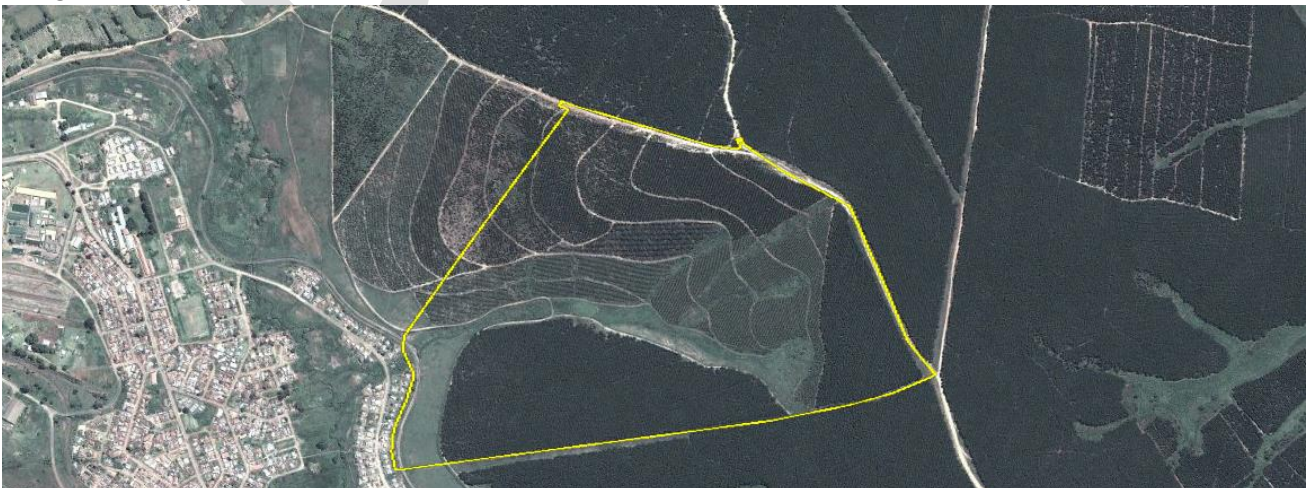
Source: Google Earth Imagery

**Image 3.2: Project Area in year 2010**



Source: Google Earth Imagery

**Image 3.3: Project Area in year 2012**



Source: Google Earth Imagery

**Image 3.4: Project Area in August 2017**



Source: Google Earth Imagery

**Image 3.5: Project Area in May 2018**



Source: Google Earth Imagery

**Image 3.6: Project Area in September 2022**



Source: Google Earth Imagery

Based on the series of historical images below it can be seen that tree plantations were contained on site since before the year 2005. Thus, agricultural plantation was the predominant land use in the history of the site. The images also clearly illustrate the occurrence of the valley bottom wetland within the project area.

### 3.4.3 SITE WALK OVER

A site walk over was undertaken by K2M Environmental in October 2017. The presence of the tree plantations and the valley bottom wetland were observed on site. In addition, vegetation on a portion of the western periphery site was heavily degraded. There was evidence of erosion, footpaths and overgrazing that occurred in this portion of the site. Photos taken during the site walk over are provided below.

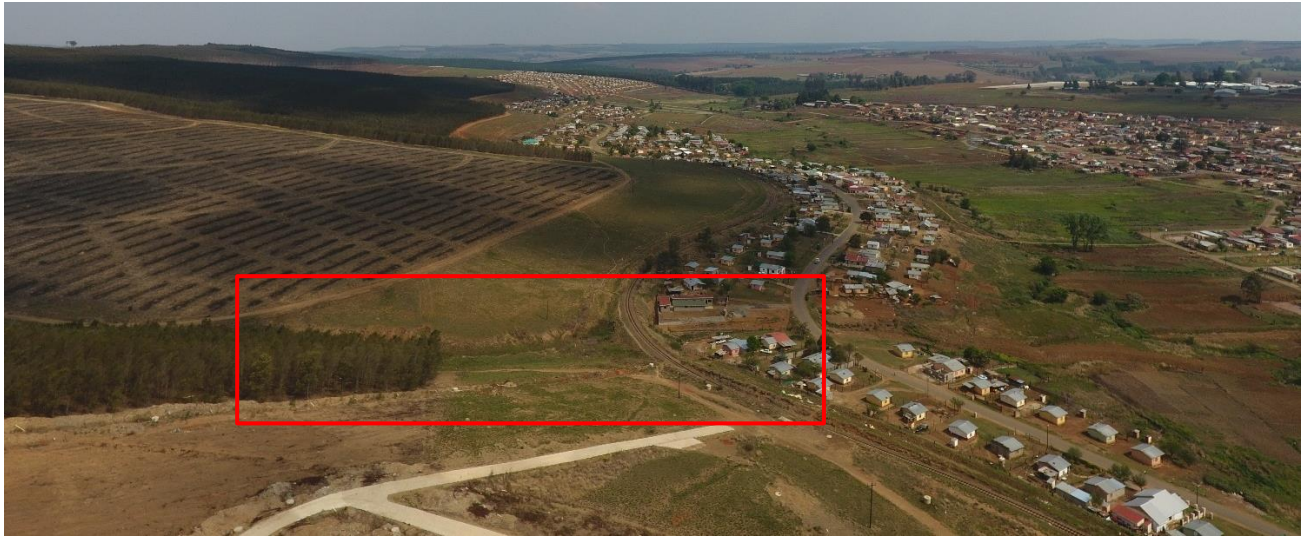
**Photo 3.1: Tree plantation located within a portion of the project area**



**Photo 3.2: Portion of the site that contained footpaths, overgrazing and erosion; and evidence of harvested trees**



**Photo 3.3: Wetland crossing and presence of the valley bottom wetland on the western portion of the site**



**Photo 3.4: Presence of the valley bottom wetland**



### 3.4.4 CONCLUDING REMARKS

From the information discussed above, it is evident that the proposed site was historically and is still extensively utilised for agricultural purposes. Furthermore, as observed during the site walk over, the project area had also experienced disturbances such as erosion, overgrazing and footpaths; causing the vegetation on the periphery of the site to become heavily degraded.

Based on the above, apart from the area that contains the valley bottom wetland, the proposed site shows no evidence of any naturally occurring indigenous vegetation of significance or contains any species of conservation concern. The proposed development will thus only entail the clearance of approximately 1.34 ha of degraded vegetation located within the western portion of the site.



### 3.5 WETLAND ASSESSMENT

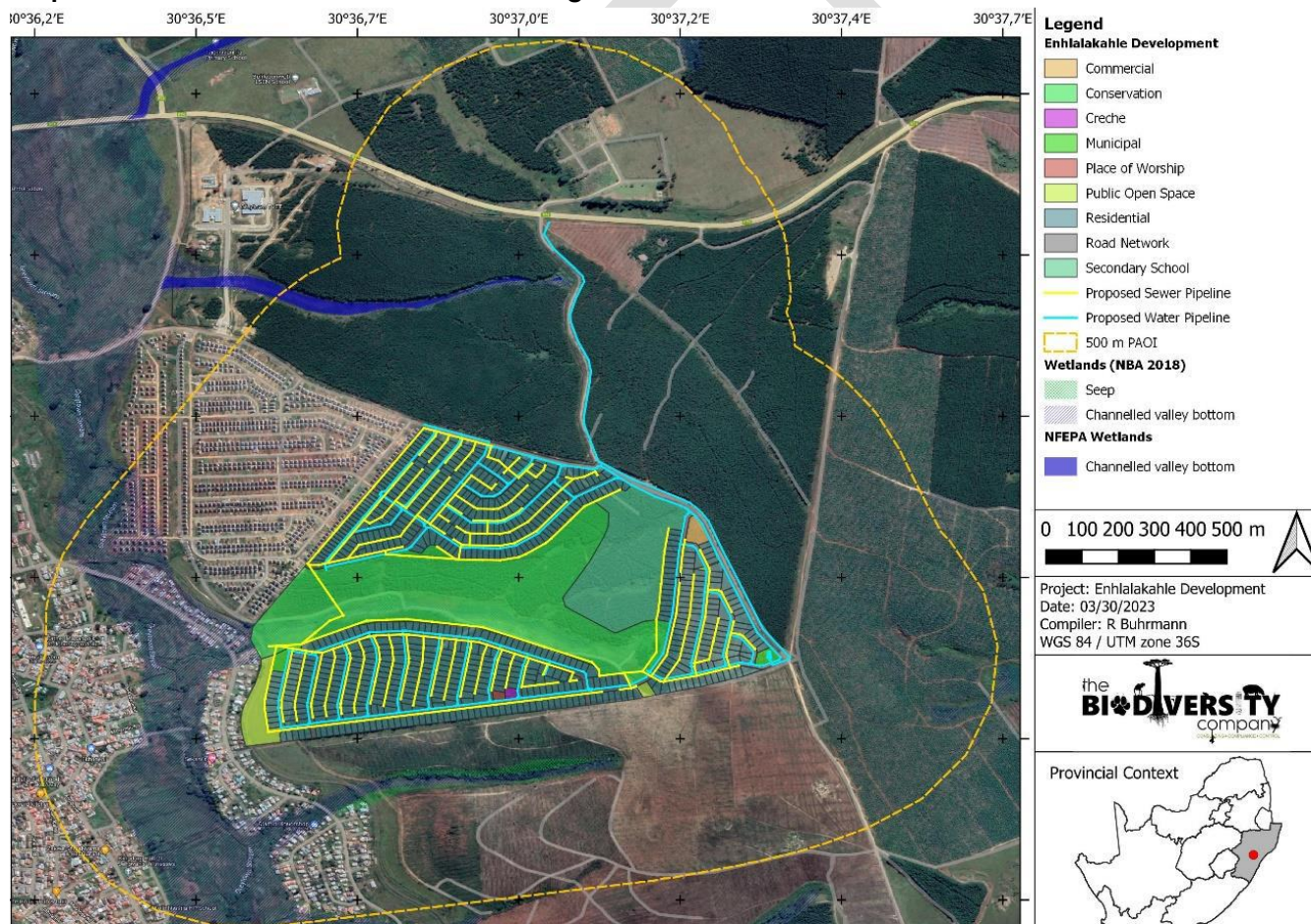
A Wetland Assessment for the proposed development was undertaken in June 2019 and was updated in March 2023 by The Biodiversity Company and is attached as **Appendix G2**.

#### 3.5.1 DESKTOP ASSESSMENT

##### 3.5.1.1 NFEPA Wetlands

One NFEPA wetland type, namely a channelled valley bottom wetland was identified within the 500m regulated area of the project area. The wetland condition is mainly moderately modified (Class C), with a rank of 2 (cranes in the area).

**Map 3.1: NFEPA Wetlands within the 500m regulated area**



Source: Wetland Assessment Report, 2019 (Updated March 2023)

### 3.5.2 WETLAND DELINEATION AND DESCRIPTION

During the field survey, three wetland types were identified within the 500m regulated area of the site as follows:

- **Channelled Valley Bottom Wetland**

Channelled valley bottom wetlands are characterised by their location on valley floors, the absence of characteristic floodplain features and the presence of a river channel flowing through the wetland.

- **Unchanneled Valley Bottom Wetland**

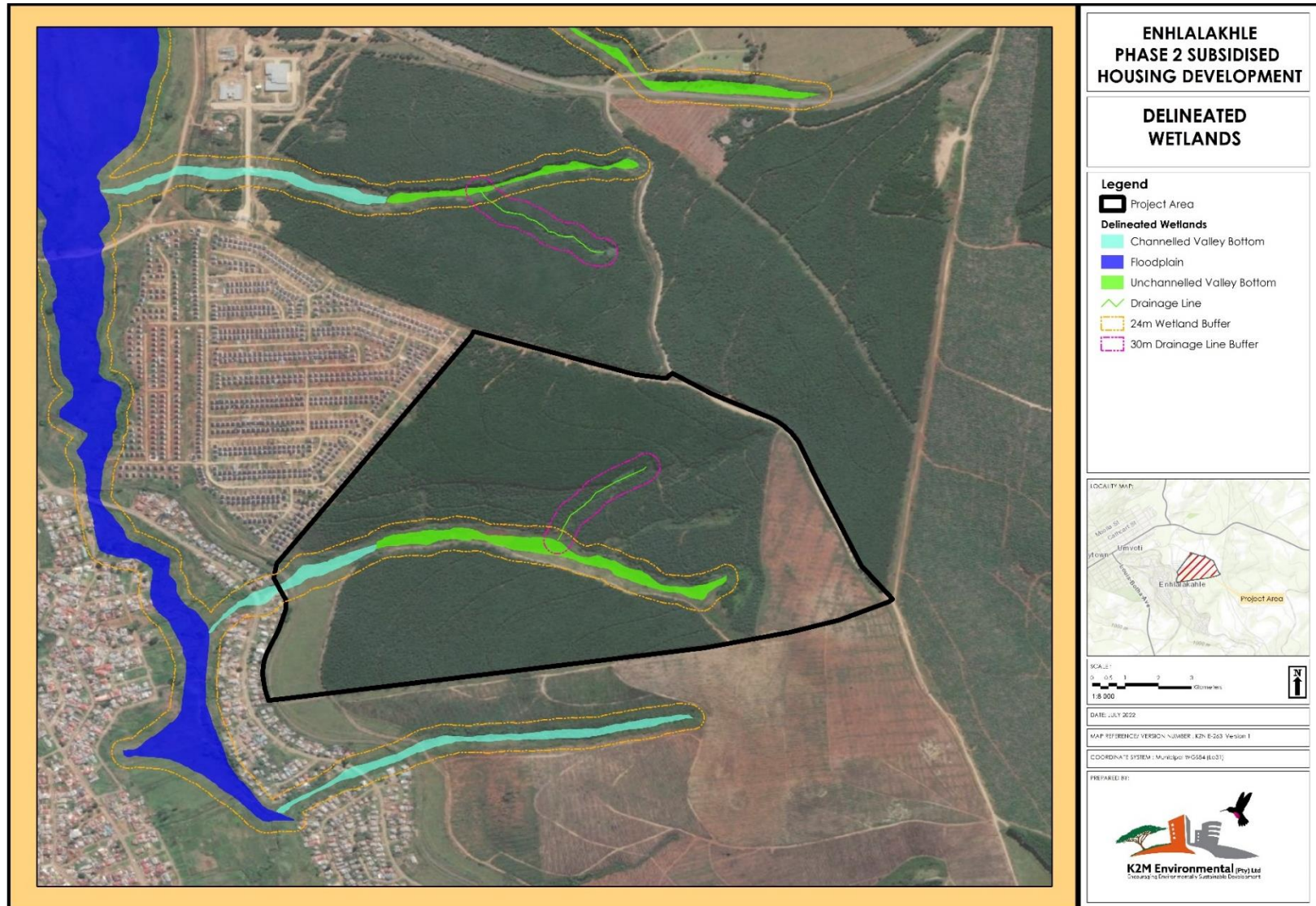
A valley bottom wetland without a river channel running through it. Unchanneled valley bottom wetlands are characterised by their location on valley floors, an absence of distinct channel banks, and the prevalence of diffuse flows.

- **Floodplain Wetland**

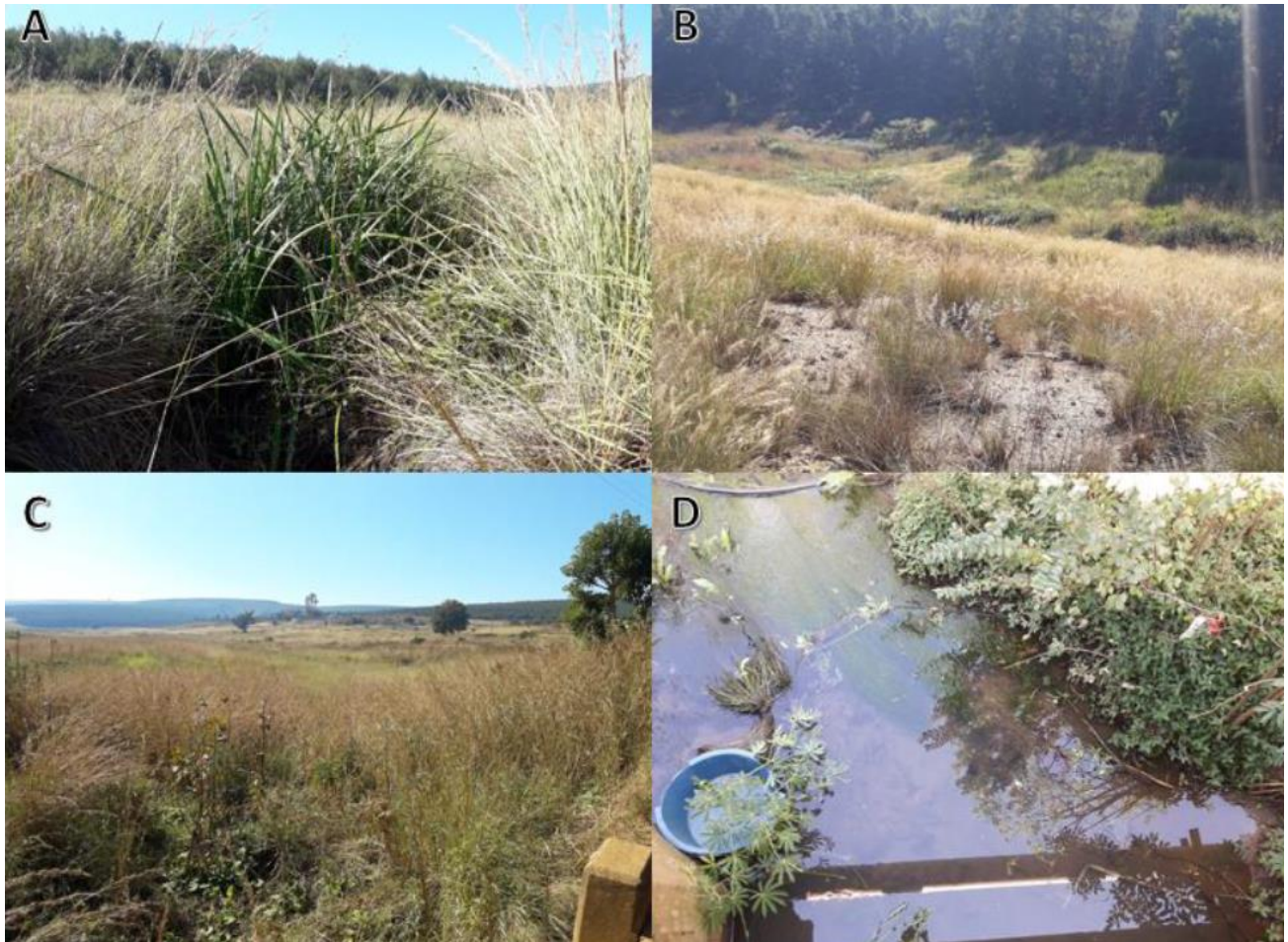
Floodplain wetlands are on the mostly flat or gently-sloping land adjacent to and formed by an alluvial river channel, under its present climate and sediment load, which is subject to periodic inundation by overtopping of the channel bank. Water movement through the wetland is predominantly horizontal and bidirectional (i.e. in and out of the wetland), in the form of diffuse surface or subsurface flow, although significant temporary containment of water may occur in floodplain depressions. Water generally exits a floodplain wetland as diffuse surface and/or subsurface flow (often returning to the river channel), but infiltration and evapotranspiration of water from a floodplain wetland can also be significant, particularly if there are a number of depressional areas within the wetland.

