



ENVIRONMENTAL MANAGEMENT PROGRAMME (EMPR)

THE PROPOSED DEVELOPMENT OF ERF 1327 AND 1328,
STRUBENSVALLEI EXT 24, CITY OF JOHANNESBURG

Comment Period: 1 December 2021 – 1 February 2022

Proponent:

Renico Construction (Pty) Ltd.

Project Reference:

22040-Strubensvallei Ext 24

Report Date:

December 2021





Report Reference:

22040-EMPR-1

DOCUMENT CONTROL

Project Name	The Proposed Development of Erf 1327 And 1328, Strubensvallei Ext 24, City of Johannesburg
Report Title	Environmental Management Programme (EMPr)
Authority Reference Number	GAUT 002/21-22/E2896
Report Status	Public Review

Applicant Name	Renico Construction (Pty) Ltd
-----------------------	--------------------------------------

	Name	Signature	Date
Document Compilation	Ms. V Stippel (MSc. Animal, Plant and Environmental Science). Reg. EAP Pr.Sci.Nat.		2021/12
Document Compilation	Mr. D. J. Meintjes (B.Sc. Hons. Geog & Env. Man.) (<i>Cum Laude</i>) Cand.Nat.Sci.(Pending)		2021/12
Document Review	Mr. D. Botha (M.A. Env.Man.) (PHED) Wetland Specialist Reg. EAP Pr.Sci.Nat.		2021/12
Document Signoff	Mr. D. Botha (M.A. Env.Man.) (PHED) Wetland Specialist Reg. EAP Pr.Sci.Nat.		2021/12

DOCUMENT PROGRESS

Distribution List

Date	Report Reference Number	Document Distribution	Number of Copies
1 December 2021	22040-BAR-1	GDARD	Online and hard copy
1 December 2021	22040-BAR-1	I&APS	PDF
1 December 2021	22040-BAR-1	City of Johannesburg, Johannesburg Road Agency, Department of Human Settlements, Water and Sanitation	PDF
1 December 2021	22040-BAR-1	SAHRA and PHR-G	PDF upload to SAHRIS

Amendments on Document

Date	Report Reference Number	Description of Amendment

INDEMNITY AND CONDITIONS RELATING TO THIS REPORT

The findings, results, observations, conclusions and recommendations given in this report are based on the author's best scientific and professional knowledge as well as available information. The report is based on survey and assessment techniques which are limited by time and budgetary constraints relevant to the type and level of investigation undertaken and Prism Environmental Management Services and its staff reserve the right to modify aspects of the report including the recommendations if and when new information becomes available from ongoing research or further work in this field, or pertaining to this investigation.

Although Prism Environmental Management Services exercises due care and diligence in rendering services and preparing documents, Prism Environmental Management Services accepts no liability, and the client, by receiving this document, indemnifies Prism Environmental Management Services and its directors, managers, agents and employees against all actions, claims, demands, losses, liabilities, costs, damages and expenses arising from or in connection with services rendered, directly or indirectly by Prism Environmental Management Services and by the use of the information contained in this document.

This report must not be altered or added to without the prior written consent of the author. This also refers to electronic copies of this report which are supplied for the purposes of inclusion as part of other reports, including main reports. Similarly, any recommendations, statements or conclusions drawn from or based on this report must make reference to this report. If these form part of a main report relating to this investigation or report, this report must be included in its entirety as an appendix or separate section to the main report.

COPYRIGHT

Copyright on all documents, drawings and records, whether manually or electronically produced, which form part of the submission and any subsequent report or project document, shall vest in Prism Environmental Management Services.

The client, on acceptance of any submission by Prism Environmental Management Services and on condition that the client pays to Prism Environmental Management Services the full price for the work as agreed, shall be entitled to use for its own benefit:

- The results of the project;
- The technology described in any report; and
- Recommendations delivered to the client.

Should the applicant wish to utilise any part of, or the entire report, for a project other than the subject project, permission must be obtained from Prism Environmental Management Services to do so. This will ensure validation of the suitability and relevance of this report on an alternative project.

TABLE OF CONTENTS

1	INTRODUCTION.....	8
1.1	OVERVIEW	8
1.2	PROJECT LOCATION.....	9
1.3	ALTERNATIVES	9
2	EMPR REQUIREMENTS AND REPORT OUTLINE.....	5
3	DETAILS OF THE EAP	7
4	PROJECT DESCRIPTION AND ACTIVITIES, ASPECTS, AND IMPACTS	8
4.1	PROJECT DESCRIPTION.....	8
5	ENVIRONMENTAL SENSITIVITY	14
6	GOALS AND OBJECTIVES	16
6.1	KEY OBJECTIVES OF THE EMPR	16
6.2	IMPACT MANAGEMENT OUTCOMES.....	16
7	GENERAL ROLES AND RESPONSIBILITIES	19
7.1	COMPETENT AUTHORITIES	19
7.2	AUTHORISATION HOLDER.....	20
7.3	CONSULTANTS	20
7.4	CONTRACTORS.....	20
7.5	INDEPENDENT ECO	21
8	ENVIRONMENTAL AWARENESS PLAN	23
8.1	MEETINGS	23
8.2	EMPR TRAINING.....	24
8.3	INDUCTION TRAINING.....	24
9	WASTE MANAGEMENT PLAN	25
9.1	LEGAL REQUIREMENTS	25
9.2	WASTE HIERARCHY.....	25
9.3	WASTE MANAGEMENT ACTIONS.....	26
10	EMERGENCY PREPAREDNESS PLAN	29
10.1	POTENTIAL EMERGENCIES	29
10.2	EMERGENCY PLAN	29
11	MONITORING PROGRAMME.....	31

11.1	COMPLIANCE MONITORING AND AUDITING.....	32
11.2	PENALTIES.....	33
12	EMPR	35
12.1	PRE-CONSTRUCTION.....	35
12.2	CONSTRUCTION	39
12.3	OPERATION.....	62
13	APPENDICES.....	66
13.1	PROPOSED RESCUE AND RELOCATION PLAN FOR THE RED DATA LISTED PLANT SPECIES, <i>HYPOXIS HEMEROCALLIDEA</i> AND <i>BOOPHONIA DISTICHA</i> FOUND ON THE PROPOSED DEVELOPMENT SITE	66

LIST OF FIGURES

FIGURE 1-1: LOCALITY MAP.....	1
FIGURE 1-2: AERIAL LOCALITY MAP.....	2
FIGURE 1-3: PROPOSAL.....	3
FIGURE 1-4: ALTERNATIVE 1	4
FIGURE 4-1: EXTERNAL WATER CONNECTION.....	9
FIGURE 4-2: SEWER LAYOUT	10
FIGURE 4-3: INTERNAL STORMWATER AND STORMWATER ATTENUATION	11
FIGURE 4-4: ACCESS ROAD	12
FIGURE 5-1: OVERALL SENSITIVITY MAP	15
FIGURE 7-1: ROLES AND RESPONSIBILITIES.....	22
FIGURE 9-1: WASTE HIERARCHY	26

LIST OF TABLES

TABLE 2-1: CONTENTS OF EMPr	5
TABLE 3-1.: DETAILS OF THE EAP.	7
TABLE 4-1: DETAILS OF PLANNED DEVELOPMENT.....	8
TABLE 4-2: OPERATIONAL HOURS FOR CONSTRUCTION PHASES.	13
TABLE 7-1.: DETAILS OF THE APPLICANT.	20
TABLE 11-1: METHOD OF MONITORING IMPLEMENTATION OF EMPr	31
TABLE 11-2: DESCRIPTION OF SCORING DURING EVALUATION OF THE FINDINGS	33
TABLE 12-1: MANAGEMENT MEASURES TO BE IMPLEMENTED DURING PRE-CONSTRUCTION.....	36
TABLE 12-2: MANAGEMENT MEASURES TO BE IMPLEMENTED DURING CONSTRUCTION	40
TABLE 12-3: MANAGEMENT MEASURES TO BE IMPLEMENTED DURING OPERATION.	63

1 INTRODUCTION

1.1 Overview

The proposed Strubensvallei Ext. 24 will involve the development of Erf 1327 and Erf 1328. The following rights are applicable to Erf 1327:

- Zoning: Residential 3
- Site Area: 1.9724 ha
- Height 3 Storeys (with council consent))
- Coverage 40%
- Floor Area Ratio (FAR) 0.4
- Density 40 units per hectare
- Number of units 72 units
- Number of Parking Bays: 166 parking bays
- Refuse Area Details 41 m²

Erf 1328 will not be developed but will remain public open space.