Map 3.2 below illustrates the delineated wetlands within the 500m regulated area.

**Map 3.2: Delineated Wetlands**



**Photo 3.5: Wetlands identified within the 500 m regulated area – A: Channelled valley bottom (HGM 1); B: Unchanneled valley bottom (HGM 2); C & D: Floodplain (HGM 3)**



Source: Wetland Assessment Report, 2019 (Updated March 2023)

### 3.5.3 ECOLOGICAL FUNCTIONAL ASSESSMENT

The ecosystem services provided by the wetlands identified on site was assessed and rated using the WET-EcoServices method (Kotze *et al.* 2008). The average ecosystem services score has been determined to be Intermediate.

Channelled valley bottom wetlands tend to contribute less to sediment trapping and flood attenuation than other systems. Channelled valley bottom wetlands are well known to improve the assimilation of toxicants, nitrates and sulphates, especially in cases where sub-surface flows contribute to the systems' water source.

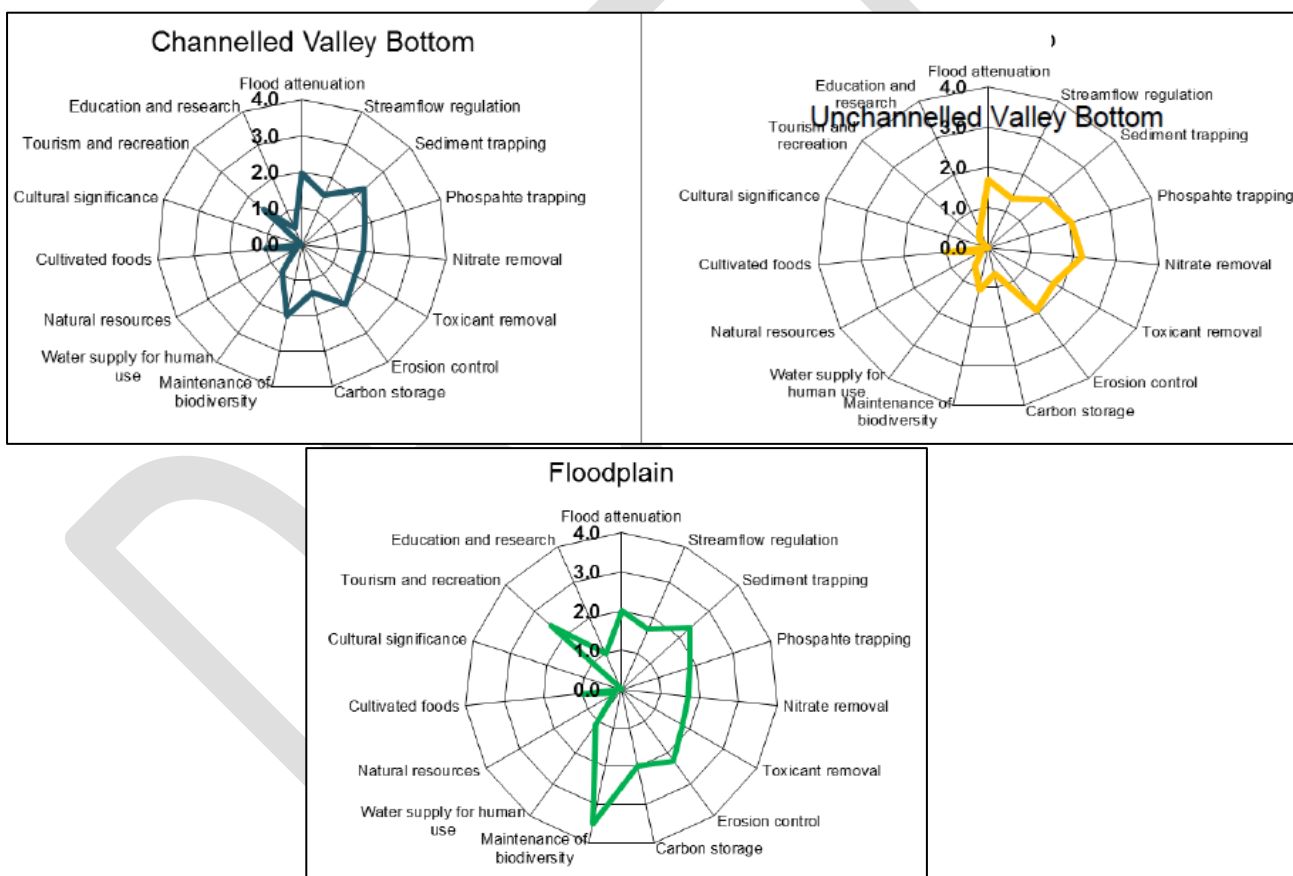
These wetlands are often on steeper gradients and play a moderate role in flood attenuation and erosion control. The assimilation of phosphates, nitrates and toxicants can be significant if the wetlands are in a healthy state. They provide a link within the landscape for fauna as these areas are often the only areas that have not been transformed.

Unchanneled valley bottoms play a significant role in streamflow regulation and erosion control. These wetlands are on flatter slopes and flow velocity is reduced. Water often moves laterally in the soil vadose zones assimilating various nutrients and toxicants in the process. They are also often cultivated

due to an increased fertility through sediment trapping and a water source close to the surface (subsistence agriculture).

Floodplain wetlands are fed from water inputs in the upper catchment and the banks of the channels are often overtopped during the wet season creating floodplain wetlands. These overtopping events deposit sediments on the floodplains assisting in sediment trapping. The overtopping events also reduce the flow velocity laterally, which attenuates flooding intensity downstream. The reduced flow velocity also assists in erosion control if the banks are vegetated. Floodplain wetlands are generally natural to some extent, with diverse habitats for the maintenance of biodiversity. The sedimentation of the floodplain and settling of water assist in the assimilation of phosphates, nitrates and toxic elements. The increased vegetation cover in some places increase the assimilation benefit. Floodplains are fertile lands due to the increased clay content and the deposition of nutrient rich sediments. The increase fertility is often used to cultivate crops and foods.

**Figure 3.2: Spider Diagrams illustrating the ecosystem services provided by the valley bottom wetlands and the floodplain within the 500m regulated area**



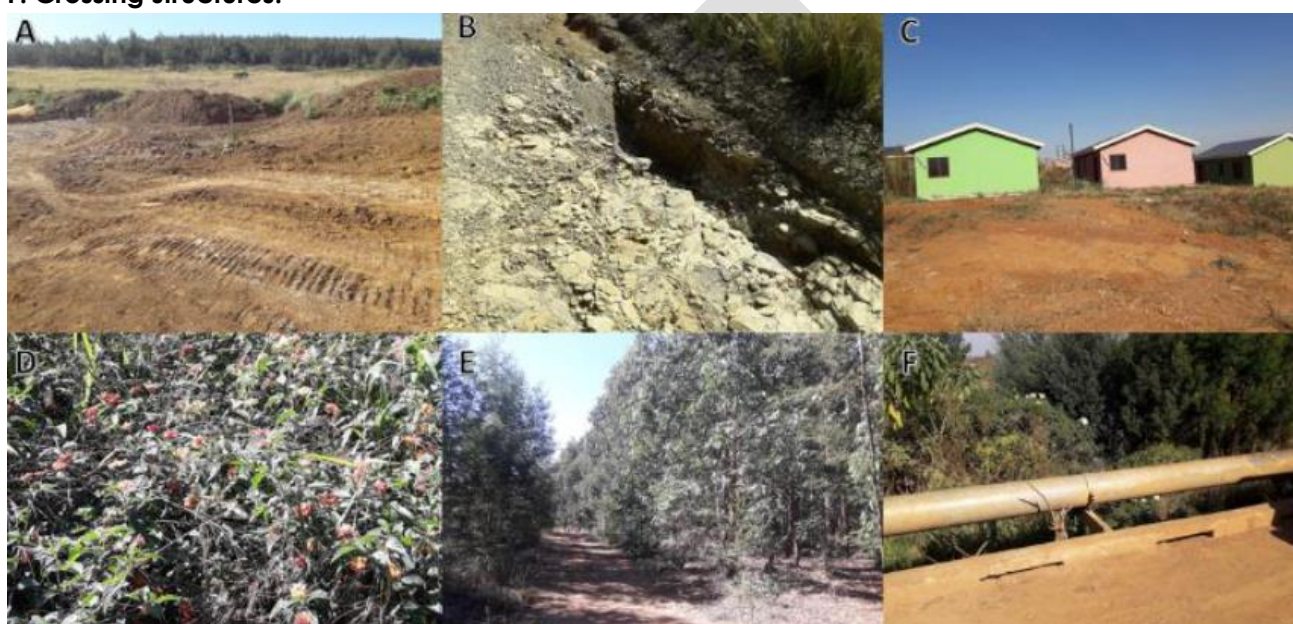
Source: Wetland Assessment Report, 2019 (Updated March 2023)

### 3.5.4 ECOLOGICAL HEALTH ASSESSMENT

The general features of the identified wetland units within the project area were assessed in terms of impacts on the integrity of these systems using the WET-Health methodology.

The identified impacts include activities such as erosion, increased hardened surfaces due to the presence of development, bridges and roads through wetlands, and alien plant species (Figure 3.3 below). Culverts where roads cross wetlands, also contribute to the negative effects on wetlands. The naturally diffuse nature of the water-flow through wetlands is altered, as culverts cause concentrated flow to occur, reducing the time for infiltration and promoting erosional processes.

**Figure 3.3: The impacts affecting the wetland health scores within the 500m regulated area. A: Cleared areas, B: Erosion, C: Developed areas increasing runoff, D: Alien vegetation, E: Eucalyptus plantations, F: Crossing structures.**



Source: Wetland Assessment Report, 2019 (Updated March 2023)

The PES for the assessed HGM units are presented in Tables 3.1 – 3.3 below. The wetlands within the catchment were moderately modified.

**Table 3.1: Summary of the scores for HGM 1 PES (channelled valley bottom)**

| Component     | PES Rating | Description  |
|---------------|------------|--|
| Hydrology     | D          | <b>Largely Modified:</b> The catchment is moderately modified by forestry, which reduces the vadose zone hydrology. The surface below the tree canopy is sparsely vegetated causing increased runoff and therefore erosion in preferential flow paths. |
| Geomorphology | C          | <b>Moderately Modified:</b> Road fill across the wetland has resulted in concentration of flows which has restricted natural sediment deposition and erosion.  |
| Vegetation    | C          | <b>Moderately Modified:</b> The vegetation is largely encroached by alien vegetation (especially forestry); the crossing structures and limited sedimentation also had an effect on the rating.  |
| Overall       | C          | <b>A moderate change in ecosystem processes and loss of natural habitat and biota has occurred, but the natural habitat remains largely intact.</b>  |

Source: Wetland Assessment Report, 2019 (Updated September 2021)

**Table 3.2: Summary of the scores for the HGM 2 PES (unchanneled valley bottom)**

| Component      | PES Rating | Description  |
|----------------|------------|--|
| Hydrology      | D          | <b>Largely Modified:</b> The catchment is moderately modified by forestry, which reduces the vadose zone hydrology. The surface below the tree canopy is sparsely vegetated causing increased runoff and therefore erosion in preferential flow paths. |
| Geomorphology  | C          | <b>Moderately Modified:</b> Road fill across the wetland has resulted in concentration of flows which has restricted natural sediment deposition and erosion. The hydrology of the catchment has altered the geomorphology by changing flows.          |
| Vegetation     | C          | <b>Moderately Modified:</b> The vegetation is largely encroached by alien vegetation (especially forestry); the crossing structures and limited sedimentation also had an effect on the rating.  |
| <b>Overall</b> | <b>C</b>   | <b>A moderate change in ecosystem processes and loss of natural habitat and biota has occurred, but the natural habitat remains largely intact.</b>  |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

**Table 3.3: Summary of the scores for HGM 3 PES (floodplain)**

| Component      | PES Rating | Description   |
|----------------|------------|---|
| Hydrology      | C          | <b>Moderately Modified:</b> The catchment is also largely by developments and forestry upslope. Crossing structures alter the flow dynamics, as well as sugarcane production in large portions of the catchment. The developments upslope increase runoff and change the flow dynamics of the floodplain. |
| Geomorphology  | C          | <b>Moderately Modified:</b> bridge crossings over the wetland has resulted in concentration of flows which has restricted natural sediment deposition and erosion.  |
| Vegetation     | C          | <b>Moderately Modified:</b> The vegetation is largely encroached by alien vegetation such as small bushes.; the crossing structures and limited sedimentation also had an effect on the rating.   |
| <b>Overall</b> | <b>C</b>   | <b>A moderate change in ecosystem processes and loss of natural habitat and biota has occurred, but the natural habitat remains largely intact.</b>   |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

### 3.5.5 ENVIRONMENTAL IMPORTANCE AND SENSITIVITY

The wetland EIS assessment was applied to the HGM units described in the previous section in order to assess the levels of sensitivity and ecological importance of the wetland. The results of the assessment are shown in Table 3.4.

The EIS rating for HGM 1 and HGM 2 was rated as Moderate. These HGM units provide some natural vegetation cover and is in contrast to the forestry. HGM 3 was rated as High due to the floodplain giving more habitat variability as well as the vegetation unit being rated as endangered. The Hydrological/Functional Importance for HGM 1 and HGM 2 was rated as Moderate. These HGM units provide the ability to enhance water quality. HGM 3 was rated as High, due to the floodplain allowing for flood attenuation and nutrient cycling. The Direct Human Benefits were rated as Low for all HGM units.

**Table 3.4: EIS results for the delineated HGM Units**

| Wetland Importance & Sensitivity             | Importance |       |       |
|--|------------|-------|-------|
|  | HGM 1      | HGM 2 | HGM 3 |
| <b>Ecological importance and sensitivity</b> | C          | C     | B     |
| <b>Hydrological/functional importance</b>    | C          | C     | B     |
| <b>Direct human benefits</b>                 | D          | D     | D     |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

### 3.5.6 BUFFER REQUIREMENTS

The wetland buffer zone tool was used to calculate the appropriate buffer required for the development. The model shows that the largest risks (Moderate) posed by the project during the construction phase is that of “increased sediment inputs and turbidity”. During the operational phase, the High risks identified for the project included “alteration of flow volumes” and “altered patterns of flows”. These risks are calculated with no prescribed mitigation and the calculated buffer requirement is presented in Table 3.5.

**Table 3.5: Pre-mitigation buffer requirement**

| Required buffer before mitigation measures have been applied |     |
|--|-----|
| Construction Phase   | 26m |
| Operational Phase  | 36m |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

According to the buffer guideline (Macfarlane, *et al.* 2014) a high-risk activity would require a buffer that is 95% effective to reduce the risk of the impact to a low level threat. The risks were then reduced to acceptable levels with the prescribed mitigation measures and therefore the recommended buffer was calculated to be 24m (Table 3.6) for the construction and operational phases.

**Table 3.6: Post-mitigation buffer requirements**

| Required buffer after mitigation measures have been applied |     |
|---|-----|
| Construction Phase  | 24m |
| Operational Phase   | 24m |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

A conservative buffer zone was suggested of 24m for the construction and operation phases respectively and is shown in Table 3.6, this buffer is calculated assuming mitigation measures are applied. This would typically include a commitment to rehabilitate and manage buffer zones to ensure that these areas function optimally. The development layout plan has made provision for the buffer zone by earmarking this portion of the site as conservation.

### 3.5.7 RISK ASSESSMENT

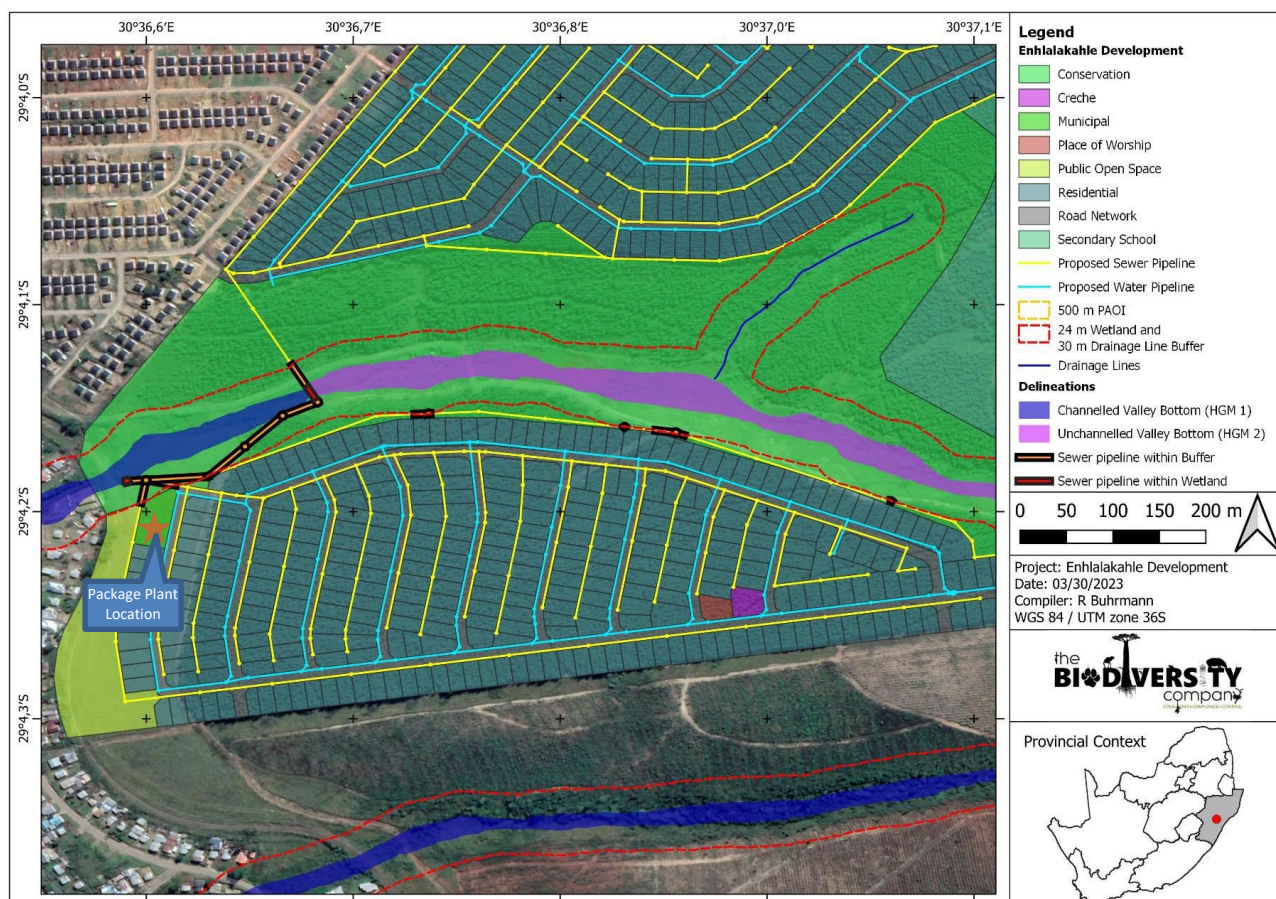
The presence and operation of the development has a smaller spatial impact but larger overall temporal impact (decades to centuries). Short term effects can occur during stormwater management activities. However, long term negative effects include alterations in stream hydrology and geomorphology which subsequently can result in a shift of ecological structures. Acute and chronic negative effects of stormwater management occur during rainfall events whereby runoff from hardened surfaces (roofing, driveways and car park areas) typically contains a mixture of contaminants such as mended garden fertilizers, metals, salts, oil and grease which enters nearby wetland systems accumulating in the instream sediments or can be dispersed into groundwater. Stormwater discharge is likely to scour the receiving areas, removing soils and modifying the geomorphology. The scouring of substrates is avoided through the implementation of appropriate energy dissipation structures.

The proposed housing development will not directly impact the delineated wetlands. However, the proposed sewer pipeline will intersect the channelled (HGM 1) and unchannelled valley bottom (HGM 2) wetlands directly, with the sewage package plant also posing a risk if not maintained correctly. The



extent of pipelines located outside of buffers, those located within buffers and the portions located within the wetlands themselves as well as the package plant location is illustrated in (Map 3.3). It is also imperative that the onsite sewage package plant be maintained and required safeguards put in place to protect the wetland system. The outlet pipe should be removed from the wetland buffer area and replaced by an artificial wetland to allow the treated effluent flowing through the artificial system prior to reaching the wetland buffer, this will further improve the water quality.

**Map 3.3: Extent of pipelines within wetlands and wetland buffers**



Source: Wetland Assessment Report, 2019 (Updated March 2023)

Tables 3.7 to 3.10 below provides results from the DWS Risk Impact Matrix. The findings from Risk Matrix indicate that the majority of aspects involved with the construction and operation of the proposed housing development and pipelines have been scored a “Moderate” pre-mitigation significance rating. All of the ratings for the housing development are expected to decrease to “Low” with the application of mitigation measures and avoidance of the recommended buffers. However, the majority of the ratings for the pipelines (specifically the sewer pipeline) are not expected to decrease to “Low” with the application of mitigation measures considering the fact that some of the proposed components (specifically the sewer pipeline) are located directly within wetlands and their associated buffer zones.

The following step in the mitigation hierarchy will be rehabilitation during and after construction. Given the small extent, condition of the wetlands, and the insignificance of the proposed pipeline’s operational phase, it is the specialist’s opinion that the rehabilitation of areas degraded from the construction of the proposed pipelines will be sufficient.

**Table 3.7: DWS Risk Impact Matrix for the proposed development**

| Aspect   | Flow Regime | Severity                           |                                      |                                   | Severity | Spatial scale | Duration | Consequence |
|--|-------------|------------------------------------|--------------------------------------|-----------------------------------|----------|---------------|----------|-------------|
|  |             | SACNASP                            |                                      |                                   |          |               |          |             |
|  |             | Rowan Buhrmann (Pr Sci Nat 136853) | Physico and Chemical (Water Quality) | Habitat (Geomorph and Vegetation) | Biota    |               |          |             |
| <b>Proposed Pipelines</b>  |             |                                    |                                      |                                   |          |               |          |             |
| <b>Construction Phase</b>  |             |                                    |                                      |                                   |          |               |          |             |
| Clearing of vegetation to facilitate the sewer pipeline installation             | 5           | 5                                  | 5                                    | 5                                 | 5        | 2             | 1        | 8           |
| Stripping and stockpiling topsoil  | 5           | 5                                  | 5                                    | 5                                 | 5        | 2             | 2        | 9           |
| Operation of heavy machinery and equipment in close proximity to the watercourse | 5           | 5                                  | 5                                    | 5                                 | 5        | 2             | 1        | 8           |
| Installation of pipelines  | 5           | 5                                  | 5                                    | 5                                 | 5        | 2             | 2        | 9           |
| Excavations  | 5           | 5                                  | 5                                    | 5                                 | 5        | 2             | 1        | 8           |
| Ablution facilities  | 2           | 3                                  | 3                                    | 2                                 | 2.5      | 2             | 2        | 6.5         |
| Domestic and industrial waste  | 2           | 3                                  | 3                                    | 3                                 | 2.75     | 2             | 2        | 6.75        |
| Storage of chemicals, mixes and fuel   | 3           | 3                                  | 3                                    | 3                                 | 3        | 2             | 1        | 6           |
| <b>Operational Phase</b>   |             |                                    |                                      |                                   |          |               |          |             |
| Maintenance of pipelines   | 2           | 2                                  | 1                                    | 1                                 | 1.5      | 3             | 2        | 6.5         |
| Alteration of sub-surface flows  | 2           | 2                                  | 1                                    | 1                                 | 1.5      | 2             | 1        | 4.5         |
| Unforeseen leakage/ breakage   | 4           | 5                                  | 4                                    | 4                                 | 4.25     | 3             | 3        | 10.25       |
| <b>Housing Development</b>   |             |                                    |                                      |                                   |          |               |          |             |
| <b>Construction Phase</b>  |             |                                    |                                      |                                   |          |               |          |             |
| Clearing of vegetation   | 2           | 2                                  | 4                                    | 4                                 | 3        | 2             | 2        | 7           |
| Stripping of soil  | 2           | 2                                  | 4                                    | 4                                 | 3        | 2             | 2        | 7           |
| Establishment of access roads  | 3           | 2                                  | 2                                    | 3                                 | 2.5      | 3             | 2        | 7.5         |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

**Table 3.8: DWS Risk Impact Matrix for the proposed development (continued)**

|   |   |   |   |   |      |   |   |      |
|---|---|---|---|---|------|---|---|------|
| Excavation of foundations                                   | 2 | 1 | 2 | 2 | 1.75 | 3 | 2 | 6.75 |
| Delivery of building material (heavy vehicles)              | 3 | 2 | 3 | 2 | 2.5  | 2 | 2 | 6.5  |
| Operation of machinery and vehicles within watercourse area | 2 | 2 | 2 | 2 | 2    | 2 | 2 | 6    |
| Operation of machinery and vehicles in adjacent areas       | 2 | 2 | 2 | 2 | 2    | 2 | 2 | 6    |
| Waste and ablutions facilities                              | 1 | 3 | 1 | 3 | 2    | 3 | 2 | 7    |
| Mixing and pouring concrete                                 | 1 | 3 | 1 | 3 | 2    | 3 | 2 | 7    |
| Storage of materials on site                                | 1 | 3 | 1 | 3 | 2    | 3 | 2 | 7    |
| Final landscaping and shaping                               | 3 | 2 | 3 | 2 | 2.5  | 2 | 2 | 6.5  |
| Final access road upgrades and stabilisation                | 1 | 1 | 2 | 1 | 1.25 | 2 | 2 | 5.25 |
| Post-construction rehabilitation                            | 1 | 1 | 2 | 1 | 1.25 | 2 | 2 | 5.25 |
| <b>Operational Phase</b>                                    |   |   |   |   |      |   |   |      |
| Alteration of in channel flows                              | 3 | 1 | 3 | 2 | 2.25 | 2 | 4 | 8.25 |
| Alteration of surface drainage and runoff                   | 3 | 1 | 3 | 2 | 2.25 | 2 | 4 | 8.25 |
| Increased traffic in the area (proximity to watercourse)    | 1 | 1 | 1 | 1 | 1    | 1 | 4 | 6    |
| Stormwater management system                                | 3 | 2 | 3 | 2 | 2.5  | 2 | 4 | 8.5  |
| Establishment of alien plants on disturbed areas            | 2 | 2 | 2 | 3 | 2.25 | 2 | 3 | 7.25 |
| Solid waste disposal in wetland areas                       | 2 | 3 | 2 | 2 | 2.25 | 3 | 4 | 9.25 |
| Increased organic pollutants                                | 1 | 3 | 1 | 2 | 1.75 | 3 | 4 | 8.75 |
| Sedimentation of wetland areas (altered flows)              | 2 | 2 | 2 | 2 | 2    | 3 | 4 | 9    |
| Human disturbance in wetland areas                          | 1 | 2 | 2 | 1 | 1.5  | 1 | 4 | 6.5  |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

**Table 3.9: DWS Risk Impact Matrix for the proposed development (continued)**

| Aspect   | Frequency of activity | Frequency of impact | Legal Issues | Detection | Likelihood | Sig.  | Without Mitigation    | With Mitigation |
|--|-----------------------|---------------------|--------------|-----------|------------|-------|-----------------------|-----------------|
| <b>Sewer Pipelines</b>   |                       |                     |              |           |            |       |                       |                 |
| <b>Construction Phase</b>  |                       |                     |              |           |            |       |                       |                 |
| Clearing of vegetation to facilitate the sewer pipeline installation             | 1                     | 2                   | 5            | 1         | 9          | 72    | Moderate              | Moderate        |
| Stripping and stockpiling topsoil  | 3                     | 3                   | 1            | 3         | 10         | 90    | Moderate              | Moderate        |
| Operation of heavy machinery and equipment in close proximity to the watercourse | 1                     | 3                   | 5            | 2         | 11         | 88    | Moderate              | Moderate        |
| Installation of pipelines  | 1                     | 2                   | 5            | 1         | 9          | 81    | Moderate <sup>*</sup> | Moderate        |
| Excavations  | 1                     | 2                   | 5            | 3         | 11         | 88    | Moderate              | Moderate        |
| Ablution facilities  | 2                     | 3                   | 5            | 1         | 11         | 71.5  | Moderate <sup>*</sup> | Low             |
| Domestic and industrial waste  | 2                     | 2                   | 5            | 1         | 10         | 67.5  | Moderate <sup>*</sup> | Low             |
| Storage of chemicals, mixes and fuel   | 2                     | 2                   | 5            | 1         | 10         | 60    | Moderate <sup>*</sup> | Low             |
| <b>Operation Phase</b>   |                       |                     |              |           |            |       |                       |                 |
| Maintenance of pipelines   | 1                     | 3                   | 5            | 2         | 11         | 71.5  | Moderate <sup>*</sup> | Low             |
| Alteration of sub-surface flows  | 3                     | 1                   | 1            | 2         | 7          | 45.5  | Moderate <sup>*</sup> | Low             |
| Unforeseen leakage/ blockage/ breakage   | 2                     | 5                   | 5            | 4         | 16         | 164   | Moderate              | Moderate        |
| <b>Housing Development</b>   |                       |                     |              |           |            |       |                       |                 |
| <b>Construction Phase</b>  |                       |                     |              |           |            |       |                       |                 |
| Clearing of vegetation   | 1                     | 3                   | 5            | 2         | 11         | 77    | Moderate <sup>*</sup> | Low             |
| Stripping of soil  | 1                     | 3                   | 5            | 2         | 11         | 77    | Moderate <sup>*</sup> | Low             |
| Establishment of access roads  | 1                     | 3                   | 5            | 1         | 10         | 75    | Moderate <sup>*</sup> | Low             |
| Excavation of foundations  | 1                     | 3                   | 5            | 2         | 11         | 74.25 | Moderate <sup>*</sup> | Low             |
| Delivery of building material (heavy vehicles)                                   | 1                     | 3                   | 1            | 2         | 7          | 45.5  | Low                   | Low             |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

**Table 3.10: DWS Risk Impact Matrix for the proposed development (continued)**

|   |   |   |   |   |   |       |                       |     |
|---|---|---|---|---|---|-------|-----------------------|-----|
| Operation of machinery and vehicles within watercourse area | 1 | 3 | 1 | 3 | 8 | 48    | Low                   | Low |
| Operation of machinery and vehicles in adjacent areas       | 1 | 2 | 1 | 1 | 5 | 30    | Low                   | Low |
| Waste and ablutions facilities                              | 1 | 2 | 1 | 2 | 6 | 42    | Low                   | Low |
| Mixing and pouring concrete                                 | 1 | 2 | 1 | 2 | 6 | 42    | Low                   | Low |
| Storage of materials on site                                | 1 | 2 | 1 | 2 | 6 | 42    | Low                   | Low |
| Final landscaping and shaping                               | 1 | 3 | 1 | 2 | 7 | 45.5  | Low                   | Low |
| Final access road upgrades and stabilisation                | 1 | 1 | 1 | 3 | 6 | 31.5  | Low                   | Low |
| Post-construction rehabilitation                            | 1 | 1 | 1 | 3 | 6 | 31.5  | Low                   | Low |
| <b>Operation Phase</b>                                      |   |   |   |   |   |       |                       |     |
| Alteration of in channel flows                              | 4 | 3 | 1 | 1 | 9 | 74.25 | Moderate <sup>+</sup> | Low |
| Alteration of surface drainage and runoff                   | 3 | 3 | 1 | 2 | 9 | 74.25 | Moderate <sup>+</sup> | Low |
| Increased traffic in the area (proximity to watercourse)    | 2 | 1 | 1 | 1 | 5 | 30    | Low                   | Low |
| Stormwater management system                                | 2 | 2 | 1 | 2 | 7 | 59.5  | Moderate <sup>+</sup> | Low |
| Establishment of alien plants on disturbed areas            | 2 | 2 | 1 | 2 | 7 | 50.75 | Low                   | Low |
| Solid waste disposal in wetland areas                       | 3 | 3 | 1 | 1 | 8 | 74    | Moderate <sup>+</sup> | Low |
| Increased organic pollutants                                | 2 | 2 | 1 | 2 | 7 | 61.25 | Moderate <sup>+</sup> | Low |
| Sedimentation of wetland areas (altered flows)              | 2 | 1 | 1 | 2 | 6 | 54    | Low                   | Low |
| Human disturbance in wetland areas                          | 2 | 2 | 1 | 2 | 7 | 45.5  | Low                   | Low |

Source: Wetland Assessment Report, 2019 (Updated March 2023)

### 3.5.8 UNPLANNED EVENTS

Even though leaks and bursts on well-engineered sewerage pipelines are unlikely, an action plan must be set in place for such an event.

The manager or any other responsible individual at the residential area must be tasked with reporting any sudden bad smells from the wetland that might indicate leaks or bursts as well as any leaking pipes in general.

Stormwater measures and structures must be implemented to adequately manage storm events. These structures are assumed to be appropriate and for the demands of the project.

### 3.5.9 MITIGATION MEASURES

The following mitigation measures were prescribed by the wetland specialist:

- Silt traps and sediment trapping berms must be in place in drainage lines around the construction site;
- Add green/soft engineering methods to the design and layout of the development
- Stormwater infrastructure should be maintained regularly;
- The first 300 mm of soil must be stockpiled separate from the soil excavated deeper than 300 mm;
- The proposed pipeline system must be divided up into 100 m intervals. Each interval's soil must be stockpiled and filled back up (in the correct order) to avoid long periods of stockpiling;
- 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.
- Make use of existing roads and road servitudes;
- To minimise the impact on both surface water flow and interflow, portions of the road must include a coarse rock layer that has been specifically incorporated to increase the porosity and permeability of the sub-layers of the road;
- Exposed road surfaces awaiting grading must be stabilised to prevent the erosion of these surfaces. Signs of erosion must be addressed immediately to prevent further erosion of the road;
- Silt traps and fences must be placed in the preferential flow paths along the road to prevent sedimentation of the watercourse;
- The wetland areas outside of the specific project site area must be avoided;
- The construction vehicles and machinery must make use of existing access routes as much as possible, before adjacent areas are considered for access;
- Laydown yards, camps and storage areas must be beyond the wetland areas. Where possible, the construction of the pipeline and crossings must take place from the existing road servitudes;
- The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly;

- Construction must take place during the dry season (April-September) as much as possible. If construction will be over a prolonged period, ensure that clearing, excavation and foundations are laid down in the dry season to reduce the erosion potential of the exposed surfaces;
- Temporary stormwater management systems must be in place and preferential runoff channels be filled with aggregate and/or logs (branches included) to dissipate flows, limiting erosion and sedimentation;
- The footprint area of the must be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas;
- Prevent uncontrolled access of vehicles through the wetland systems that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;
- All chemicals and toxicants to be used for the pipeline construction must be stored outside the channel system and in a bunded area;
- All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site;
- All contractors and employees should undergo induction which is to include a component of environmental awareness. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping";
- Adequate sanitary facilities and ablutions on the servitude must be provided for all personnel throughout the project area. Use of these facilities must be enforced (these facilities must be kept clean so that they are a desired alternative to the surrounding vegetation);
- Have action plans on site, and training for contractors and employees in the event of spills, leaks and other impacts to the aquatic systems;
- All removed soil and material must not be stockpiled within the system. Stockpiling should take place outside of the watercourse. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds;
- Erosion and sedimentation into drainage channels must be minimised through the effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed banks;
- Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching;
- Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil;
- No dumping of construction material on-site may take place;
- All waste generated on-site during construction must be adequately managed. Separation and recycling of different waste materials should be supported.