The site is affected by the future Metro Boulevard planned by the Johannesburg Roads Agency which is excluded from the project footprint. Necessary access, internal roads and services will also be put in place as follows:

- Water Services - A new 110 mm diameter mPVC pipe (SANS 1283) will be put in place within the new access road and will connect to this existing pipe. The length of this connection is approximately 180m.
- Sewer Services - A new 160mm-diameter uPVC CL 400 H/D pipe will connect into the existing sewer system by means of a new manhole. This new connection pipeline is approximately 51m in length.
- Stormwater services - An internal stormwater reticulation system will be put in place and will utilize 160mm and 300mm pipes to direct stormwater to 300mm and 375mm OGEE pipe which will run down the eastern side of the development and lead to a stormwater attenuation pond which will be approximately 231 m² in extent. From there, a 450mm OGEE pipe will discharge water under the proposed Metro boulevard into Erf 1348. The length of this pipe is approximately 79m.
- Access - The site access will be provided from the cul-de-sac intersecting with Fiddle Avenue. As part of the development, this new cul-de-sac and new section of surfaced road extending to the existing Fiddle Avenue road surface will be constructed to council standards and handed over to council upon completion and acceptance of the road infrastructure. This road will include one inbound lane with a minimum width of 3.0m and one outbound lane with a minimum width 4.5m. A 2m paved sidewalk along the northern side of the cul-de-sac will also be provided.

It should be noted that whilst the development includes both Erf 1327 and 1328, the development footprint is limited to Erf 1327 as Erf 1328 will remain as public open space and will not be developed. Further, please note: a townplanning application has been submitted to the City of Johannesburg and the layout plan approved in 2011. Conditions of establishment were subsequently provided on 16 September 2011 and the township proclaimed on 11 March 2014.

1.2 Project Location

The proposed development is located on Erf 1327 and Erf 1328 of Strubensvallei Ext 24, in Region C of City of Johannesburg. The centre coordinates of the site are as follows:

- 26° 7'5.59"S; and
- 27°54'43.29"E

Figure 1-1 and **Figure 1-2** provide the locality and aerial locality map.

1.3 Alternatives

As required by the Environmental Impact Assessment (EIA) Regulations, 2014 (as amended), alternatives have been assessed as part of the Basic Assessment (BA) process. These alternatives relate to the development layout. **Figure 1-3** and **Figure 1-4** provide an overview of the Proposal and alternative.

1.3.1 Proposal

The proposal involves of 72 “Residential 3” units as well as the necessary attenuation outside the wetland and wetland buffer area. Two play areas are also provided (at the entrance of the development and along the south-eastern boundary). Most importantly, this layout includes a 15m buffer area which was requested by the City of Johannesburg.

1.3.2 Alternative 1

In contract, Alternative 1 involves the development of 58 “Residential 3” units. Whilst attenuation is provided, it occurs within Erf 1328 (i.e. within the wetland). In addition, only one small play area is provided. Lastly, no wetland buffer is provided at all. Whilst the wetland to the south of the site will be destroyed by the development of Metro Boulevard, COJ has requested a 15m buffer and this layout does not meet this requirement.