### 3.5.10 SPECIALIST'S RECOMMENDATION AND OPINION

The following recommendations were provided by the wetland specialist:

- Include green or soft engineering for stormwater management and harvesting of rainwater;
- An alien invasive plant management plan needs to be compiled and implemented post construction to control current invaded areas and prevent the growth of invasive on cleared areas;
- A rehabilitation plan must be compiled for the housing development as well as the proposed sewer pipelines. This must include the entire unchannelled valley bottom wetland located within the development footprint, the drainage line leading into this wetland, and the channelled valley bottom wetland leading into the floodplain wetland towards the west of the development.

Given the small extent, condition of the wetlands, and the insignificance of the proposed pipeline's operational phase, it is the specialist's opinion that the rehabilitation of areas degraded from the construction of the proposed pipelines will be sufficient.

In accordance with the GA in terms of section 39 of the NWA, for water uses as defined in section 21 (c) or section 21 (i) a GA does not apply "to any water use in terms of section 21 (c) or (i) of the Act associated with the construction, installation or maintenance of any sewer pipelines, pipelines carrying hazardous materials and to raw water and waste water treatment works". Owing to the fact that this project will include the installation of sewerage services to accommodate the proposed development, a water use license will be required. Furthermore, it is the opinion of the specialist that no fatal flaws are expected for the project. Development of the project is feasible, but all mitigation measures and recommendations must be considered by the issuing authority.

## 3.6 AGRICULTURAL POTENTIAL ASSESSMENT

An Agricultural Potential and Impact Assessment was undertaken by Mzansi Agriculture in October 2019 and is attached as **Appendix G3**. The objective for this assessment was to determine whether or not the agronomic or agribusiness potential of the proposed site permits a change of land use from a zoning as agricultural land to a subsidized housing development. The findings from this assessment are provided below.

### 3.6.1 SUMMARY FINDINGS

- There is no open rangeland at the site. The District Municipality as a whole is an important component of the KZN Midlands Misbelt Grasslands of the Sub-Escapement grassland bioregion of the Grassland Biome. This habitat has been depleted by timber and crop farming as well as urban development within areas of the District, and as observed within the project area.
- There was no evidence of food crops ever having been planted on the property.
- The only industrial crop is timber.
- There is no livestock on site.



- The soil parent materials are the Pietermaritzburg Formation of the ECCA Group of the Karoo Sequence interspersed with Dolerite. The Pietermaritzburg Formation has weathered dark-grey shale, siltstone and subordinate sandstone, resulting in the Mispah soils found at site.
- Mispah soils are highly erodible, hence, exceptionally good surface water management is required. Topsoil depth is often less than 200 mm, covering a stratum of densely bedded shale or solid rock. Often found in proximity are Glenrosa soils. Mispah soils also carry a high erosion hazard.
- Land Capability Classes: Most of the profiles studied fell into LCC V and LCC VII. Soils complying with Land Capability Classes LCC V and LCC VII refers to wetlands and are limited to domestic livestock and wild game, respectively.
- It is inevitable that the proposed development will permanently impact on the site, which site is covered by a sterile mono-culture. The site has no potential for arable crops.

### 3.6.2 CONCLUDING REMARKS

There is no agronomic or agri-business reason why this site should not be released for the proposed residential development. The land between this site and Greytown is taken up by an already developed residential township and the Phase 1 Housing Project which is located to the west of the site.

### 3.7 SITES WITH ARCHEOLOGICAL INTEREST

The KwaZulu-Natal Heritage Act requires that AmafaKwazulu-Natali (Heritage KwaZulu Natal) is to comment on the need for an archaeological assessment for proposed development if:

- Development area is larger than 5 000m<sup>2</sup>
- Development is longer than 300m
- The development area contains known archaeological sites.

Documentation pertaining to the proposed eNhlalakahle Phase 2 Subsidised Housing Development was submitted to KZN Amafa for comment and in their interim comment (**Appendix F**), AMAFA indicated that a Heritage Impact Assessment must be undertaken for the proposed development.

A Heritage Impact Assessment was undertaken in October 2022 by Umlando: Archaeological Surveys and Heritage Management and is attached as **Appendix G4**. The findings from the Heritage Impact Assessment Report are summarised in the points below:

#### 3.7.1 DESKTOP STUDY

- The 1937 aerial photograph indicates that the area is grassland with no visible structures.
- The 1963 topographical map indicates that there are no built structures within the study area and that it has been converted to a timber plantation. This means the area has had 60+ years of afforestation.

- Palaeontological Sensitivity - The area is in an area of medium palaeontological sensitivity. A desktop PIA was undertaken by Dr Alan Smith (attached as **Appendix A of the Heritage Impact Assessment**). The findings from the desktop PIA are as follows:
  - The Pietermaritzburg Formation may contain scattered, fragmentary plant fossils and invertebrate trace fossils, some of which are diagnostic of marine conditions (such as Helminthopsis). Potentially it could contain vertebrate fossils, but to the writer's knowledge none have been found. The chance of finding Palaeontological Material is very low, but not zero, consequently a chance find protocol should be included in the Environmental Management Programme.

### 3.7.2 FIELD SURVEY

- A field survey was undertaken on the 18 October 2022. Ground visibility was mostly good; and there were enough tracks and open areas to undertake a survey. The area appears to be covered by shallow soils with shale layers below it. These types of soils are not conducive for archaeological sites.
- Much of the land is on a steep gradient except for the lower southwestern corner.
- The survey did not record or note any artefacts or features. If any artefacts do occur, then they will be in a secondary context due to 50+ years of afforestation and colluvial movement.

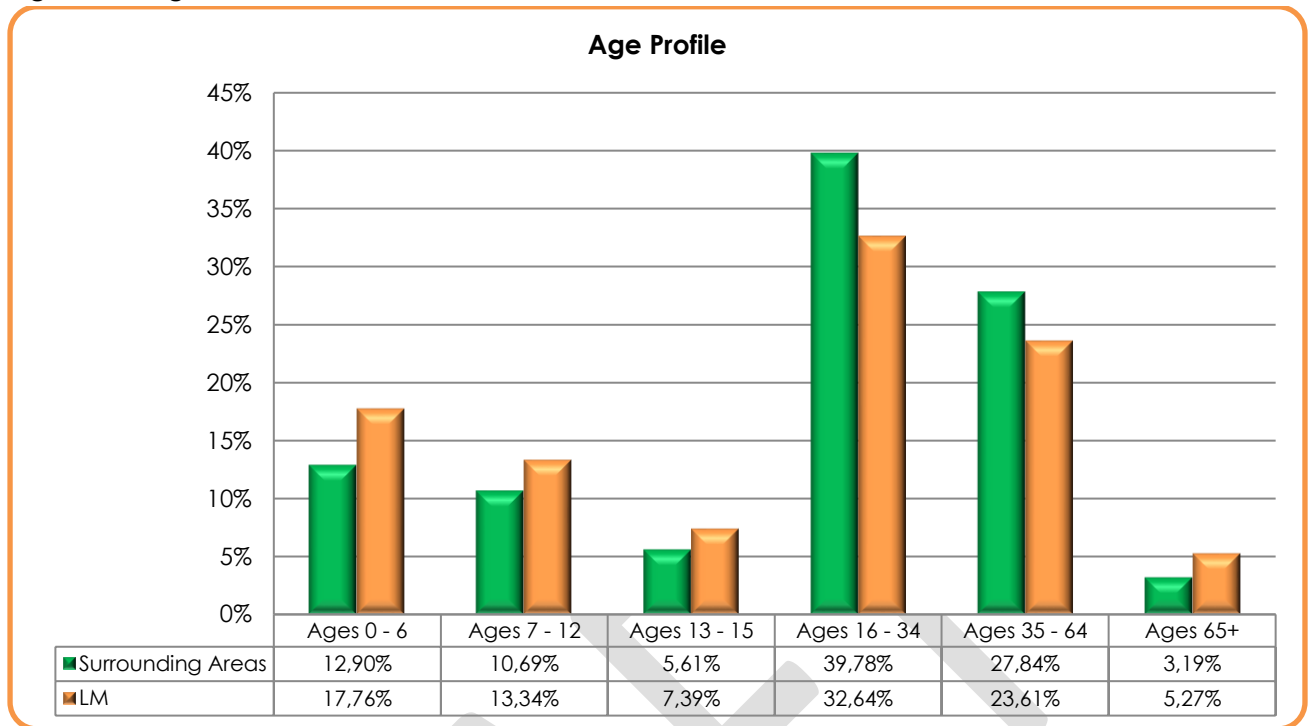
## 3.8 SOCIO ECONOMIC IMPACTS

Given that this project is a Greenfield Development, small area layers (SAL), surrounding the project area was utilised to present a socio-economic overview of the area, as the project will benefit from the similar services. The areas selected were France, Greytown SP and eNhlalakahle and are referred to as the "study area" in the subsections below. The eNhlalakahle Phase 2 Housing project area falls within the jurisdiction of the uMvoti Municipality; the figures of the surrounding areas are therefore presented together with the overall figures of the municipality to yield a comparative socio-economic overview for the study area. The total population of the surrounding area is approximately 8 273 persons and the population of the municipality is estimated at 103 092 persons.

### 3.8.1 AGE PROFILE

Figure 3.4 below provides the age profile of the study area in relation to the age profile of the Umvoti Local Municipality. Majority of the population within the study area were aged between 16-34 years. It is evident from the graph that majority of the population within the surrounding area is between 16 – 34 years of age. A total of 27.84% are between the ages of 35-64 years, while only 3.19% of the total population are older than the age of 65 years. The figures also indicate that 38.49% of the population within the Umvoti Municipality is younger than 15 years, which is higher when compared to the project area.

**Figure 3.4: Age Profile**

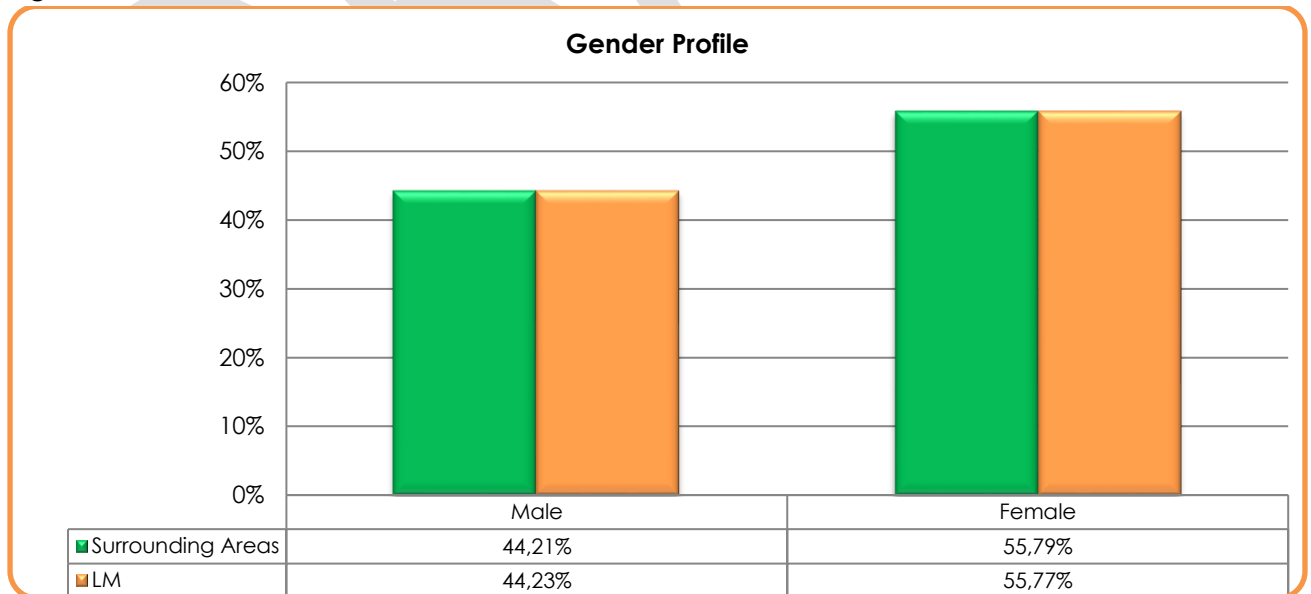


Source: Stats SA, 2011

### 3.8.2 GENDER PROFILE

According to the 2011 census information in Figure 3.5 below, as much as 55.79% of the total population is female and 44.21% are male.

**Figure 3.5: Gender Profile**

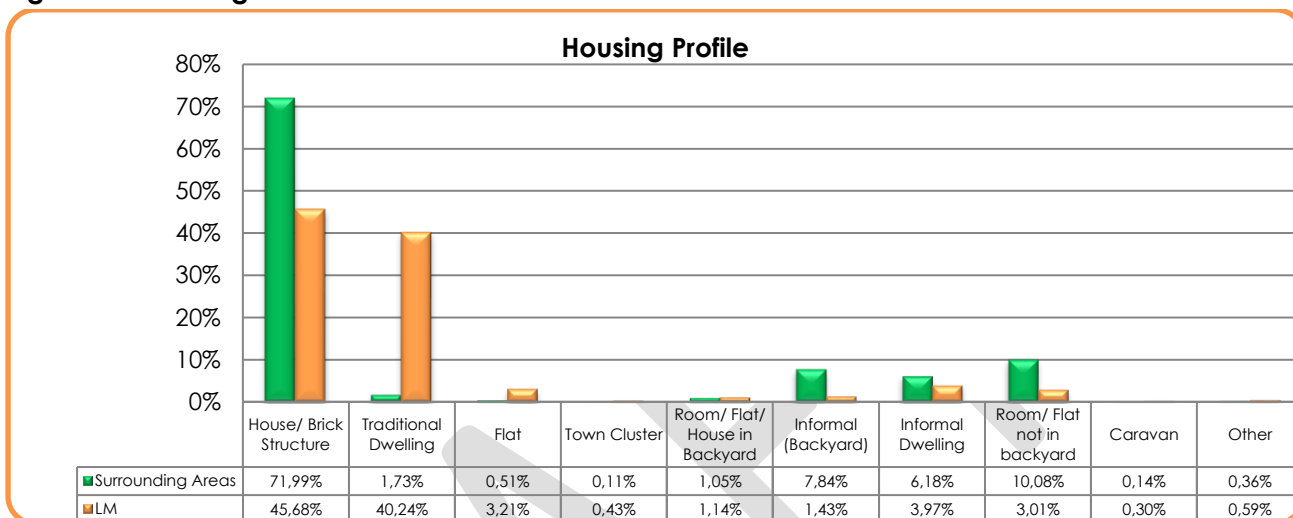


Source: Stats SA, 2011

### 3.8.3 HOUSING PROFILE

As can be seen from Figure 3.6, the most predominant housing type in the project area is the “House/Brick Structure” with 71.99% of houses falling into this category, followed by the “Room/Flat not in backyard” with 10.08%. The figures indicate that within the Umvoti Municipality, approximately 45.68% of houses fall in the “House/Brick Structure” housing category while 40.24% fall within the “Traditional dwellings” category and 3.97% fall within the “Informal dwellings” category.

**Figure 3.6: Housing Profile**

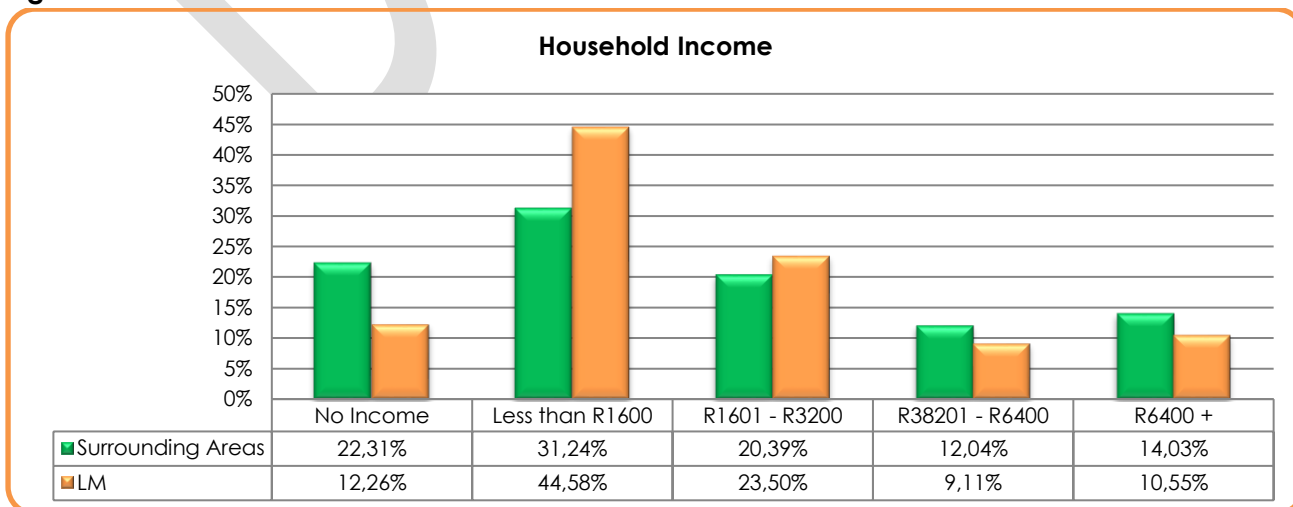


Source: Stats SA, 2011

### 3.8.4 HOUSEHOLD INCOME

As much as 22.31% of the total number of households within the study area indicated not to have an income. The figures also show that 31.24% of the total number of households indicated a collective monthly household income of less than R1 600, with 20.39% falling within the income range of R1 600 – R3200 and 12.04% falling between R3200 and R6400. Approximately 14.03% of households earn more than R6400, which is much higher than the Umvoti Municipality percentage of 10.55%.

**Figure 3.7: Household Income**



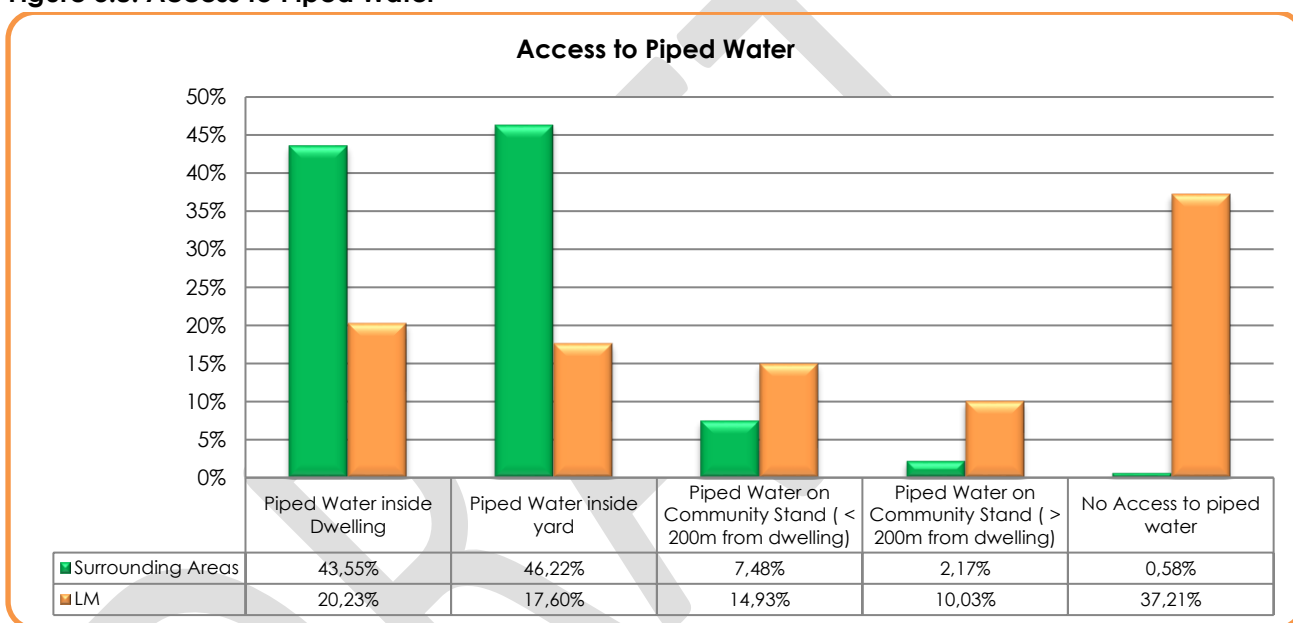
Source: Stats SA, 2011

### 3.8.5 ACCESS TO PIPED WATER

Figure 3.8 below illustrates the percentage of households which have access to piped water with the Umvoti LM and areas surrounding the proposed site.

The overall figures for the Umvoti Municipality indicate that approximately 43.55% of the total number of households within the surrounding area have access to piped water “inside dwelling” and 46.22% have piped water “inside the yard”. Approximately 97.25% of households within the surrounding area have to walk less than 200m to get water, whilst 2.17% of households have to walk more than 200m to get water.

**Figure 3.8: Access to Piped Water**

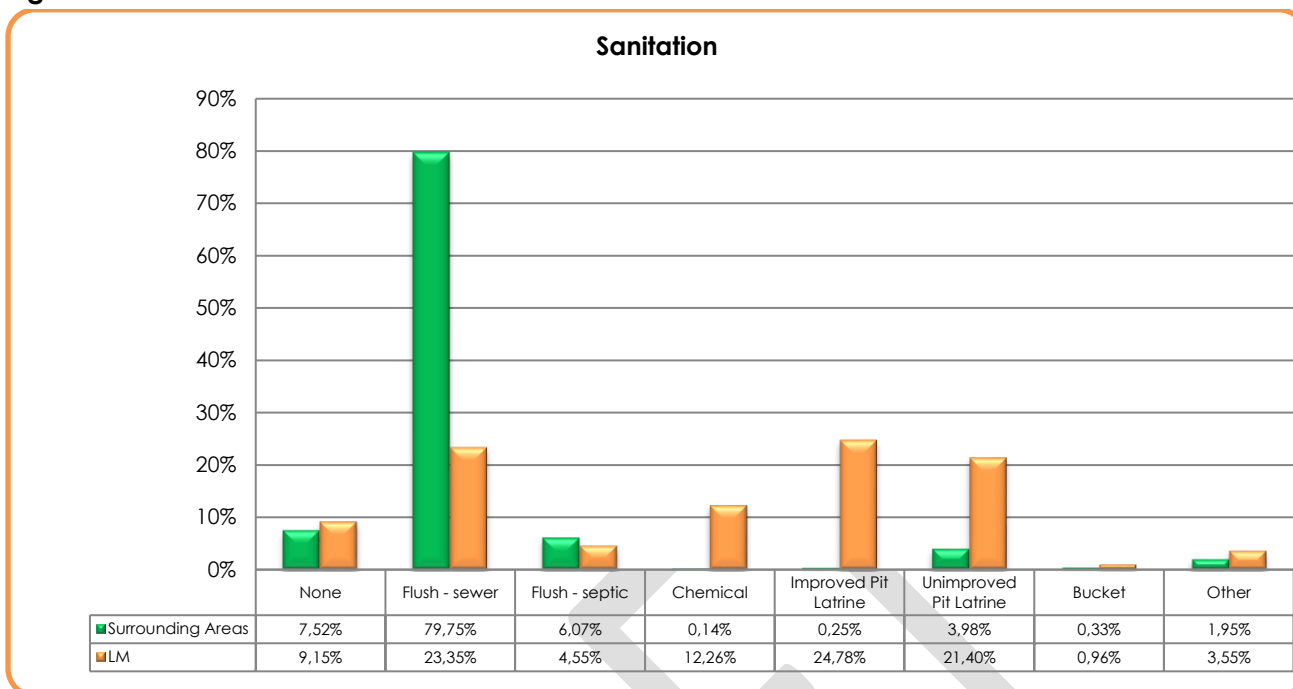


Source: Stats SA, 2011

### 3.8.6 ACCESS TO SANITATION

Figure 3.9 illustrates that the majority (79.75%) of households in the surrounding area use flush toilets which are connected to a sewage system while 6.07% use flush toilets which are connected to a sewage tank. The statistics of the overall uMvoti municipality indicates that the majority (24.78%) of households make use of “improved pit latrines” whilst 23.35% utilise flush toilets connected to a sewage system.

**Figure 3.9: Access to Sanitation**



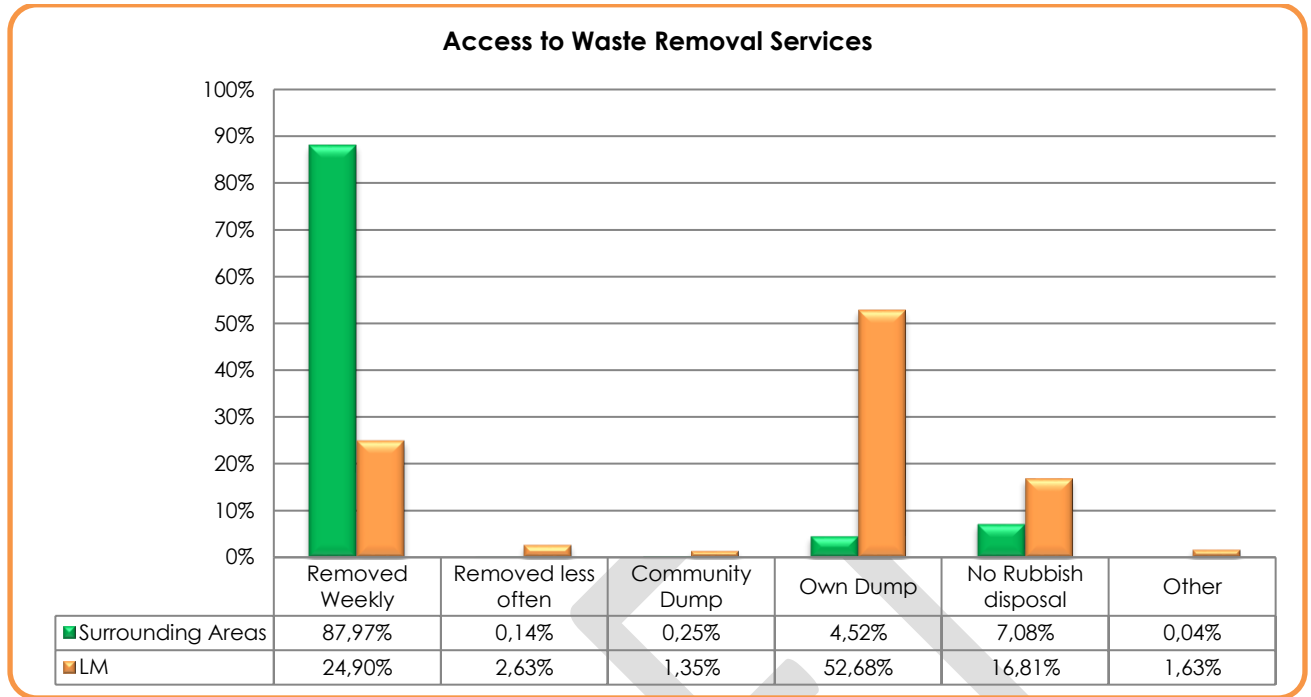
Source: Stats SA, 2011

### 3.8.7 WASTE REMOVAL SERVICES

The graph in Figure 3.10 below depicts the various waste management/ removal methods recorded as being used by the various households within the study area and the overall Municipality.

As much as 87.97% of households within the study area indicated that their waste was removed weekly, whilst 4.52% indicated that they utilised their own dump. The figures from the graph indicate that 24.90% of the households in the uMvoti Municipality had their refuse collected once a week and 2.63% collected less often than on a weekly basis. Approximately 52.68% of the local municipality use their own dumps.

**Figure 3.10: Access to Waste Removal Services**



Source: Stats SA, 2011

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## 4 ENGINEERING SERVICES

A Preliminary Engineering Design Report was prepared by Bigen Africa Services in May 2022 (updated in October 2022) and is attached as **Appendix H1**.

### 4.1 BULK AND LINE SERVICES

#### 4.1.1 BULK SEWERAGE

Umzinyathi District Municipality is the Water Services Authority that is responsible for water and sanitation services for the project area. The District Municipality indicated that there is no future development in respect of bulk sanitation services (sewage treatment, outfall sewers and pump station) are planned for the short term.

The closest existing sewage treatment facility is in Greytown approximately 1.5km downstream from the proposed development, but this treatment works has reached its maximum treatment capacity and cannot accommodate any further effluent inflows until it has been upgraded. The estimated sewage outflow from the proposed development is 433Kℓ/day. The uMvoti WWTW is currently operating at 41% above its operating design capacity of 3.2Mℓ/day. Adding the additional sewage outflow from this development will worsen the scenario. It is therefore proposed that 2 options be investigated:

Option 1: Applying from WSIG funding to refurbish and upgrade the existing Greytown WWTW from a 3.2Mℓ/day plant to a 5.5Mℓ/day plant.

Option 2: Applying for funding from DoHS, supplemented from the LM/DM budget for a Waste Water Package Treatment Plant for the proposed development only.

The first option proposed by the project engineer to refurbish and upgrade the existing Greytown WWTW from a 3.2Mℓ/day plant to a 5.5Mℓ/day plant, may take a while for it to be undertaken and be in operation. As such, due to the high demand for housing within the Umvoti Municipality, and the need for the proposed eNhlalakahle Phase 2 Housing Development, the Applicant (the Umvoti Local Municipality) therefore opted for the second option that was proposed to construct an onsite waste water package treatment plant for the proposed development only. The proposed development layout plan has made provision for the on-site waste water package treatment plant by earmarking a stand located to the western portion of the site as 'Municipal'.

The proposed waste water package treatment plant will be a Turnkey-Modular Activated Sludge Treatment Plant above ground and will have a capacity of 500m<sup>3</sup>/day (2 x lines – each calculated at 250m<sup>3</sup>). Figures 4.1 and 4.2 illustrate a treatment line and treatment process of a typical waste water package treatment plant, respectively.

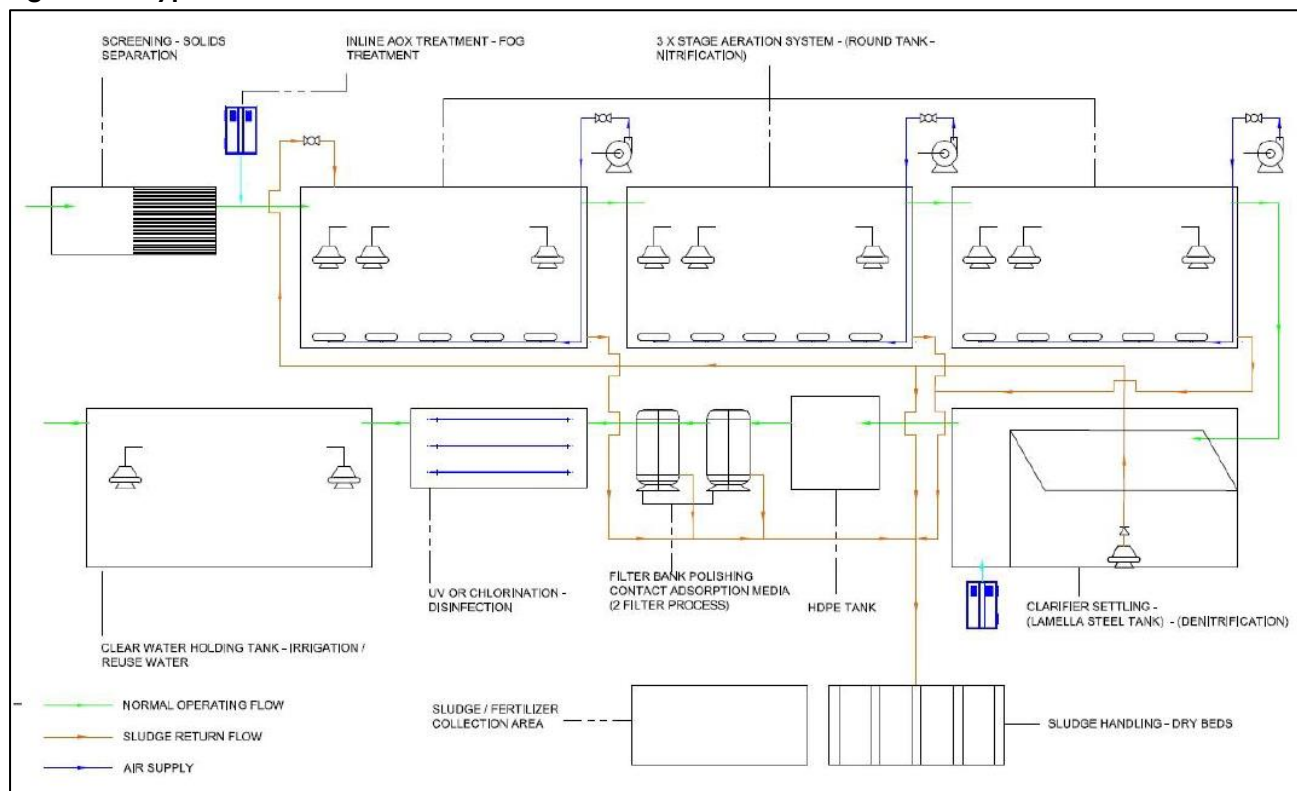


**Figure 4.1: Typical Treatment Line**



Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

**Figure 4.2: Typical Treatment Process**



Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

## 4.1.2 BULK WATER SUPPLY

The uMzinyathi District Municipality is the Water Services Authority (WSA) for this area and is responsible for providing the required water services in the area. Any additions or changes to the bulk infrastructure would have to be included in the Water Master Plan of the uMzinyathi District Municipality as the WSA.

There is an existing 5Mℓ concrete reservoir along the R74 approximately 2km north of the proposed site, however, because of the position of the development there is areas in the eastern section the lies higher than the existing concrete reservoir. It is therefore proposed that a 35Kℓ elevated storage tank be constructed on the most north-eastern stand of the development (proposed zoning to be municipal) to supply the be proposed development with adequate pressure and water flow, as part of this bulk proposal, a pumpstation should be constructed along the at the existing concrete reservoir site to pump potable water via a 160ømm uPVC pipeline to the proposed elevated tank site.

Funding for the proposed 35Kl elevated tank, pumpstation and pump line will have to be sourced/applied for from the Department of Water and Sanitation through the LM/DM MIG funding programme.

In their letter dated 7 June 2018, the Umzinyathi District Municipality indicated that they were in process of implementing a bulk water project from Craigieburn Dam to Greytown (see Letter from District attached as **Appendix H4**). The project would deliver up to 12 megalitres of raw water to the Greytown Water Treatment Plant. According to the letter, the District anticipated that the pipeline would have been commissioned by December 2018, in which case there would be adequate treated water to accommodate the proposed development.

### 4.1.3 BULK ELECTRICITY AND EXISTING ELECTRICAL INFRASTRUCTURE

Eskom is the bulk electrical supplier to the Umvoti Local Municipality.

Currently there is an Eskom HV transmission line (400kV) running past Greytown towards the western side, namely;

- Chivelston/Mersey 3 400kV line

There is also an Eskom MV transmission line (11kV) traversing the proposed development in the south-western corner. A servitude will have to be registered for this line.

- Greytown NB54 line

## 4.2 INTERNAL ENGINEERING SERVICES

### 4.2.1 SANITATION

It was proposed that upgradeable ventilated improved pit latrines (VIP's) be provided to each new stand, however the Umvoti Local Municipality was not in favour of this and instead requested full waterborne sanitation.

As discussed above in Section 4.1.1, uMzinyathi District Municipality indicated that the Waste Water Treatment Works is running above its design capacity and cannot allow any more waste water to the treatment works at this stage. As such, an onsite waste water package treatment plant for the proposed development only is being proposed.

The internal sewer network consists mainly of 160mm and 200mm diameter uPVC pipelines with a total length of 12 861m in length.