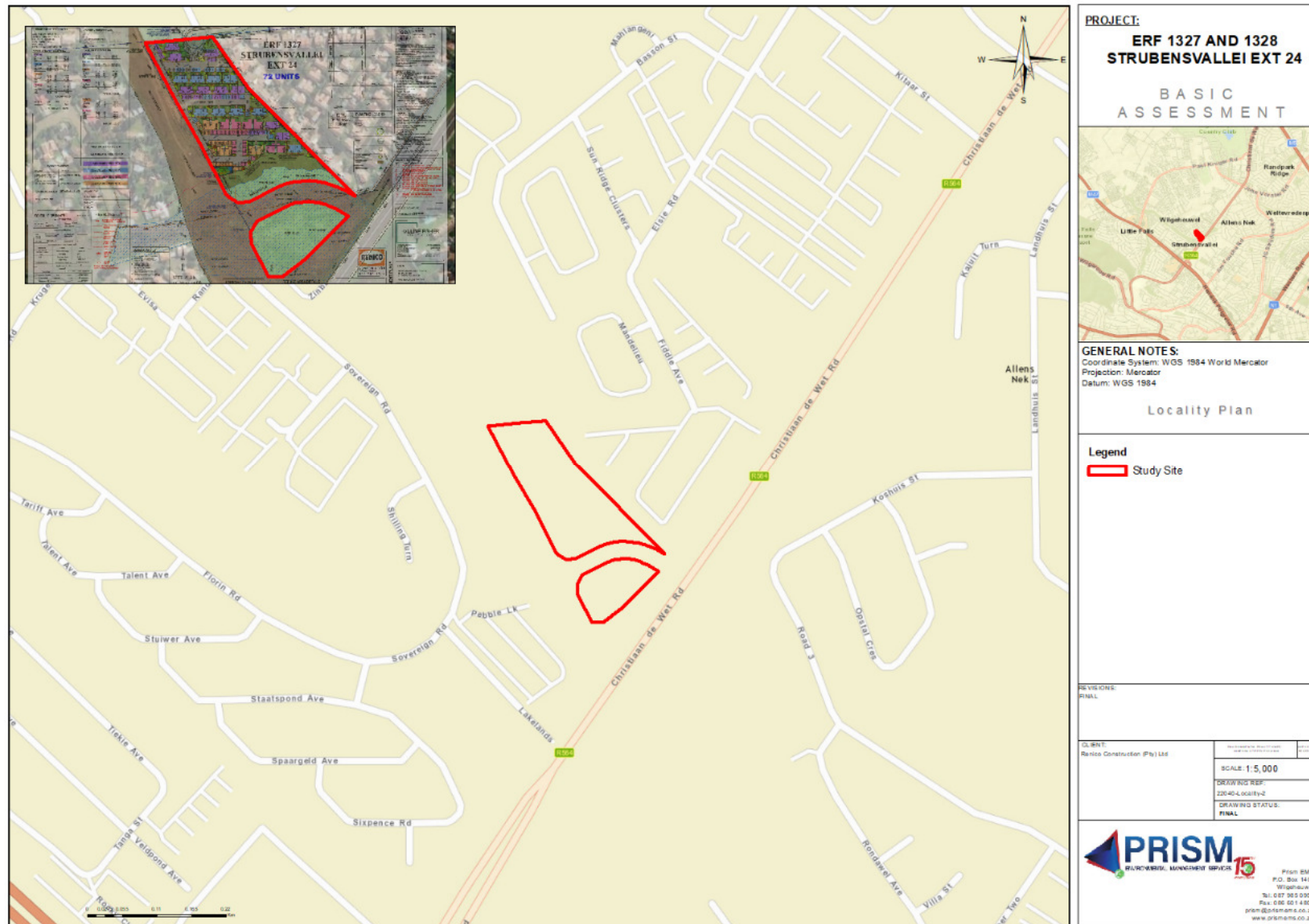


Figure 1-1: Locality Map



Figure 1-2: Aerial Locality Map

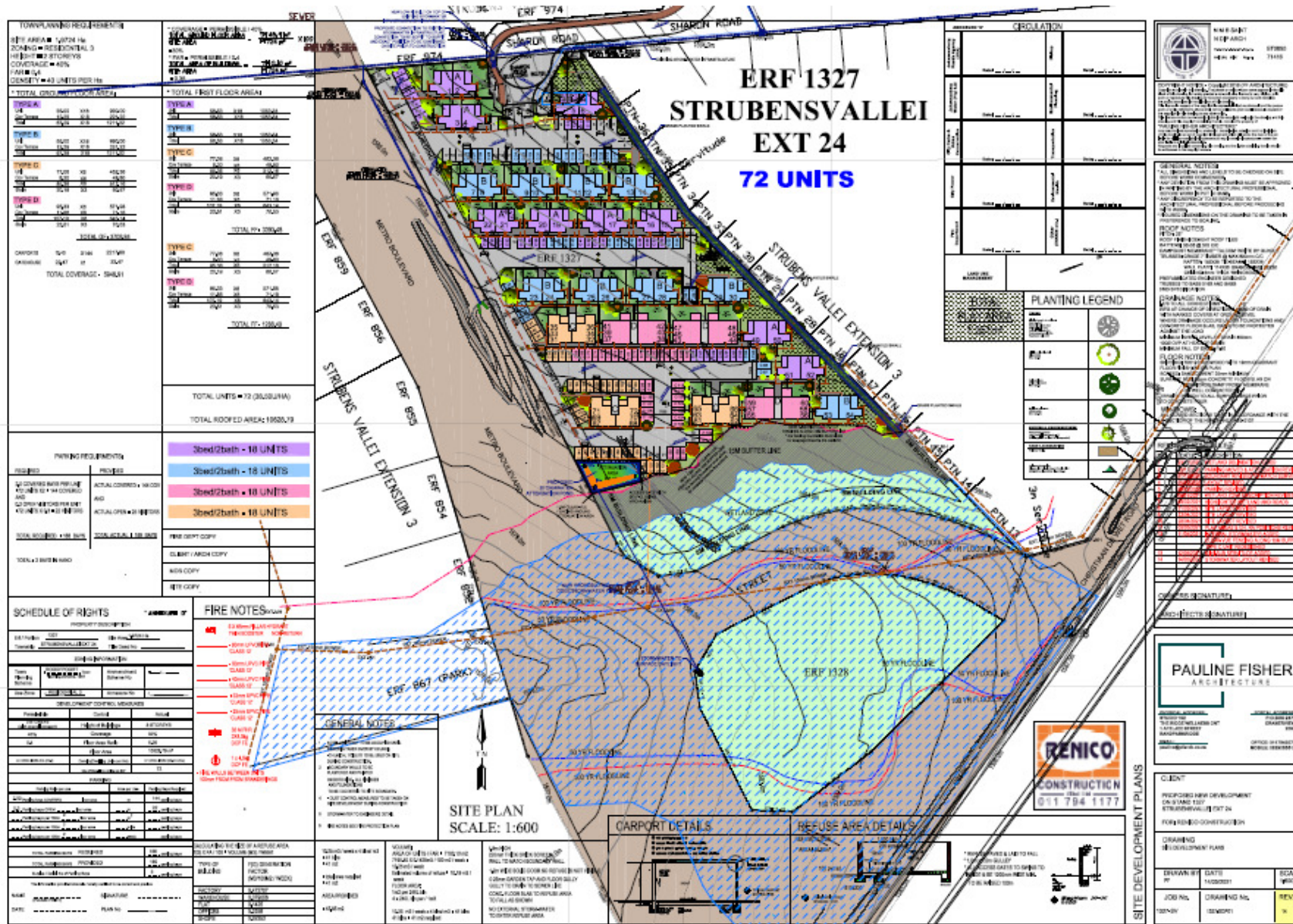


Figure 1-3: Proposal

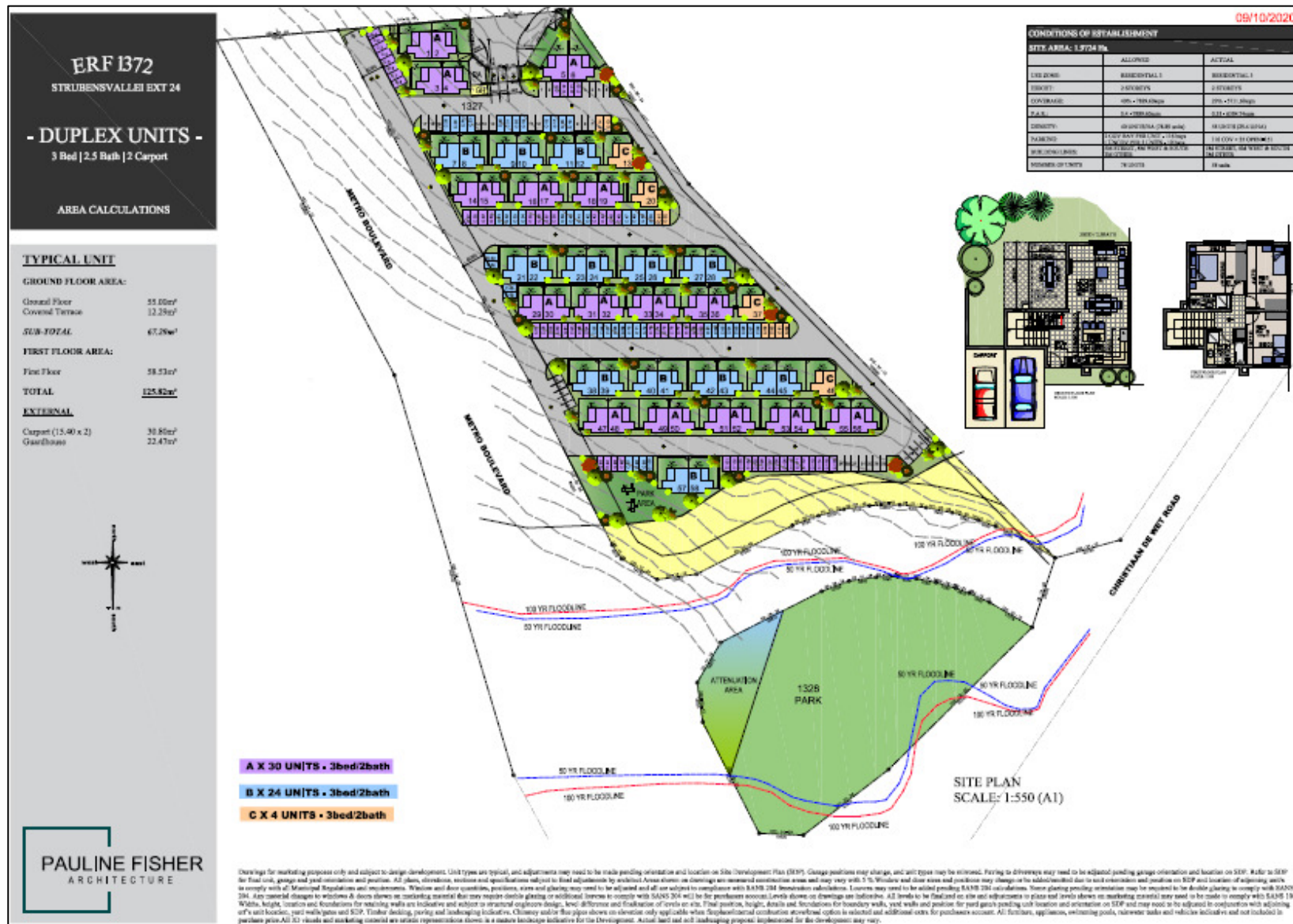


Figure 1-4: Alternative 1

2 EMPr REQUIREMENTS AND REPORT OUTLINE

The contents of this EMPr has been compiled according to the prescribed minimum legal requirements contained in Appendix 4 of the EIA Regulations, 2014 (as amended). Refer to **Table 2-1** below. Additional sections have been added to the report for purposes of best environmental practice.

Table 2-1: Contents of EMPr

Chapter Number	Chapter Name	Requirements included in Appendix 4 of 2014 EIA Regulations
1.	Introduction	-
2.	EMPr Requirements and Report Outline	-
3.	Details of EAP	(a) details of (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;
4.	Project Description and Activities, Aspects, and Impacts	(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description.
5.	Environmental Sensitivity	(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;
6.	Goals and Objectives	(d) a description of the impact management objectives, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including- (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities; (e) a description and identification of impact management outcomes required for the aspects contemplated in paragraph (d)
7.	General Roles and Responsibilities	(i) an indication of the persons who will be responsible for the implementation of the impact management actions

Chapter Number	Chapter Name	Requirements included in Appendix 4 of 2014 EIA Regulations
8.	Environmental Awareness Plan	<p>(m) an environmental awareness plan describing the manner in which-</p> <ul style="list-style-type: none"> (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and
9.	Waste Management Plan	-
10.	Emergency Preparedness Plan	-
11.	Monitoring Programme	<p>(g) the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);</p> <p>(h) the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);</p> <p>(j) the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;</p> <p>(k) the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);</p> <p>(l) a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;</p>
12.	EMPr	<p>(f) a description of proposed impact management actions, identifying the manner in which the impact management objectives and outcomes contemplated in paragraphs (d) and (e) will be achieved, and must, where applicable, include actions to -</p> <ul style="list-style-type: none"> (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;

3 DETAILS OF THE EAP

Prism EMS have been appointed to undertake the required Environmental Authorisation process in terms of the 2014 Environmental Impact Assessment (EIA) Regulations. Details and expertise of the Environmental Assessment Practitioner (EAP) who prepared the EMPr is provided in **Table 3-1** and Curriculum Vitae is appended in Appendix I2 of the Basic Assessment Report.

Table 3-1.: Details of the EAP.

EAP:	Vanessa Stippel
Company:	Prism Environmental Management Services
Qualifications:	MSc. Ecology, Environment and Conservation
Experience:	9 years
Affiliation/ Registration	Professional Member of Southern African Institute of Ecologists and Environmental Scientists SACNASP Pr.Sci.Nat. (116221) Registered EAP (2019/175)
Address:	PO Box 1401, Wilgeheuwel, 1736
Tel:	087 985 0951
Fax:	086 601 4800
Email:	vanessa@prismems.co.za

Designation	Name	Qualification	Professional Registration	Specialist Assessment
Prism EMS Team				
Contact Details	Post: PO Box 1401, Wilgeheuwel, Johannesburg, 1736		Tel: 087 985 0951 Fax: 086 601 4800 Email: prism@prismems.co.za Website: www.prismems.co.za	
Principal EAP	De Wet Botha (17 years' Experience)	MA. Env. Man. (PHED)	South African Council for Natural Scientific Professions (SACNASP) registered Scientist Pr.Sci.Nat. (119979) Registered Member of Environmental Assessment Practitioners Association of South Africa (EAPASA)(2019/1209) Member of the International Association for Impact Assessors (IAIAsa) (1653) Member of the Gauteng Wetland Forum Member of the South African Wetland Society	Project Director and Wetland Specialist
Junior EAP	Daniel Meintjes	B.Sc. Hons. Geog & Env. Man	Cand.Nat.Sci.(Pending)	Public Participation

4 PROJECT DESCRIPTION AND ACTIVITIES, ASPECTS, AND IMPACTS

4.1 Project Description

The proposed Strubensvallei Ext. 24 will involve the development of Erf 1327 and Erf 1328. The site is affected by the future Metro Boulevard planned by the Johannesburg Roads Agency which is excluded from the project footprint. Necessary access, internal roads and services will also be put in place.

The details of the proposed development are provided in Table 4-1.