#### 4.2.1.1 Design Standards

The design of the sewer network will inter alia be based on uMzinyathi District Municipality's design standards and the design standards and criteria as set out in the "Guidelines for the Human Settlement Planning and Design" (RED BOOK). Design norms and standards is provided below:

**Table 4.1: Sanitation Flow Units**

| Description of Consumer  | Daily Flow                                   |
|--|--|
| Residential Households   | 540 l per unit                               |
| School <sup>1</sup>  | 15 l per pupil                               |
| Crèche   | 15 l per pupil                               |
| Municipal / Community Facility   | 400 l per 100m <sup>2</sup> gross floor area |
| Church   | 2000 l per stand                             |
| General industrial development (dry) per 100 m <sup>2</sup> floor area | 300 l  |
| General business and commercial per 100 m <sup>2</sup> floor area      | 800 l  |
| Peak factor (residential flow)   | 2.50   |
| Peak factor (commercial & industrial flow)                             | 2.00   |
| Allowance for extraneous infiltration                                  | 15% of capacity of pipe reserved.            |

Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

**Table 4.2: Sanitation Design Guidelines**

| Parameter                     | Element   | Guidelines   |
|-------------------------------|---|--|
| Minimum pipe diameter         | Gravity sewers  | 160 mm   |
| Minimum velocity at full flow | Gravity sewers  | 0,7 m/s  |
| Design capacity               | All pipes   | d/D = 0,7  |
| Minimum slopes for pipes      | Rodding eye to first manhole<br>160 mm<br>200 mm<br>300 mm and bigger | 1 : 100<br>1 : 200<br>1 : 300<br>1 : 400   |
| Pipe materials                | 110mm to 315mm Diameter<br><br>Larger than 315mm                      | Solid Wall uPVC Class 34 to SANS 791<br><br>Solid Wall uPVC Class 34 to SANS 791                 |
| Location of sewers            | In road reserves<br><br>Midblock                                      | (As per Typical Road Cross sections included in Part G2, Section G2.1)<br><br>1,0m from boundary |
| Distance between Manholes     | All Sewers  | 80m (Max)  |
| Minimum Cover over pipe       | In road reserves<br>On stands   | 1,4 m<br>1,0 m   |

Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

#### 4.2.1.2 System Demand

The total sewer effluent from the proposed eNhlalakahle Phase 2 Housing Development can be calculated as follows:

**Table 4.3: System Demand**

| Land Use               | No. of Erven | Size ha/stand | Area (ha)    | Unit Demand (ℓ/d) | Total Demand (kℓ/d) |
|------------------------|--------------|---------------|--------------|-------------------|---------------------|
| Single residential     | 793          | Varies        | 35.382       | 528               | 418                 |
| Education              | 1            | Varies        | 6.85         | 21.25             | 7.578               |
| Commercial             | 1            | 0.29          | 0.29         | 320               | 4.608               |
| Municipal & Government | 2            | Varies        | 0.10         | 0.4               | 0.4                 |
| Worship                | 1            | Varies        | 1.16         | 320               | 2.576               |
| <b>Sub-Total</b>       | <b>800</b>   |               | <b>44.26</b> | <b>18.34</b>      | <b>433.16</b>       |

Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

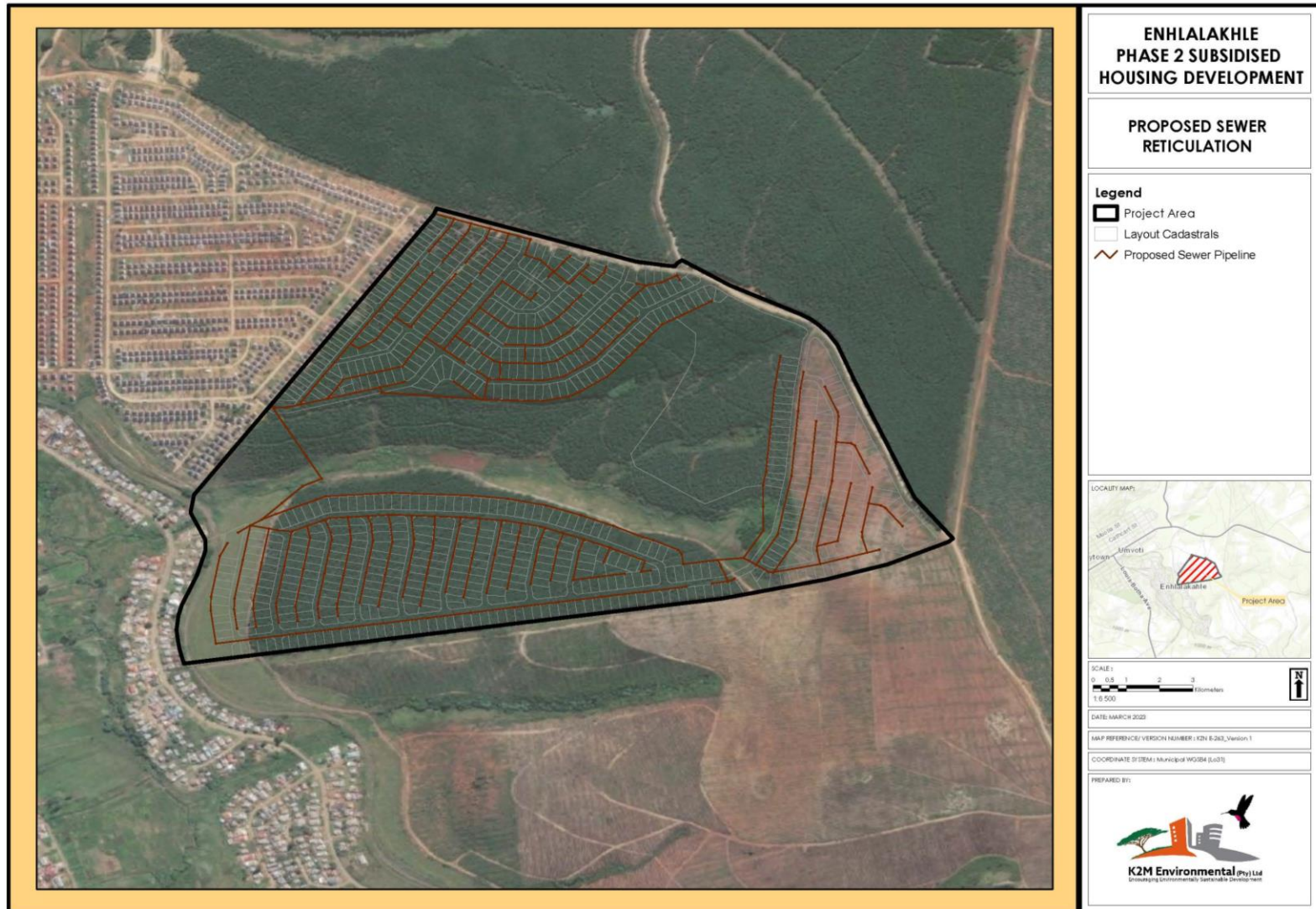
To calculate the peak flows expected within the sewer reticulation it is important to note that the land use type will govern the time of day where a peak in sewerage run-off takes place. As a result, peak flows for residential and non-residential stands will not occur at similar time periods in the day. When a peak flow is therefore calculated, only the sewerage run-off from residential stands is used:

$$\begin{aligned}
 \text{Peak Dry Weather Flow (PDWF)} &= \text{ADWF} / (3,6 \times 24) \times \text{PF} \\
 &= 433.16 / (3,6 \times 24) \times 2.5 \\
 &= 12.53 \ell/s
 \end{aligned}$$

$$\begin{aligned}
 \text{Peak Wet Weather Flow (PWWF)} &= \text{PDWF} \times 1.15 \\
 &= 12.53 \times 1.15 \\
 &= 14.41 \ell/s
 \end{aligned}$$

Map 4.1 below illustrates the proposed sewer reticulation network.

**Map 4.1: Proposed Sewer Reticulation**



## 4.2.2 WATER SUPPLY SCHEME

### 4.2.2.1 Design Standards and Specifications

The design of the potable water network will inter alia be based on uMzinyathi District Municipality's design standards, SANS 10090:2003 and the design standards and criteria as set out in the "Guidelines for the Human Settlement Planning and Design" (RED BOOK). Design norms and standards are provided below:

**Table 4.4: Water Supply Unit Demands**

| Description of consumer  | Daily demand                                 |
|--|--|
| Residential 1 (Subsidised)   | 660 ℓ per unit                               |
| School   | 15 kℓ / ha / day                             |
| Crèche   | 15 kℓ / ha / day                             |
| Municipal / Community Facility   | 400 ℓ per 100m <sup>2</sup> gross floor area |
| Church   | 2000 ℓ per stand                             |
| General industrial development (dry) per 100 m <sup>2</sup> floor area | 300 ℓ  |
| General business and commercial per 100 m <sup>2</sup> floor area      | 800 ℓ  |
| FSR assumed for:   |  |
| Commercial / industrial stands   | 0,55   |
| Municipal (Multi Purpose Centre)                                       | 0,5  |
| Municipal (Bus & Taxi)   | 0,45   |
| Government   | 0,45   |
| Institutional (Churches)   | 0,4  |
| Public Open Space and Cemetery   | No water demand allowed                      |

Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

**Table 4.5: Water Design Guidelines**

| Parameter          | Element  | Guidelines   |       |
|--------------------|--|--|-------|
| Pressure           | Maximum (Static)   | 90m  |       |
|                    | Dynamic Pressure   | Min 20m  |       |
| Flow Velocity      | Residential Areas  | Max 2 m/s (Excluding Fire Flow)  |       |
| Losses             | Secondary  | 10%  |       |
| Fire Flow          | <u>Business Area / Cluster Housing</u> (SANS 10090:2003) |  |       |
|                    | Flow at Hydrant  | 33.3l/s  |       |
|                    | Total Flow   | 150l/s   |       |
|                    | Pressure   | Min 12m (At Abstraction point)   |       |
| Fire Flow          | <u>Single Residential erven</u> (SANS 10090:2003)        |  |       |
|                    | Flow at Hydrant  | 20l/s  |       |
|                    | Total Flow   | 47l/s  |       |
|                    | Pressure   | Min 7m (At Abstraction point)  |       |
| Fire Hydrants      | Spacing  | Business Area: 120m<br>Residential Area: 200m                          |       |
| Water Supply Zones | Number of Stands per zone                                | Max. 1000  |       |
| Maintenance        | Isolation zone size                                      | 600m of pipeline   |       |
|                    | Max Number of valves to isolate a zone                   | 4 valves   |       |
| Piping             | Size   | Min 75mm Dia   |       |
|                    | Material   | uPVC Class Varies  |       |
| Pipe Location      | All Areas  | (As per Typical Road Cross Sections included in Part G2: Section G2.1) |       |
| Cover to Pipes     | Sidewalks  | Min 1m   |       |
|                    | Road Crossings   | Min 1m   |       |
|                    | Across Erven   | Min  | 0,75m |
|                    |  | Max  | 1m    |
|                    | Other services Present                                   | Min  | 0,8m  |
|                    |  | Max  | 1,5m  |

Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

#### 4.2.2.2 Water Demand

The annual average daily demand (AADD) for water of the proposed eNhlalakahle Phase 2 Subsidised Housing Development can be calculated as follows.

**Table 4.6: Annual Average Daily Demand (AADD) – Residential Units**

| Land Use                  | Residential Units | Size ha / stand | Area (ha) | Unit Demand (ℓ/d) | Total Demand (kℓ/d) |
|---------------------------|-------------------|-----------------|-----------|-------------------|---------------------|
| <b>SUBSIDIZED HOUSING</b> |                   |                 |           |                   |                     |
| Residential Households    | 793               | varies          | 35.38     | 660               | 523.38              |
| <b>Sub-Total</b>          | <b>793</b>        |                 |           |                   | <b>523.38</b>       |

Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

**Table 4.7: Annual Average Daily Demand (AADD) – Non-residential Land Uses**

| Land Use                         | No. of Erven | Size ha / stand | Area (ha) | Unit Demand (ℓ/d) | Total Demand (kℓ/d) |
|----------------------------------|--------------|-----------------|-----------|-------------------|---------------------|
| <b>NON-RESIDENTIAL LAND USES</b> |              |                 |           |                   |                     |
| Education                        | 1            | Varies          | 6.86      | 25/scholar        | 12.5                |
| Municipal                        | 2            | Varies          | 0.10      | 100               | 0.2                 |
| Commercial                       | 1            | Varies          | 0.29      | 400               | 2.576               |
| Waterworks                       | 1            | 0.09            | 0.09      | 15                | 1                   |
| Worship/Creche                   | 2            | Varies          | 0.16      | 400               | 2.576               |

Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

Instantaneous peak flow (Peak Factor =4) = 21.81ℓ/s (Whole Development)

#### 4.2.2.3 Internal Water Reticulation

The internal water reticulation was designed utilizing the existing bulk water infrastructure as far as possible, linking to the proposed internal reticulation for individual yard/house connections as agreed with the Local/District Municipality and using information supplied at the time.

The proposed water network consists of the following pipe diameter and lengths:

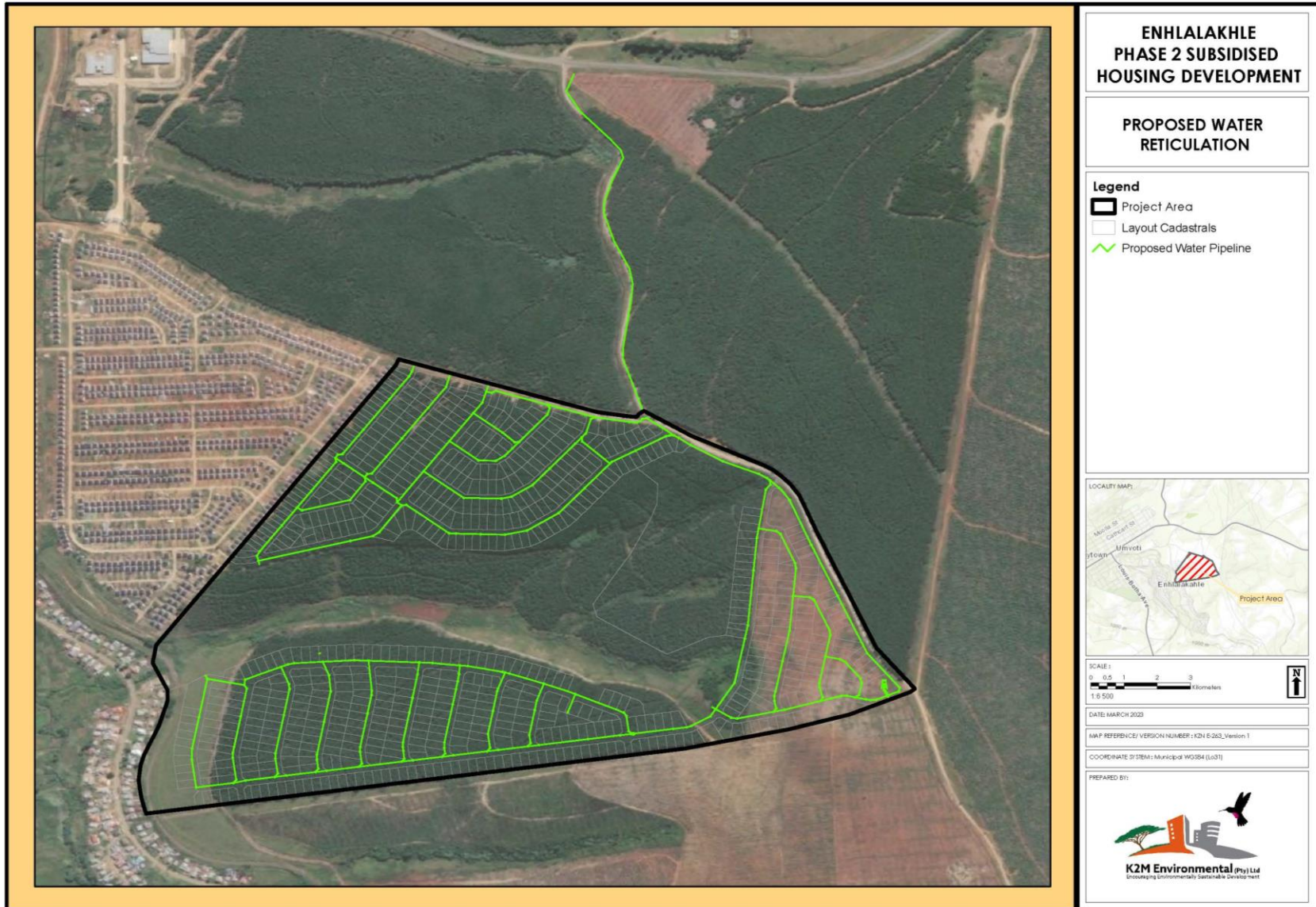
- 75mm diameter = 4388.11m
- 160mm diameter = 3815.81m
- 200mm diameter = 986.95m
- 250mm diameter = 14.490m

The total length of proposed internal water reticulation is 9 205.36m.

Map 4.2 illustrates the proposed internal water reticulation.



**Map 4.2: Proposed Internal Water Reticulation**



### 4.2.3 ROAD INFRASTRUCTURE

The general condition of the local farm / forestry gravel access roads varies. These roads have to some degree already been constructed in some areas to a prescribed standard.

These roads have not been geometrically designed or constructed to any prescribed standards either longitudinally or in its cross section, which was clearly evident during the site visit. In most cases, the majority of these un-numbered local access roads and/or tracks might have to be upgraded, depending on the availability of funds and the location of the target beneficiaries within the proposed development area.

The internal road network for the development will vary road widths and road reserves as included in Table 4.8 below.

**Table 4.8: Length of internal road network**

| Length of Road Reserve (m) | Length of Road Width (m) |
|----------------------------|--------------------------|
| 6 m                        | 3 m                      |
| 8 m                        | 3.5 m                    |
| 10 m                       | 3.5 m                    |
| 12 m                       | 4 m                      |

Source: Preliminary Engineering Design Report, May 2022 (Updated October 2022)

### 4.2.4 ELECTRICITY

The provision of an internal electrical reticulation network is not viewed as a minimum requirement as far as subsidised housing is concerned. Eskom on the other hand, are running their own parallel subsidised electrification programme in the various provinces, which is funded separately by the Department of Mineral and Energy Affairs. The provision of any future electricity supply, area lighting and metered reticulation to the proposed new subsidised top structures will rest with Eskom who are the Services Authority responsible for the planning, supply and network distribution for the area.

## 4.3 STORMWATER MANAGEMENT PLAN

A Stormwater Management Plan for the proposed development was prepared by Bigen Africa Services in March 2023 and is attached as **Appendix H2**.

### 4.3.1 STORMWATER DESIGN

The stormwater infrastructure for the development will be designed to carry the post-development runoff, for both the minor and major stormwater events. The minor and major flood events will be characterized by the 5 and 100 year recurrence intervals, respectively.