Table 4-1: Details of planned development

	Erf 1327		Erf 1328
	Permissible/Minimum Required	Actual	
Zoning	Residential 3	Residential 3	Public Open Space
Site Area	1.9724 ha	1.9724 ha	0.63 ha
Height	3 Storeys (<i>with council consent</i>)	3 Storeys (<i>combination of 2 and 3 storey buildings</i>)	N/A
Coverage	40%	30%	N/A
Floor Area Ratio (FAR)	0.4	0.36	N/A
Density	40 units per hectare	36.50 units per hectare	N/A
Number of units	79 units	72 units	N/A
Number of Parking Bays	166 parking bays	169 parking bays	N/A
Refuse Area Details	41 m ²	45.95 m ²	N/A

4.1.1 Water and Sewer Services

A Water and Sanitation Outline Scheme Report has been developed by C-Plan Development Consultants and is included in Appendix G of the Basic Assessment Report.

In terms of existing services, the Study found that there is an existing 110mm-diameter Council water pipes within the Fiddle Avenue Road Reserve to the North of the study site. A new 110 mm diameter mPVC pipe (SANS 1283) will be put in place within the new access road and will connect to this existing pipe. The length of this connection is approximately 180m.

This pipeline will be constructed to Johannesburg Waters requirements as well as the necessary SABS Standards and handed over to Johannesburg Water upon completion and acceptance of the installed water infrastructure. An internal reticulation system will also be put in place but will remain the responsibility of the developer and will be maintained by the Section 21 Company for this development.

All fire hydrants will meet the standard requirements of the Johannesburg Fire Department.

Figure 4-1 shows the new 110mm water connection pipeline.

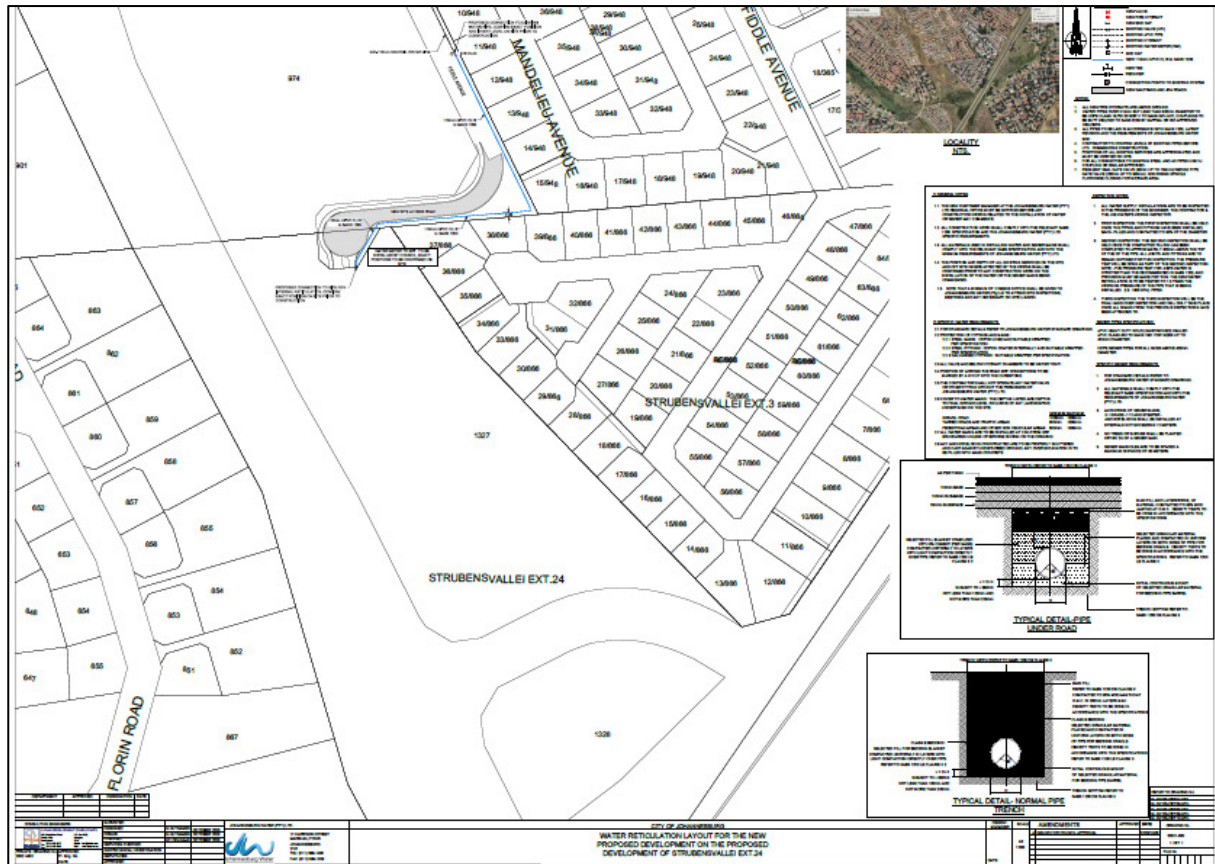


Figure 4-1: External Water Connection

In terms of Sewer, there are existing 150mm-diameter clay Council sewer pipe running along the Southern Boundary line of the development situated within the flood lines. In order to service the proposed development, a new 160mm-diameter uPVC CL 400 H/D pipe will connect into the existing sewer system by means of a new manhole. This new connection pipeline is approximately 51m in length.

All materials, construction and testing of the sewer reticulation will comply to the requirements of Johannesburg Water as necessary SABS Standards. Pipes will consist of uPVC Heavy Duty Class 400 as per SANS 1601. Manholes and chambers shall be constructed as specified in SANS 1294 with manholes comprising of precast concrete with dolomitic aggregate or fibre-cement rings (min. 1,05m nominal diameter). Manholes deeper than 3m shall be a minimum of 1.5m in diameter.

In addition, internal sewer reticulation will also be put in place and will remain private and maintained by the Section 21 Company for this development.

Figure 4-2 shows the new 160mm diameter connection as well as the existing line.

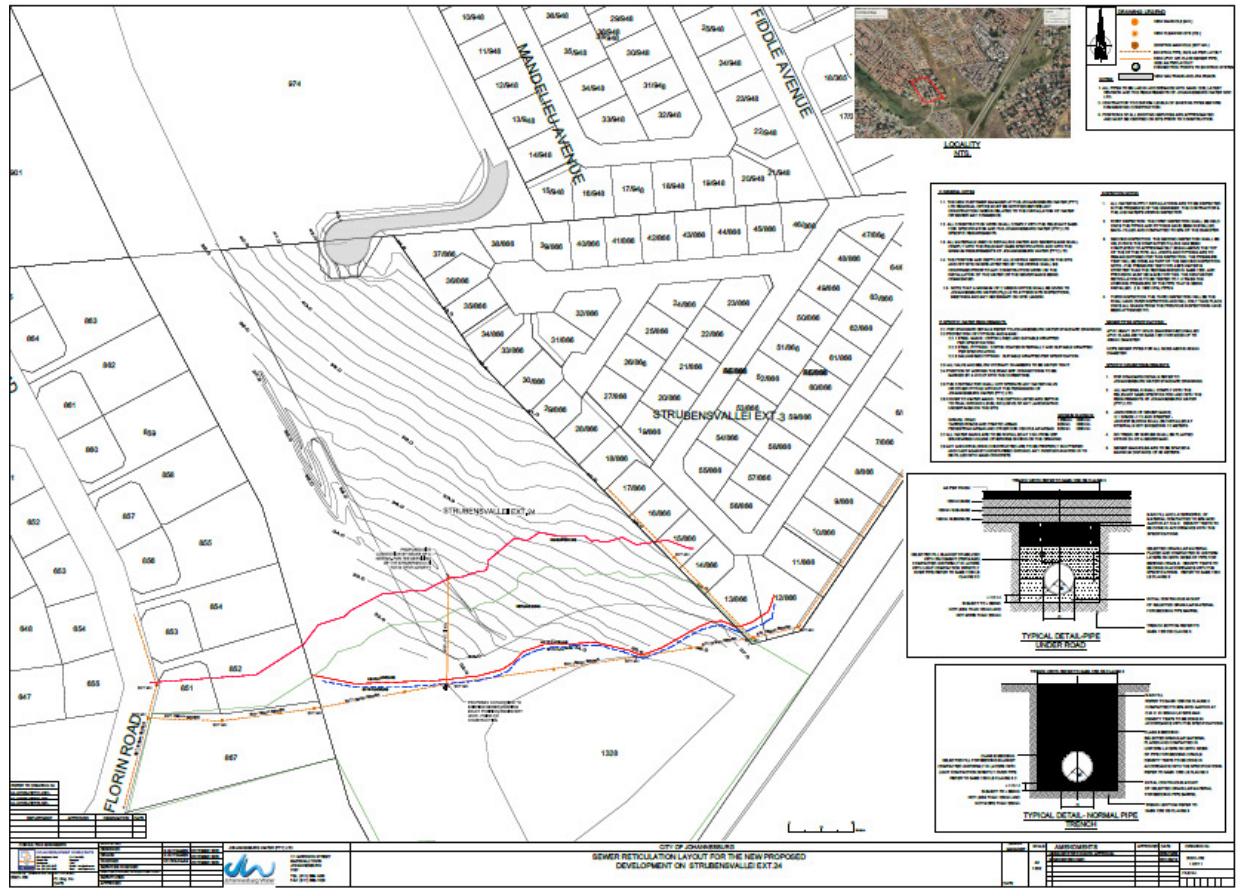


Figure 4-2: Sewer Layout

4.1.2 Stormwater Services

A Road and Stormwater Outline Scheme Report has been developed by C-Plan Development Consultants and is included in Appendix G of the Basic Assessment Report.

An internal stormwater reticulation system will be put in place and will utilize 160mm and 300mm pipes to direct stormwater to 300mm and 375mm OGEE pipe which will run down the eastern side of the development and lead to a stormwater attenuation pond which will be approximately 231 m² in extent.

From there, a 450mm OGEE pipe will discharge water under the proposed Metro boulevard into Erf 1348. The length of this pipe is approximately 79m.

All materials, construction and testing of the stormwater reticulation will comply with Johannesburg Road Agency requirements, as well as the necessary SABS Standards.

Figure 4-3 shows the internal stormwater reticulation as well as the attenuation structure and discharge pipeline.

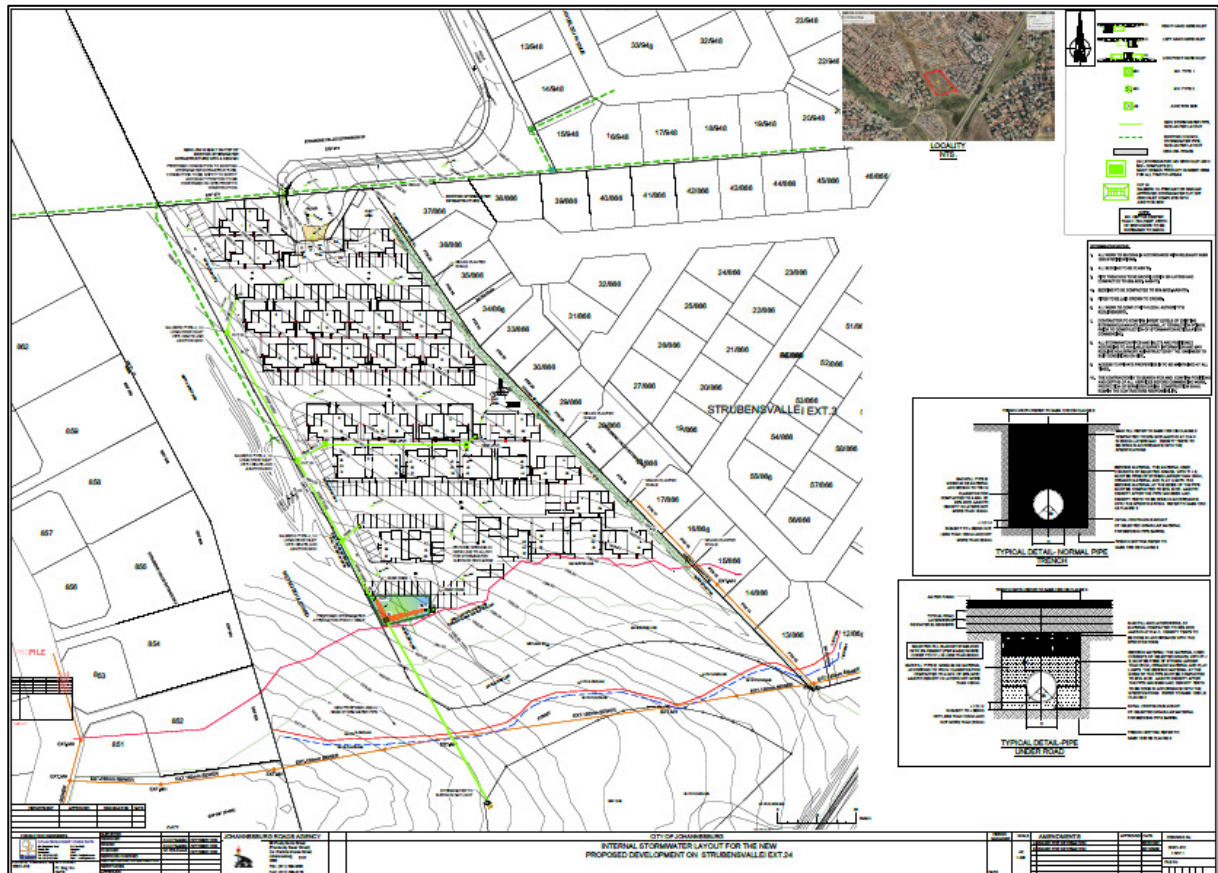


Figure 4-3: Internal Stormwater and Stormwater Attenuation

4.1.3 Roads and Access

A Road and Stormwater Outline Scheme Report has been developed by C-Plan Development Consultants and is included in Appendix G of the Basic Assessment Report. Further, a Traffic Impact Assessment has been undertaken by Mariteng Consulting Engineers and is also included in Appendix G. The latter found that the proposed development will generate 59 trips, during the weekday morning and weekday afternoon peak hours respectively. No external road upgrade required to accommodate the traffic demand.

The site access will be provided from the cul-de-sac intersecting with Fiddle Avenue. As part of the development, this new cul-de-sac and new section of surfaced road extending to the existing Fiddle Avenue road surface will be constructed to council standards and handed over to council upon completion and acceptance of the road infrastructure.

This road will include one inbound lane with a minimum width of 3.0m and one outbound lane with a minimum width 4.5m. A 2m paved sidewalk along the northern side of the cul-de-sac will also be provided.

Figure 4-4 shows this access road.

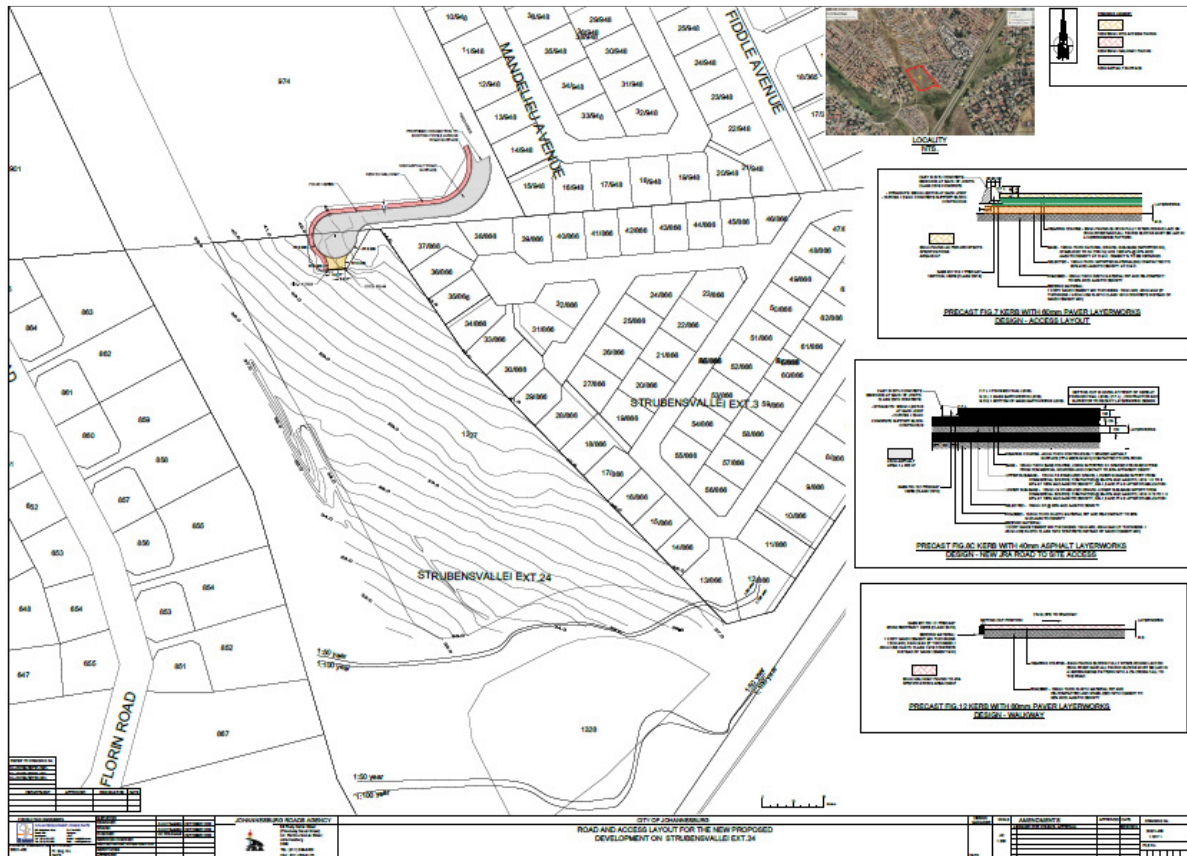


Figure 4-4: Access Road

4.1.4 Timeframes

The proposed development will be constructed in line with the following timeframes, see Table 4-2.

Table 4-2: Operational hours for construction phases.

Period	Open	Close
Weekdays	07:00	18:00
Saturdays	07:00	15:00
Sunday	Only when required	
Public holidays	Only when required	

4.1.5 Ancillary Infrastructure Required for Construction

No major infrastructure is required on site for the construction of the development. The required ancillary infrastructure for the purposes of supporting services is discussed below.