The stormwater management plan is required to address some of the expected difficulties on site, such as extreme gradients and high runoff volumes due to new development and the and hardened surfaces (i.e. roads, paving etc.). If the stormwater design does not adequately cater to the needs of

the housing, the proposed project area could potentially be prone to flooding during severe storm/rainfall events. Accordingly, the successful management of stormwater is considered essential.

In general, stormwater within the development will be managed and controlled by means of surface drainage as far as possible within the road reserves. The capacities of the road channels to cater to the required run off volumes has been assessed, and the strategic placement of stormwater drifts has been investigated, to allow water to flow across roads at key points and discharge via channels.

The water will be discharged into the natural flood plain formed by the valley, and discharged via the existing 1.8m culvert, of which the capacity has been assessed and been deemed adequate for controlled throttled release of the runoff post development allowing flows equal to predevelopment to be discharged downstream.

Table 4.9 below provides a summary of the Design Standards of the Stormwater Network

**Table 4.9: Proposed Stormwater Drainage Design Standards**

| Design Criteria                                 | Value   |
|---|---|
| Design flood recurrence interval (Minor Floods) | 1:5   |
| Design flood recurrence interval (Major floods) | 1:50  |
| Pipe System                                     |   |
| Pipe Material (Dia < 200mm)                     | mPVC (SABS 677)   |
| Pipe Material (Dia > 200mm)                     | Concrete (SABS 677)   |
| Minimum pipe size (mm)                          | 160   |
| Manholes material and covers                    | Concrete (SABS 677), Heavy duty cast iron cover and frames in roadways, medium duty concrete precast covers for other scenarios |
| Headwalls                                       |   |

Adapted from: Annexure F of the Stormwater Management Plan, December 2022

### 4.3.2 STORMWATER MANAGEMENT PLAN

The topography of the site is defined by a natural valley along the middle of the site, traversing it from the eastern to western side, to which the natural watercourses drain. The valley acts as a low point, dividing the site into two distinct drainage areas, which can then be further divided based on natural drainage along the ridges into catchments. The Stormwater Design Plan is provided in Figure 4.1 and indicates the channels, proposed connections to natural watercourses and flow paths along the proposed road network.

Open multicell channels along the roads are proposed to direct and convey stormwater runoff emanating from the new developed area. This type of installation is cost effective, requires little maintenance and are not prone to blockages. These channels will concentrate stormwater flow and discharge stormwater into the existing watercourse. Erosion protection structures are proposed at these discharge points.

The existing 1.8m diameter culvert throttles the major storm peak flow to pre development peak flow. It is therefore not required to construct a stormwater attenuation pond downstream of the

development footprint. A litter trap could be constructed at the inlet of the existing 1.8m diameter pipe culvert should it be required.

#### 4.3.2.1 Pre-development Catchments

The predevelopment catchments have been split into 6 areas based on their drainage paths. The majority of the catchments tend to drain toward the natural floodline bisecting the development site.

#### 4.3.2.2 Post Development Catchments

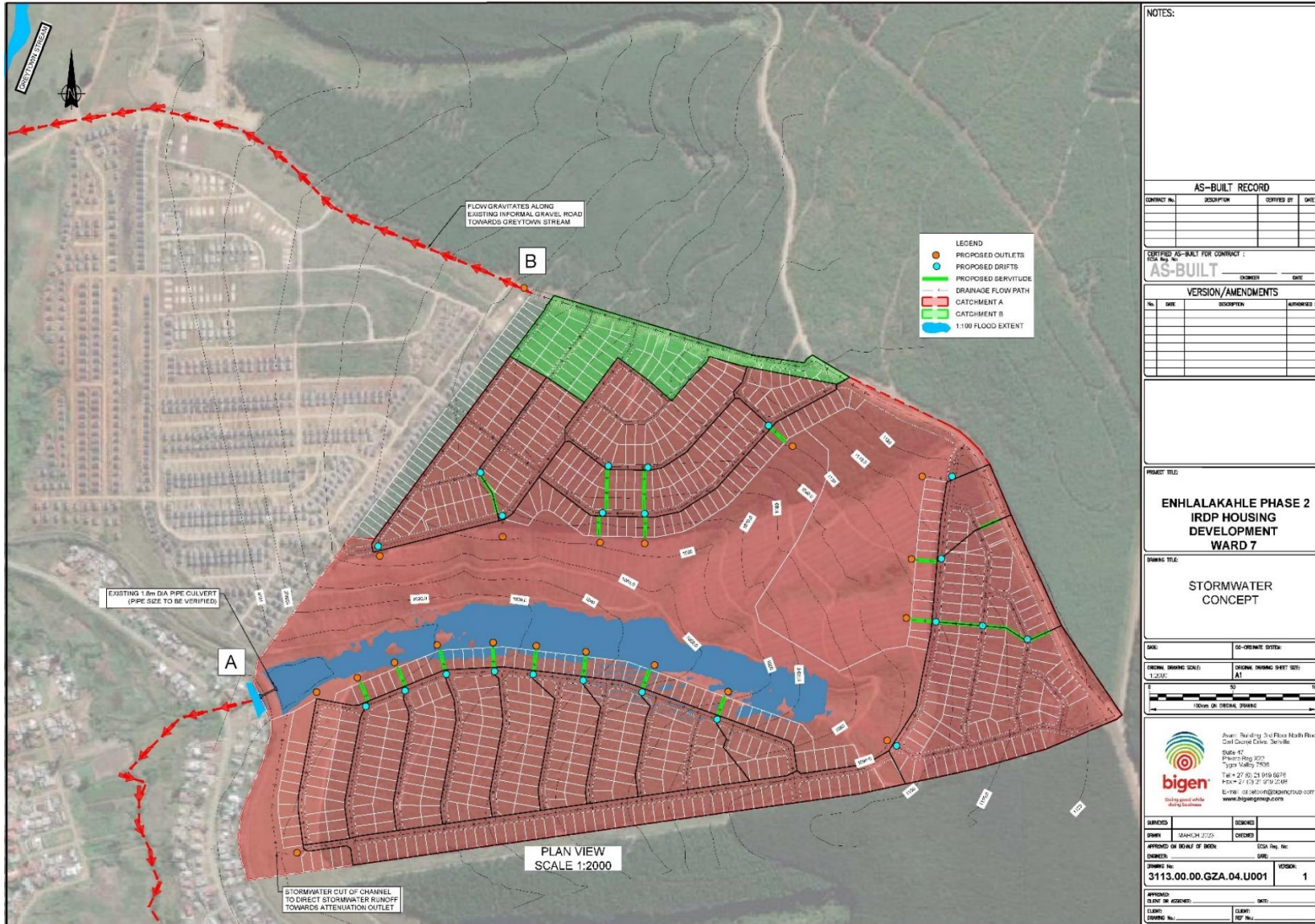
The site has been divided into two major catchments for post development analysis and capacity checks of the channels draining along the proposed roads, as the road networks tend to converge, allowing flow to be collected as it naturally gravitates along each catchment, to two main drainage points. Points A and B depicted on Figure 4.1 below.

The larger catchment (Catchment A) drains to the existing 1.8m diameter pipe culvert as indicated in Figure 4.1. The smaller catchment, Catchment B, has flows which gravitate along the opposite side of a natural ridge on the site.

Stormwater runoff emanating from this catchment flows along the existing gravel road and directly into the Greytown stream. The flows have been deemed small enough that no attenuation or controlled discharge is required and will have no effect on downstream development.

The new catchments tend to follow the same drainage routes as the predevelopment catchments due to extreme slopes on site, cut fill earthwork platform design and ground conditions necessitating the need to follow the existing ground profiles.

**Map 4.3: Proposed and Existing Stormwater Infrastructure (Post Development)**



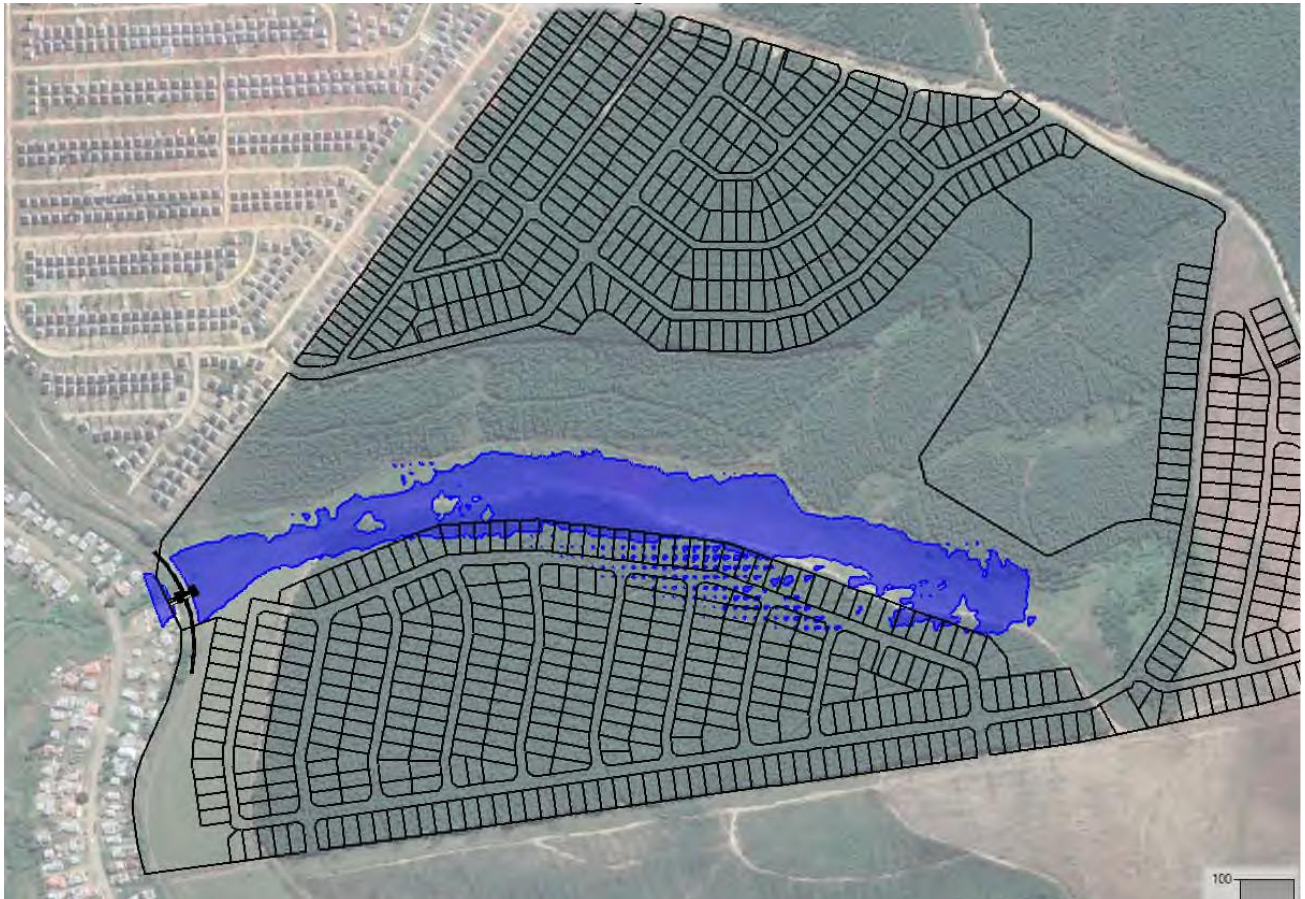
Source: Stormwater Management Plan, March 2023

## 4.4 FLOODLINE ASSESSMENT

A Floodline Report was prepared by Bigen Africa in December 2022 and is attached as **Appendix H3**.

The Floodline was calculated using the US Army Corp of Engineers HEC-RAS model 2D unsteady state. The 1:100 year footprint is graphically depicted in Figure 4.3 below.

**Figure 4.3: 1:100 Year Floodline**



Source: Floodline Report, December 2022

## 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.

##### 5.2.2.1 Footprint

The impacted area extends only as far as the actual footprint of the activity.

##### 5.2.2.2 Site

The impact will affect the entire or substantial portion of the site/property.

##### 5.2.2.3 Local

The impact could affect the area including neighbouring properties and transport routes.

##### 5.2.2.4 Regional

Impact could be widespread with regional implication.

#### 5.2.2.5 National

Impact could have a widespread national level implication.

### 5.2.3 DURATION

The duration of the impact.

#### 5.2.3.1 Short term

The impact is quickly reversible within a period of one year, or limited to the construction phase.

#### 5.2.3.2 Medium term

The impact will have a medium term lifespan (project lifespan 1 – 10 years).

#### 5.2.3.3 Long term

The impact will have a long term lifespan (project lifespan > 10 years).

#### 5.2.3.4 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:

#### 5.2.4.1 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.

#### 5.2.4.2 Low

The activity will have a low impact on the affected environment

#### 5.2.4.3 Medium

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

#### 5.2.4.4 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.



#### 5.2.4.5 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.

#### 5.2.5.1 Improbable

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

#### 5.2.5.2 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).

#### 5.2.5.3 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).

#### 5.2.5.4 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).

#### 5.2.5.5 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).

### 5.2.6 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.

#### 5.2.6.1 No significance

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

#### 5.2.6.2 Low

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

### 5.2.6.3 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.

### 5.2.6.4 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    |

### 5.2.6.5 Abbreviations for tables listed below:

WOM : Without Mitigation  
 WM : With Mitigation  
 O : Operational  
 C : Construction

## 5.2.7 ASSESSMENT OF POTENTIAL IMPACTS

### 5.2.7.1 Physical and landscape characteristics

| Nature  | Phase | Type     | Extent | Duration | Intensity | Probability | WOM    | Mitigation   | WM  |
|---|-------|----------|--------|----------|-----------|-------------|--------|--|-----|
| 1. Clearance of vegetation will lead to alteration of runoff flow volumes and patterns.                                       | C     | Negative | Local  | Short    | Medium    | Medium      | Low    | <ol style="list-style-type: none"> <li>The stormwater management plan (attached as <b>Appendix H2</b>) must be implemented to ensure that runoff velocities will be reduced, and flows discharged into watercourses.</li> <li>Outlet areas in watercourses that will receive runoff must be protected against degradation and soil erosion.</li> <li>Erosion protection measures and dissipator structures must be installed.</li> <li>Stormwater infrastructure must be maintained regularly.</li> </ol>  | Low |
| 2. Degradation of the environmentally sensitive area on site such as the valley bottom wetland during the construction phase. | C     | Negative | Site   | Short    | Medium    | Medium      | Medium | <ol style="list-style-type: none"> <li>Environmentally sensitive areas (demarcated as Conservation on the Development Layout Plan (<b>Appendix D1</b>)) must be clearly demarcated.</li> <li>Layout down yards, construction camps and storage areas must be located outside the valley bottom wetland.</li> <li>The footprint area (areas to be developed) the must be kept a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.</li> <li>All contractors and employees should undergo induction which is to include a component of environmental awareness and be made aware of the Conservation area located on site.</li> </ol> | Low |

### 5.2.7.2 Ecological characteristics

| Nature   | Phase | Type     | Extent    | Duration | Intensity | Probability | WOM    | Mitigation  | WM  |
|--|-------|----------|-----------|----------|-----------|-------------|--------|---|-----|
| 1. Clearance of approximately 1.34 ha of degraded vegetation located within the western portion of the site. | C     | Negative | Footprint | Short    | Minor     | Medium      | Low    | 1. The footprint area (areas to be developed) the must be kept a minimum.<br>2. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas.  | Low |
| 2. Establishment and spread of alien invasive plants on disturbed areas.                                     | C/O   | Negative | Site      | Long     | Medium    | Medium      | Medium | 3. An alien invasive management plan must be compiled and implemented post construction to control existing invaded areas and prevent the growth on cleared areas.<br>4. Limit soil disturbance and minimize unnecessary clearing of vegetation beyond the infrastructure footprints.<br>5. Any exposed earth should be rehabilitated promptly by planting suitable vegetation to protect the exposed soil. | Low |
| 3. Impact on surrounding vegetation during construction (e.g. collection of firewood, veld fires, etc.).     | C     | Negative | Local     | Short    | Medium    | Low         | Low    | 1. No harvesting of firewood from the site or from the areas adjacent to it.<br>2. Under no circumstances are the staff allowed to start a fire.  | Low |

### 5.2.7.3 Soil characteristics and Geology

| Nature   | Phase | Type     | Extent | Duration | Intensity | Probability | WOM    | Mitigation  | WM  |
|--|-------|----------|--------|----------|-----------|-------------|--------|---|-----|
| 1. Increased bare and hardened surfaces leading to increased runoff and potential for erosion. | C/O   | Negative | Local  | Long     | Medium    | Medium      | Medium | 1. Temporary and permanent erosion control methods may include silt fences, flotation silt curtains, retention basins, detention ponds, interceptor ditches, seeding and sodding, riprap of exposed embankments, erosion mats, and mulching.<br>2. Exposed road surfaces awaiting grading must be stabilised to prevent the erosion of these surfaces.<br>3. Signs of erosion must be addressed immediately to prevent further erosion. | Low |

| Nature   | Phase | Type     | Extent | Duration | Intensity | Probability | WOM | Mitigation   | WM  |
|--|-------|----------|--------|----------|-----------|-------------|-----|--|-----|
|  |       |          |        |          |           |             |     | 4. Construction must take place during the dry season (April-September) as much as possible.<br>5. If construction is over a prolonged period, clearing, excavation and foundations must occur in the dry season to reduce the erosion potential of the exposed surfaces.<br>6. All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised, and be surrounded by bunds.<br>7. Erosion and sedimentation into watercourses must be minimised through the effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed banks. |     |
| 2. Soil pollution (cement powder, diesel, oil etc.) during construction. | C     | Negative | Site   | Short    | Medium    | Medium      | Low | 1. Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.<br>2. All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.<br>3. 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      | Low | 1. Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil.   | Low |