4.1.5.1 Security

A construction camp will be erected on site for the duration of the construction. This camp will be fenced for security purposes. A security guard will also be posted on site during non-operational times. A wall will be erected around the property boundary as part of the development project.

4.1.5.2 Sanitation

During the construction phase of the project, chemical toilets will be placed on site for the duration of the construction phase.

4.1.5.3 Construction Camp and Laydown Areas

Designated areas will be established during the construction phase for construction equipment and vehicles. These will all be located outside the 15m buffer of the wetland.

5 ENVIRONMENTAL SENSITIVITY

Figure 5-1 provides an overview of overall sensitivity of the study area and are based on the findings of the specialist studies that were undertaken: The following should be noted:

- **Medium Sensitivity** – this area includes the wetland area delineated by the specialist. The Wetland specialist found that the Wetland identified is highly transformed and impacted by historical and ongoing anthropogenic activities. Regardless, the area must be pegged prior to construction and access to the area limited. Only authorized activities (stormwater pipeline and sewer pipeline) are permitted within this area.
 - Two SCC were identified on site (primarily in this area), namely *Hypoxis hemerocallidea* and *Boophone disticha*. Whilst these species are classified as “Least Concern” in terms of Red Data List, GDARD has confirmed that they should be considered as “Orange List” species in Gauteng due to provincial level pressures. Therefore, in order to mitigate impacts to these species, a Search and Rescue and Relocation Plan has been devised and included in Appendix 13. This must be implemented prior to construction where necessary.
- **Low-medium Sensitivity** – this area includes the 15m wetland buffer recommended by the specialist. This will buffer the development from the wetland. The buffer will suffice in the required management of the development impacts and continuation and maintenance of the wetland drivers. the area must be pegged prior to construction and access to the area limited. Only authorized activities (stormwater pipeline and sewer pipeline) are permitted within this area.
- **Low sensitivity** – this area is the remainder of the development footprint. The Ecological specialist noted that these areas are disturbed areas due to historical activities (consisting of dumping and compact roads and pathways made by vehicles and humans) as well as sections of grassland with pioneer and alien invasive species. All general mitigation measures included in the EMPr must be adhered to.

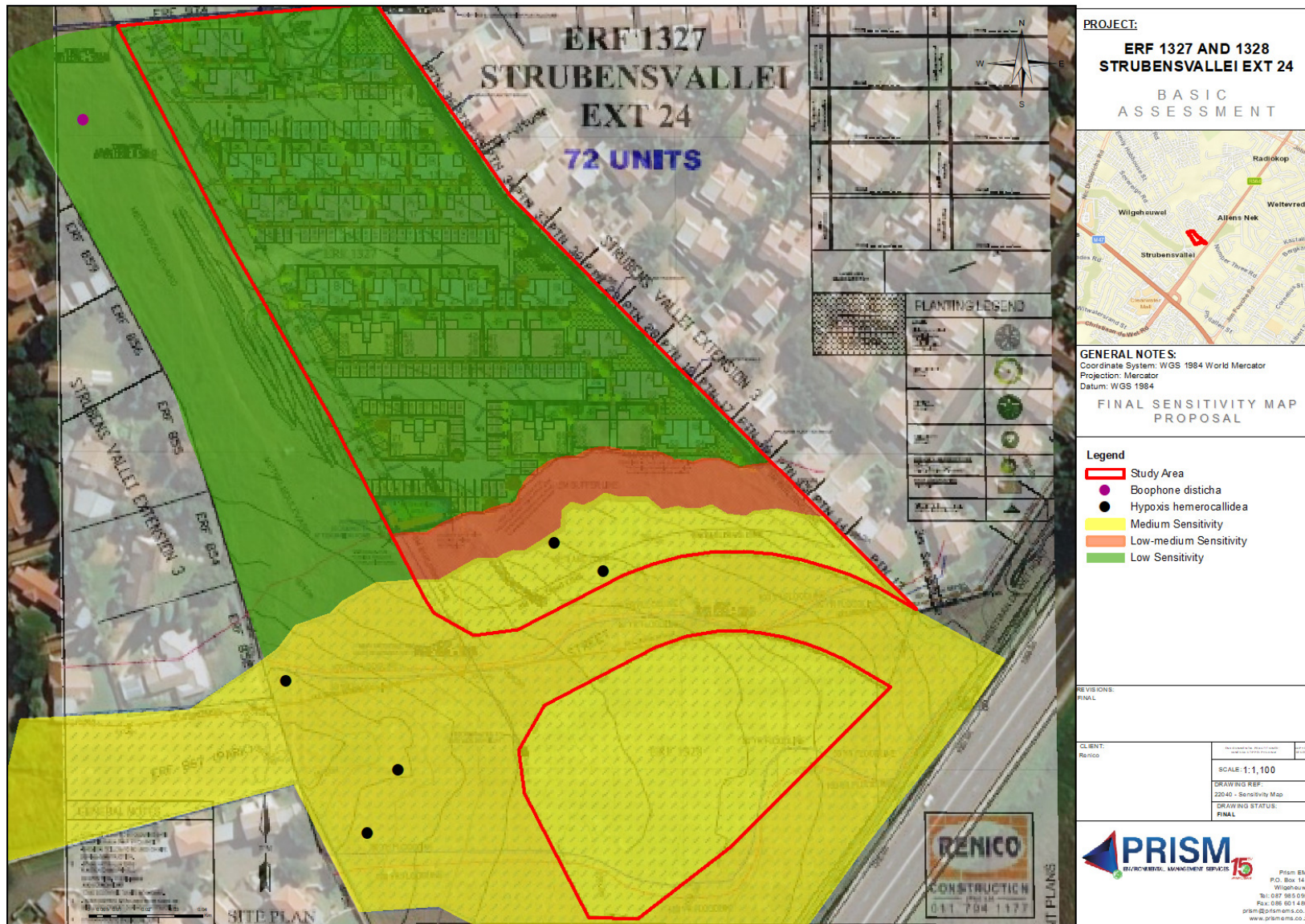


Figure 5-1: Overall Sensitivity Map

6 GOALS AND OBJECTIVES

The **EMPr** provides performance criteria required to address potential environmental impacts during the construction and operational phases of the proposed development.

This document incorporates the relevant recommendations of the Basic Assessment Report and other environmental studies and at a high level aims to provide the following:

- Establish **management objectives** for the Development to enhance benefits and minimise adverse environmental impacts.
- Describe **actions** required to achieve management objectives; and
- Outline institutional structures and roles required to implement the EMPr.

6.1 Key Objectives of the EMPr

The key objectives of the EMPr for the construction and operation phases of the proposed Development are as follows:

- To ensure effective communication with stakeholders and regulatory authorities.
- To ensure good housekeeping practices and general neatness on site.
- To mitigate any possible negative impacts identified in the EMPr for the construction and operational phase of the development.
- To prevent pollution to the receiving environment that may emanate directly or indirectly from the source (development activities) both during the construction and operational phases.
- To preserve flora and fauna.
- To preserve topsoil for optimal rehabilitation and landscaping following construction.
- To control the establishment of alien invasive plants during the construction phase of the project, as well as following rehabilitation of designated construction camp areas within the site thereafter.
- To ensure water saving and recycling mechanisms are implemented and adhered to.
- To ensure that all legislative requirements are met by the proposed development.

Following each site visit an audit report must be compiled to relay any non-compliance issues that need to be addressed, as well as compliance matters.

6.2 Impact Management Outcomes

Through effective implementation of the environmental management measures, the following outcomes must be achieved:

- All relevant authorizations, licenses and approvals are in place prior to the commencement of construction.
- A formal document control system is in place to ensure all relevant documents are in place prior to commencement.

- Site specific method statements are compiled and approved.
- Proper management of sensitive features through identification and barricading.
- Planning and layout of construction site is undertaken responsibly to ensure protection of sensitive environmental features.
- Environmental awareness creation and training is undertaken prior to construction commencement to minimize environmental impacts and ensure compliance to relevant legislation and authorizations.
- Ensure that all possible causes of dust are mitigated as far as possible to minimize impacts to the surrounding environment.
- All vehicles/plant on site must be properly maintained to reduce emission sources.
- Ensure that noise disturbance to surrounding areas are minimized and that construction activities comply with the Noise Control Regulations and the provisions of South African National Standards; Environmental, Health and Safety (EHS) Guidelines, World Health Organization (WHO, 2002).
- Construction activities are managed correctly to ensure no negative impacts to water quality. This includes proper management of ablution facilities, workshop and equipment and concrete batching and mixing.
- Ensure minimal impacts to the flow regime of the wetland through poor stormwater management.
- Ensure minimal impact to wetland habitat.
- Ensure minimal impact to wetland biota.
- Ensure that minimal disturbance of geomorphology during construction.
- Domestic waste must be managed properly to ensure minimal impacts.
- Construction waste must be managed properly to ensure minimal impacts.
- Hazardous waste must be managed properly to ensure minimal impacts.
- Effective management of topsoil, to minimize the impact of construction activities.
- Changes to topography to be planned properly to prevent negative impacts.
- Ensure that all possible causes of erosion are mitigated as far as possible to minimize impacts to the site and the surrounding environment.
- Ensure that all possible causes of soil pollution are mitigated as far as possible to minimize impacts to the site and the surrounding environment.
- Electricity reduction mechanisms to be implemented.
- Water conservation mechanisms to be implemented.
- Fuel conservation mechanisms to be implemented.
- Raw materials conservation mechanisms to be implemented.
- No loss of habitat outside the approved footprint.
- Minimal disturbance to fauna occurs during construction.
- Ensure that minimal disturbance of ecological systems and natural corridors takes place during construction.
- Ensure that minimal disturbance of ecological life cycles due to noise and lighting.
- Ensure proper management of alien invasive species.
- Minimize potential pollution incidents due to construction.
- A safe working environment for contractors/construction workers and the public is provided.

- Effective and safe storage of hydrocarbons on site, to minimize the impact of hydrocarbons on the environment.
- Minimize potential fire incidents during construction.
- Proper management of construction activities to minimize disturbance to visual environment.
- Proper management of labor force is undertaken to ensure that there are no security-related issues or disturbance to tenants or landowners outside the construction footprint.
- Minimal disturbances to traffic due to road upgrades.
- No adverse impact on the historical and cultural inheritance of the area.
- Proper management of construction activities to minimize disturbance to sense of place.
- Preferential use of local contractors and suppliers.
- Proper management of labor force is undertaken to ensure that there is optimal use of local laborer's and local contractors.
- Adequate reinstatement and rehabilitation of construction areas
- Residential development must comply with acceptable noise levels.
- Proper maintenance of connection to sewer line and proper management of stormwater
- Ensure Stormwater is properly managed.
- Limited impact to habitat during operation
- Limited impact to biota during operation
- Limited impact to geomorphology during operation
- Proper management of waste.
- Ensure that all possible causes of erosion are mitigated as far as possible to minimize impacts to the site and surrounding environment.
- Minimal loss of vegetation to fire
- Minimal disturbance of fauna during operation
- Minimal disturbance of ecological life cycles during operation
- Minimize potential impacts/incidents.
- Minimal safety and security issues.
- Minimal traffic disturbances related to operation.
- Preferential use of local contractors and suppliers.
- Proper management of labor force is undertaken to ensure that there is optimal use of local laborer's and local contractors.

7 GENERAL ROLES AND RESPONSIBILITIES

There are various role players that are involved in responsible environmental management. An overview of the applicable role players and institutional arrangements are provided in **Figure 7-1**. Information on each role player is then provided in the subsections below.

7.1 Competent Authorities

Since the proposed development takes place in Gauteng and activities are triggered in terms of the EIA Regulations, 2014 (National Environmental Management Act, 1998 (NEMA), the Gauteng Department of Agriculture and Rural Development (GDARD) is the relevant competent authority. A Water Use Licence Application is also required and the Department of Human Settlements, Water and Sanitation (DHWS) is the competent authority in this regard.

7.1.1 Gauteng Department of Agriculture and Rural Development (GDARD)

GDARD is the mandated authority in terms of NEMA that determined whether an Environmental Authorisation (EA) will be issued for the project, following a decision-making process conducted as part of the EIA. Conditions will be included in the EA, which need to be complied with by the project applicant. The EMPr will need to be updated to include these conditions.

GDARD also fulfils a compliance and enforcement role with regards to the EA. The Department may perform random inspections to check compliance. GDARD will also review the monitoring and auditing reports compiled by the ECO.

Amendments may be required to the EMPr, based on adaptive management to the site conditions and the technical requirements of the project. These amendments will need to be approved by GDARD.

7.1.2 Department of Human Settlements, Water and Sanitation (DHWS)

The Department of Human Settlements, Water and Sanitation (DHWS) is the mandated authority in terms of the National Water Act, 1998 and will be responsible for issuing the Water Use Licence (WUL). The WUL, should it be issued, will include a number of conditions which will need to be complied with. As an integrated process is required, this EMPr also includes the management of the water resource and as above, the EMPr should be updated to include the conditions of the WUL.

DHWS will also be responsible for the compliance and enforcement of the conditions of the WUL and they also perform inspections or audits to check compliance. Copies of the necessary monitoring reports will also need to be submitted to Regional office.

Any amendments to the WUL would also need to be approved by DHSWS.

7.2 Authorisation Holder

Renico Construction (Pty) Ltd. is the applicant in terms of NEMA and is ultimately responsible for the development and implementation of the EMPr and ensuring that the conditions in the EA are satisfied. The liability for non-compliance also rests with the Authorisation Holder. Details of the Authorisation holder are contained in **Table 7-1**.

Table 7-1.: Details of the Applicant.

Applicant:	Renico Construction (Pty) Ltd
Contact Person:	Nico Louw

7.3 Consultants

7.3.1 Project Manager

To ensure that the proposed development is constructed as per the relevant designs and requirements, a project manager will be responsible for managing the planning, design, and construction phases of the project. The Project Manager will furthermore also be required to tend to any environmental matters at the request of the Environmental Control Officer (ECO). The Project Manager shall assist the ECO where necessary and shall have the following responsibilities in terms of the implementation of the EMPr:

- Regular site inspections.
- Reviewing and approving the Contractor's Method Statements.
- Assisting the Contractor in finding environmentally responsible solutions to problems with input from the ECO where necessary; and
- Communicating all environmental issues to the ECO.

7.4 Contractors

Contractors will be responsible for constructing the proposed Development and associated infrastructure. All contractor/s employed by the developer in respect of any aspect of the construction of the subject site, will be bound by all and any agreement between the developer and the contractor, to ensure compliance with the Environmental Authorisation, mitigating measures included in the Specialist Studies, as well as this EMPr. The responsibilities include:

- Taking full responsibility for each of his/her employees.
- Be familiar with the contents of the EMPr and the specifications contained herein.
- Comply with the Environmental Specifications contained in the EMPr and subsequent revisions.
- Confirm legislative requirements for the construction works and ensure that appropriate permissions and permits have been obtained before commencing activities.
- Prepare Method Statements, programme of activities and drawings/plans for submission to the ECO when requested.
- Undertake daily site inspections to monitor environmental performance and compliance with the Environmental Specifications.
- Notify the ECO immediately in the event of any accident or infringements of the Environmental Specifications and ensure appropriate remedial action is taken.

- Notify the ECO at least 10 working days in advance of any activity he has reason to believe may have significant adverse environmental impacts, with specific reference to blasting, so that mitigatory measures may be implemented timeously.

7.5 Independent ECO

A competent and independent ECO must be appointed and will undertake bimonthly inspections with monthly reporting on site as well as biyearly auditing against the EMPr and EA. The reports must be submitted to Renico Construction (Pty) Ltd. and GDARD for their records.

The ECO will also check the following:

- The record of environmental incidents (spills, impacts, legal transgressions, etc.) as well as corrective and preventive actions taken.
- The public complaints register in which all complaints are recorded, as well as actions taken; and
- Results from the environmental monitoring programme (water quality etc.).

In terms of Audits, the ECO will be required to ensure the following:

- All documentation (e.g., audit/monitoring/compliance reports and notifications) required to be submitted to the Department in terms of the EA.
- The holder of the EA must submit an environmental audit report to the Department within 30 days of the completion of the construction phase (i.e., within 30 days of site handover) and within 30 days of completion of rehabilitation activities.
- The Environmental Audit Report must indicate the date of the audit, the name of the auditor and the outcome of the audit in terms of compliance with the EA conditions as well as the requirements of an approved EMPr.
- Records relating to monitoring and auditing must be kept on site and made available for inspection to any relevant and competent authority in respect of this development.