#### 5.2.7.4 Ground and Surface Water

| Nature  | Phase | Type     | Extent | Duration | Intensity | Probability | WOM    | Mitigation  | WM  |
|---|-------|----------|--------|----------|-----------|-------------|--------|---|-----|
| 1. Shallow subsurface water that occurs during the rainy seasons at the interface between the shallow | C     | Negative | Site   | Long     | Medium    | Medium      | Medium | 1. The requirement of subsoil drainage should be investigated at the Design Development Stage of the project. | Low |

| Nature  | Phase | Type     | Extent | Duration | Intensity | Probability | WOM    | Mitigation   | WM  |
|---|-------|----------|--------|----------|-----------|-------------|--------|--|-----|
| bedrock and the residual soils.   |       |          |        |          |           |             |        |  |     |
| 2. Increase in sediments inputs and turbidity of valley bottom wetlands.  | C     | Negative | Site   | Long     | Medium    | Medium      | Medium | 2. Ensure soil stockpiles and concrete / building sand are sufficiently safeguarded against rain wash.<br>3. Layout down yards, construction camps and storage areas must be located outside the valley bottom wetland.<br>4. Silt traps and fences must be placed in the preferential flow paths along the road to prevent sedimentation of the watercourse.<br>5. Erosion and sedimentation into watercourses must be minimised through the effective stabilisation (gabions and Reno mattresses) and the re-vegetation of any disturbed banks.  | Low |
| 3. Contamination and pollution of valley bottom wetlands with hydrocarbons due to leaks and spillages from machinery, equipment & vehicles. | C/O   | Negative | Site   | Long     | High      | Low         | Medium | 1. The contractors used for the project should have spill kits available to ensure that any fuel or oil spills are clean-up and discarded correctly.<br>2. All chemicals and toxicants to be used for the pipeline construction must be stored outside the valley bottom wetland and in a bunded area.<br>3. All machinery and equipment should be inspected regularly for faults and possible leaks, these should be serviced off-site.<br>4. Have action plans on site, and training for contactors and employees in the event of spills, leaks and other impacts to the aquatic systems.<br>5. Adequate sanitary facilities and ablutions must be provided for all personnel during the construction phase. | Low |
| 4. Potential leakage of sewage from the proposed sewerage pipeline that crosses the valley bottom wetland.                                  | C/O   | Negative | Site   | Long     | High      | Medium      | High   | 1. The proposed pipeline system must be divided up into 100 m intervals. Each interval's soil must be stockpiled and filled back up (in the correct order) to avoid long periods of stockpiling.<br>2. Ensure that sewerage is contained within not allowed to flow, whether by accidental spill / blockage or any 'other means' into the valley bottom wetland.   | Low |

| Nature | Phase | Type | Extent | Duration | Intensity | Probability | WOM | Mitigation  | WM |
|--------|-------|------|--------|----------|-----------|-------------|-----|---|----|
|        |       |      |        |          |           |             |     | 3. If a sewage leak does occur it must be reported to DWS and the local municipality. |    |

#### 5.2.7.5 Archaeological, historical and cultural significance

| Nature  | Phase | Type     | Extent | Duration | Intensity | Probability | WOM | Mitigation  | WM  |
|---|-------|----------|--------|----------|-----------|-------------|-----|---|-----|
| 1. Impact on sites with valuable archaeological, history and cultural significance    | C     | Negative | Site   | Short    | Minor     | Low         | Low | 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 AMAFA should be notified as soon as possible. | Low |
| 2. Potential impact of finding paleontological material or fossils during earthworks. | C     | Negative | Site   | Short    | Low       | Low         | Low | 1. The construction must be halted in that specific area.<br>2. A Palaeontologist and KZN AMAFA must be notified immediately by the ECO.  |     |

#### 5.2.7.6 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) |

### 5.2.7.7 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         | Low    | 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 |

### 5.2.7.8 Engineering Services

| Nature   | Phase | Type     | Extent   | Duration | Intensity | Probability | WOM    | Mitigation  | WM  |
|--|-------|----------|----------|----------|-----------|-------------|--------|---|-----|
| 1. Insufficient capacity of the Waste Water Treatment Works to accommodate the effluent from the proposed development. | O     | Negative | Regional | Long     | High      | High        | High   | 1. An onsite waste water package treatment plant is proposed to treat effluent from the proposed development.<br>2. The development layout plan has made provision for the on-site waste water package treatment plant by earmarking a stand located to the western portion of the site as 'Municipal'. | Low |
| 2. Potential malfunctioning of the proposed onsite waste water treatment plant.  | O     | Negative | Site     | Medium   | Medium    | Low         | Medium | 1. The developer must ensure that regular maintenance and monitoring of the system must be undertaken.<br>2. An action plan must be set in place in the event of leaks and bursts of the sewage pipeline during the operational phase as well as plan for loadshedding.                                 | Low |
| 3. The proposed onsite waste water package plant may cause odour nuisance to the future residents.                     | O     | Negative | Local    | Long     | Low       | Medium      | Medium | 3. The developer must ensure that regular maintenance and monitoring of the system must be undertaken.  | Low |



| Nature   | Phase | Type     | Extent | Duration  | Intensity | Probability | WOM    | Mitigation   | WM  |
|--|-------|----------|--------|-----------|-----------|-------------|--------|--|-----|
| 4. Capacity of road network to handle additional traffic generated from the proposed development.  | O     | Negative | Local  | Short     | Low       | Low         | Low    | 4. It must be ensured that a backlog of traffic does not develop at access points during peak hours during the construction phase.   | Low |
| 5. 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. | O     | Negative | Local  | Permanent | Medium    | Medium      | Medium | 1. The Stormwater Management attached as <b>Appendix H2</b> must be implemented.   | Low |
| 6. Impacts associated with poor waste management during construction and operational phases.   | C/O   | Negative | Site   | Long      | Medium    | Low         | Low    | 1. All waste generated on-site during construction must be adequately managed.<br>2. Separation and recycling of different waste materials should be supported.<br>3. No dumping of construction material on-site may take place.<br>4. The contractor should supply waste collection bins and all solid waste collected must be disposed of at a licensed disposal facility.<br>5. During the operational phase, waste should be removed weekly by the Municipal Waste Removal Service. | Low |

### 5.2.7.9 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.).<br>2. Some phases of construction may cause odours that are detectable over some distance | C/O   | Negative | Local  | Short    | Low       | Medium      | Low | 1. Air filters on all mechanized equipment must be properly designed and maintained.<br>2. Onsite burning of waste is not permitted.<br>3. A dust suppression programme should be implemented by means of periodic water sprinkling.<br>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 |

| Nature  | Phase | Type                  | Extent | Duration | Intensity | Probability | WOM    | Mitigation   | WM  |
|---|-------|-----------------------|--------|----------|-----------|-------------|--------|--|-----|
| (e.g. burning of plastic containers and bags).<br>3. Impact on the ambient air quality due to vehicle tailpipe emissions from increased traffic volumes.                        |       |                       |        |          |           |             |        |  |     |
| 4. Increase in ambient noise level affecting surrounding properties during construction.  | C/O   | Negative              | Local  | Short    | Low       | Medium      | Medium | 1. Silencers on diesel-powered equipment must be properly designed and maintained.<br>2. Construction activities should be limited to normal office hours.<br>3. Adjacent landowners should be notified of extremely noisy activities at least 24 hours prior to such activities commencing.<br>4. Construction should take place between 07:00-17:00, Mondays to Fridays. | Low |
| 5. Visual impact of development on landscape ("sense of place").  | C/O   | Negative/<br>Positive | Local  | Long     | Medium    | High        | Low    | 1. Ensure that the Architectural design is sympathetic to the surrounding areas.<br>2. All construction material must be stored in one place out of the direct eyesight of pedestrians.<br>3. The Architectural code must be adhered to during construction.   | Low |
| 6. 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        | Low    | 1. Avoid shiny metals in structures. If possible shiny metal structures should be darkened or screened to prevent glare.<br>2. Night-time light sources must be directed away from residential areas.<br>3. Incorporate measures for visual screening (e.g. using shade cloth) in the EMPr.<br>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

An impact statement is required as per the NEMA regulations with regards to the proposed development. 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. The proposed project may result in short and long term negative impacts during the construction phase such as the establishment of alien invasive species, clearance of vegetation and increase in bare surfaces which leads to the alteration of runoff flow volumes and patterns. During the operational phase of the proposed development, significant impacts include potential leakage of sewage from the proposed sewerage pipeline that crosses the valley bottom wetland. Whilst these impacts can be rated as being of medium to high significance, they can be reduced to an acceptable level provided that the mitigation measures as proposed in this Draft BAR, Wetland Report, Stormwater Management Plan and EMP 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 Municipality.   | Construction of a sewage pipelines across the valley bottom wetland.                |
| The proposed development will assist in reducing the establishment of informal settlements within the Municipality through the provision of housing opportunities to suitable / qualifying beneficiaries. | Potential risks of the onsite sewage package plant as a result of poor maintenance. |
| Basic services such as water and sanitation will be provided.   |   |
| Employment opportunities during the construction phase of the development.  |   |
| Potential employment opportunities will be available during the operational due to the secondary school and commercial land uses that are proposed.   |   |
| Optimal development on the site will reduce security risks and prevent illegal dumping within the project area.   |   |

### 5.3.2 NEED AND DESIRABILITY

The need and desirability for the eNhlalakahle Phase 2 Housing Development is evident in the Umvoti Local Municipal IDP (2022/23) where the need for housing has been identified. The implementation of the housing development will reduce the housing backlog within the municipality as the proposed land for development can include approximately 787 BNG Housing 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**

|   |     |
|---|-----|
| <b>1. Is the activity permitted in terms of the property's existing land use rights?</b>  | NO  |
| The proposed development is not permitted in terms of the existing land use rights. As per the Umvoti Land Use Management Scheme, the proposed site is currently zoned for Agriculture. The land was leased to Mondi for timber plantations; however, Mondi will remove the timber trees to accommodate the proposed subsidised housing project. As part of the town planning application for this project, the site will be rezoned from Agriculture to Residential. The wetland and associated buffer on the site will be demarcated and reserved for conservation purposes.                                    |     |
| <b>2. Will the activity be in line with the following?</b>  |     |
| <b>(a) Provincial Spatial Development Framework (PSDF)</b>  | 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 and will entail the provision of water and sanitation infrastructure and services. Furthermore, the proposed development lies approximately 2.5km south west of Greytown CBD, which will enable future beneficiaries to seek employment in the CBD or surrounding areas.  |     |
| <b>(b) Urban edge / Edge of Built environment for the area</b>  | YES |
| The project area falls within the outskirts of Greytown. As per the Municipal IDP, Greytown has been identified as an area in need of housing and is proclaimed an urban settlement. In addition, the proposed site is directly adjacent to an urban housing development that is currently in the construction phase.   |     |
| <b>(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?).</b>   | YES |
| Human settlement provision has been identified as a key challenge in the Umvoti Municipality's IDP. Furthermore, the eNhlalakahle Phase 2 Subsidised Housing Development has been identified in the Municipal IDP as a prioritized planned urban housing project. As such, the proposed development is aligned with the Municipality's IDP as it entails the construction subsidised residential units together with provision of infrastructure for water and sanitation. The proposed development will therefore not compromise the integrity of the IDP but would rather enhance the objectives of the policy. |     |
| <b>(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?)</b>  | N/A |
| The Umvoti Local Municipality currently does not have an Environmental Management Framework.  |     |
| <b>(f) Any other Plans (e.g. Guide Plan)</b>  | YES |
| According to the Umvoti Municipal Housing Sector Plan, the overall housing backlog within the Municipality in 2022 was 538. In addition, the demand for low income housing (BNG units) will be 5 131 by 2027. As such, once construction of the proposed development is completed, it will assist in reducing the municipal housing backlog / demand. Furthermore, the eNhlalakahle Phase 2 Subsidised Housing Development has been identified in the Municipal Housing Sector Plan as an urban housing project.  |     |

|   |     |    |
|---|-----|----|
| <b>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)?</b>  | YES |    |
| Please see above (2c).  |     |    |
| <b>4. Does the community/area need the activity and the associated land use concerned (is it a societal priority)?</b>  | YES |    |
| The implementation of the housing development will assist in reducing the establishment of informal settlements and reduce the housing backlog within the Municipality. The proposed development will also include the provision of waste and sanitation infrastructure as well other supporting land uses.   |     |    |
| <b>5. 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)?</b>   | YES |    |
| The Department of Human Settlements together within the Umvoti Local Municipality will be responsible for the construction of the proposed subsidised housing units. The proposed Enhlalakahle Phase 2 Housing Development has been identified in the Municipal IDP and Housing Sector Plan.  |     |    |
| <b>6. Is this project part of a national programme to address an issue of national concern or importance?</b>   | YES |    |
| 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 can be utilised by low income earners.  |     |    |
| <b>7. 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.)</b>  | YES |    |
| The site proposed for development is currently vacant, the cultivated tree plantations will be cleared for development. As indicated the Municipal IDP, the Greytown area has been identified as an area in need of housing. In addition, the proposed site is directly adjacent to the eNhlalakahle Phase 1 Subsidised Housing Project as well as Greytown, which is proclaimed an urban settlement in the Municipality as indicated in the IDP. All environmentally sensitive areas are demarcated and included into the development layout.                              |     |    |
| <b>8. Will the benefits of the proposed land use/development outweigh the negative impacts of it?</b>   | YES |    |
| The purpose of this development is to address the Municipality's housing backlog and need for more houses due to the expanding population and urbanisation.   |     |    |
| <b>9. Will the proposed land use/development set a precedent for similar activities in the area (local municipality)?</b>   | YES |    |
| There are many other proposed housing developments in the municipality as indicated in the Municipal Housing Sector Plan.   |     |    |
| <b>10. Will any person's rights be negatively affected by the proposed activity/ies?</b>  |     | NO |
| 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.   |     |    |
| <b>11. What will the benefits be to society in general and to the local communities?</b>  |     |    |
| <ul style="list-style-type: none"> <li>• Provision of housing opportunities to suitable beneficiaries.</li> <li>• Optimal development of the site.</li> <li>• Provision of education facilities such as a secondary school and creche.</li> <li>• Access to services such as water and sanitation.</li> <li>• Job creation during the construction phase of the proposed development.</li> <li>• Prevent illegal occupation of the land and informal settlements which will affect the existing surrounding community.</li> <li>• Prevention of illegal dumping.</li> </ul> |     |    |

## 6 PUBLIC PARTICIPATION

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

According to Section 41 of the Environmental Impact Assessment Regulations, the following is required for the public participation process:

- a. *Fixing a notice board at a place conspicuous to the public at the boundary or on the fence of*
  - i. *the site where the activity to which the application relates is or is to be undertaken; and*
  - ii. *any alternative site;*
- b. *Giving written notice in any of the manners provided for in section 47D of the Act, to-*
  - 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;*
  - 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;*
  - iii. *the municipal councillor of the ward in which the site or alternative site is situated and any organisation of ratepayers that represent the community in the area;*
  - iv. *the municipality which has jurisdiction in the area;*
  - v. *organ of state having jurisdiction in respect of any aspect of the activity; and*
  - vi. *any other party as required by the competent authority;*
- c. *Placing an advertisement in –*
  - i. *one local newspaper; or*
  - 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;*
- d. *placing an advertisement in at least one provincial newspaper or national newspaper, if the activity has or may have an impact that extends beyond the boundaries of the metropolitan or local municipality in which it is or will be undertaken: Provided that this paragraph need not be complied with if an advertisement has been placed in an official Gazette referred to in paragraph (c)(ii); and*
- e. *using reasonable alternative methods, as agreed to by the competent authority, in those instances where a person is desiring of but unable to participate in the process due to-*
  - i. *Illiteracy;*
  - ii. *disability; or*
  - iii. *any other disadvantage.*

## 6.2 SUBMISSION OF EIA APPLICATION FORM

The Environmental Authorisation application form was completed and submitted to DEDTEA as required by the EIA regulations. Reference Number **DC24/0001/2023** was allocated to the proposed development.

## 6.3 NEWSPAPER ADVERTISEMENTS AND SITE NOTICES

The EIA Regulations require that the proposed project be advertised in a local newspaper. As such, isiZulu and English adverts were published in the iLanga and Greytown Gazette Newspapers and on the 06<sup>th</sup> and 07<sup>th</sup> of April 2023, respectively (see **Appendix I1** for the wording of the English and IsiZulu Adverts). A copy of the tear sheets will be provided in the Final BAR.

Site Notices were also placed at various locations on the site boundary to ensure that it is visible and accessible (see **Appendix I2** for a copy of the site notice). The purpose of the advertisements and site notice's is to notify I&APs of the EIA process for the proposed development and to invite them to register as I&APs.

In addition to the site notices and newspaper adverts, background information documents (**Appendix I3**) were distributed to households adjacent to the proposed site.

## 6.4 PUBLIC CONSULTATION MEETING

A public meeting will be held should there be a number of concerns from Registered Interested and Affected Parties. The purpose of the meeting will be to address any issues and queries. Copies of the meetings and minutes will be included as part of the Final BAR, if any.

## 6.5 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.

## 6.6 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.

## 6.7 DISTRIBUTION OF DRAFT BASIC ASSESSMENT REPORT

The following governmental and non-government authorities were provided with a copy of the Draft Basic Assessment Report for comment.

- KwaZulu Natal Department of Economic Development, Tourism and Environmental Affairs
- KwaZulu Natal Department of Agriculture and Rural Development
- KwaZulu Natal Department of Agriculture, Forestry and Fisheries
- KwaZulu Natal Department of Water and Sanitation
- KwaZulu Natal Department of Education
- KwaZulu Natal Department of Transport
- uMzinyathi District Municipality
- Umvoti Local Municipality
- Greytown Public Library
- Ezemvelo KZN Wildlife
- Ward Councillor
- KZN AMAFA

The following were provided with a copy of the Background Information Document for comment:

- Eskom



## 7 SUMMARY RECOMMENDATIONS OF EAP

### 7.1 RECOMMENDATIONS

- An alien invasive plant management plan needs to be compiled and implemented post construction to control current invaded areas and prevent the growth of invasive on cleared areas.
- The portion of the site demarcated for conservation as per the development layout plan must be managed accordingly for conservation purposes.
- An action plan must be set in place in the event of leaks and bursts of the sewage pipeline during the operational phase.
- An action plan must be set in place for any failures at the on-site waste water package treatment plant.
- The Developer must ensure that regular maintenance and monitoring of the on-site waste water package treatment plant is undertaken to prevent any malfunctioning of the plant.
- A rehabilitation plan must be compiled for the housing development and the proposed sewer pipelines. This must include the entire unchannelled valley bottom wetland located within the development footprint, the drainage line leading into this wetland, and the channelled valley bottom wetland leading into the floodplain wetland towards the west of the development.

### 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 recommended by Specialists 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 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.

DRAFT