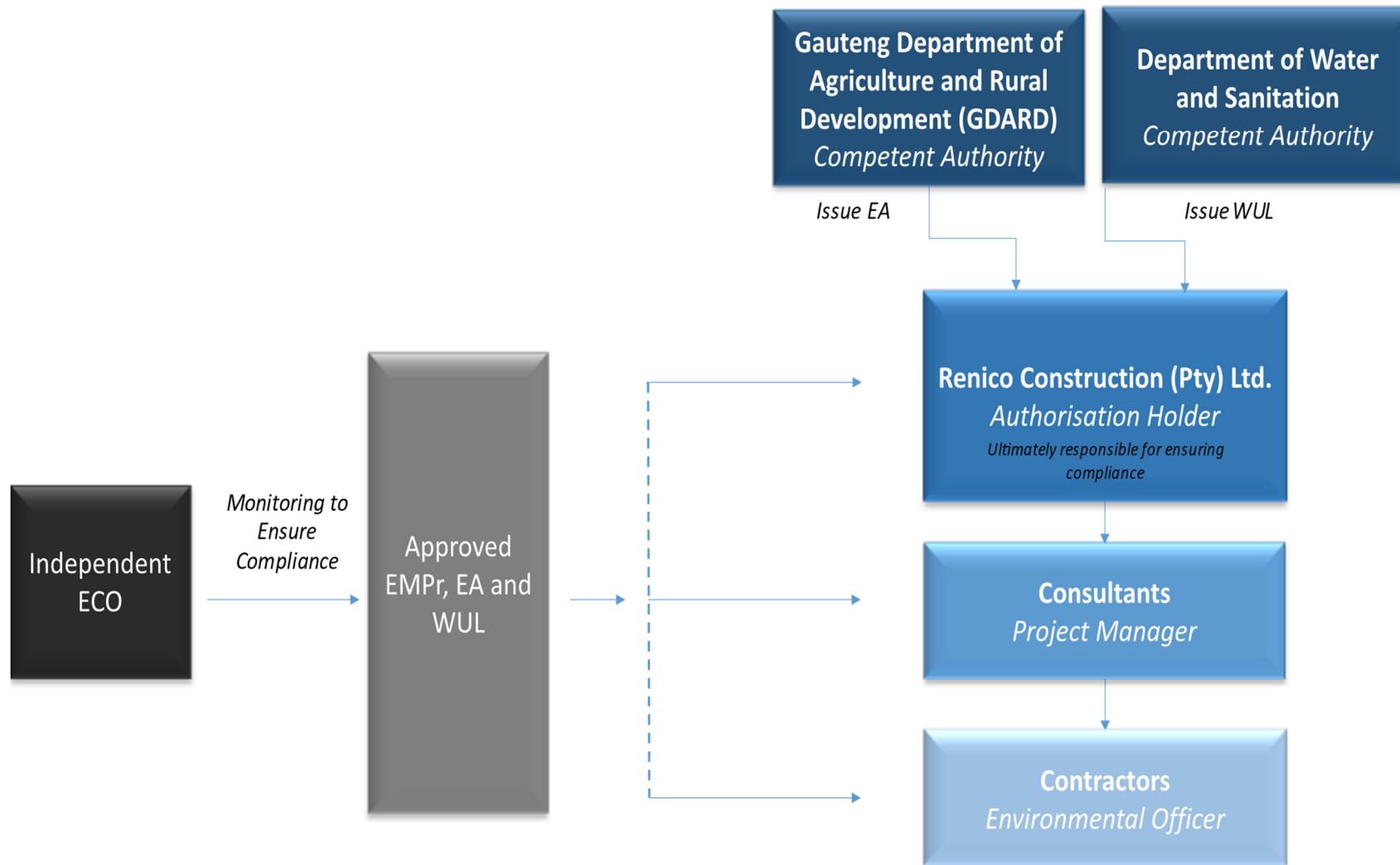


Figure 7-1: Roles and responsibilities.

8 ENVIRONMENTAL AWARENESS PLAN

Training aims to create an understanding of environmental management obligations and prescriptive measures governing the execution of the project. It is generally geared towards project team members that require a higher-level of appreciation of the environmental management context and implementation framework for the project. In contrast, **Environmental Awareness Creation** strives to foster a general attentiveness amongst the construction workforce to sensitive environmental features and an understanding of implementing environmental best practices. The Environmental Awareness Plan for the Development incorporates both training and environmental awareness to ensure that the proposed development is implemented in line with the requirements of the EMPr and that environmental sensitivities on site are managed correctly.

As part of this, Renico Construction (Pty) Ltd. is committed to remaining responsible and accountable for environmental practices on site. Being accountable for environmental practices undertaken during working tasks and activities remain the responsibility of both employer and employee awareness of the potential environmental impacts that could result from these activities.

All potential incidents to the environment may be effectively minimised through effective training and awareness of the employees using any of the following methods:

- Supervisory meetings (weekly).
- Induction training (annually).
- EMP Training (annually); and
- External environmental and/or health and safety courses (when applicable).

These methods are discussed below in more detail.

8.1 Meetings

Weekly supervisory meetings are ideal to facilitate awareness of specific environmental dangers pertaining to each week. Various topics may be discussed during these meetings and must be recorded or logged. All attendees at each meeting must sign an attendance register, these records must be kept on file at the administration office. Topics for discussion may include:

- Topics applicable to the entire operation.
- Area specific topics (e.g., heritage); and
- General environmental awareness:
 - Waste management
 - Spillages
 - Saving water
 - Electricity consumption
 - Dust control
 - Noise generation

- Housekeeping
- Indigenous Vegetation
- Alien vegetation
- Fire-making

Should issues be identified by the ECO, these can also be addressed during these weekly meetings.

8.2 EMPr Training

Aspects of the EMPr must be selected and discussed at training workshops at least annually. Such training topics may be focused on the incidents that are frequently reported during the previous year and may be focused around the following:

- Hydrocarbon spillages.
- Stormwater Control.
- Waste Management.
- Monitoring Protocols; and
- Safety topics.

Workers should be informed that they may refuse work that is harmful to human health and/or the environment.

8.3 Induction Training

All new employees are required to undergo induction training prior to commencement of work. Returning and existing employees must undergo repeat induction training at least annually. Environmental awareness training must form part of the induction and must include the basic topics relating to the environment:

- Main environmental legislation (e.g., NEM: WA¹ or NWA²).
- Constitutional right pertaining to the environment (e.g., section 24)
- Waste Management hierarchy.
- Environmental, social, and economic concerns.
- Sensitive environmental features; and
- Prevention of poaching.

¹ National Environmental Management Waste Act (NEM: WA), 2008 (Act No. 59 of 2008)

² National Water Act (NWA), 1998, (Act No. 36 of 1998)

9 WASTE MANAGEMENT PLAN

To ensure waste is properly dealt with, waste management is included in the EMPr. In addition, a **Waste Management Plan** is discussed below.

9.1 Legal Requirements

Section 16 of the National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008), as amended states that –

“A holder of waste must, within the holder’s power, take all reasonable measures to –

- *Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated.*
- **Reduce, reuse, recycle and recover waste.**
- *Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner.*
- *Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour, or visual impacts.*
- *Prevent any employee or any person under his or her supervision from contravening this Act.*
- *Prevent the waste from being used for any unauthorised purpose.*

Only temporary storage of waste is allowed (once of storage of waste for a period less than 90 days). The volume of material should be limited to less than 100m³ of general waste and less than 80m³ of hazardous waste. Should this be exceeded the Norms and Standards for the Storage of Waste will need to be complied with.

9.2 Waste Hierarchy

Management objectives provided in this EMPr are aligned to the waste management hierarchy indicated in Figure 9-1.

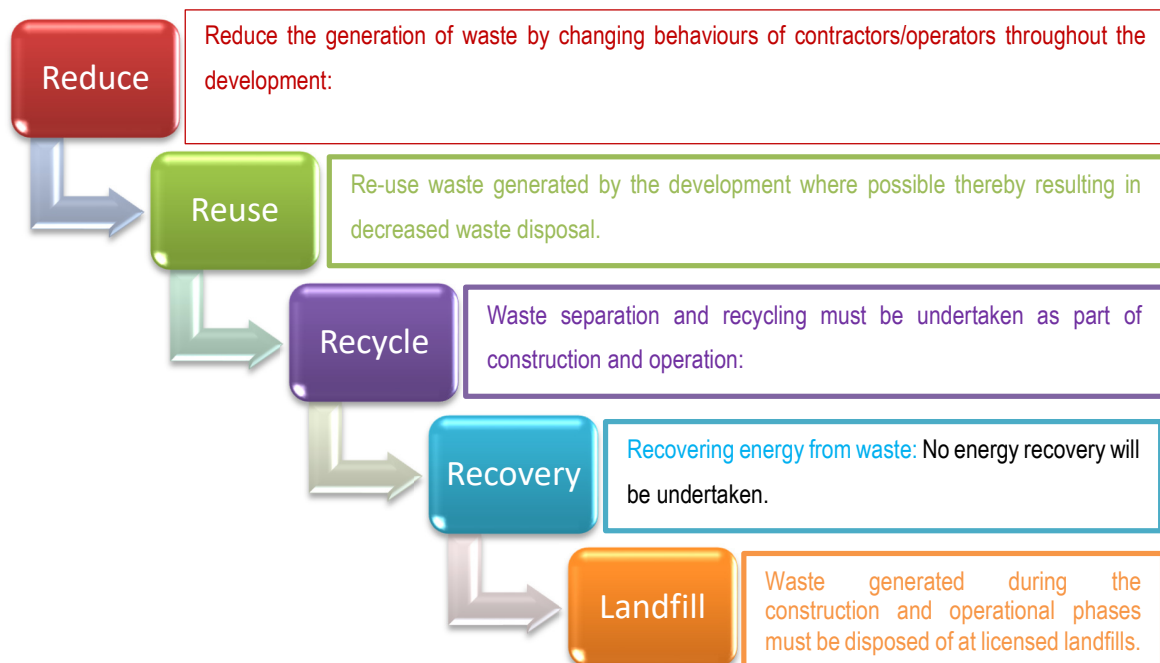


Figure 9-1: Waste Hierarchy.

9.3 Waste Management Actions

The following waste management actions must be implemented to ensure the objectives included in the waste hierarchy above are met.

9.3.1 Waste Avoidance and Reduction

Avoidance and reduction should be practiced wherever possible. Recommended actions include but are not limited to:

- Bulk buying of materials to reduce the volume of packaging required.
- Avoidance of materials/items/brands that are heavily packaged, have a short lifespan or are low quality.
- Buying items that last longer and can be repaired.
- Buying items in refillable containers.
- Environmental awareness training should focus on management of waste and all construction workers should be aware of the importance of waste minimisation and avoidance.

9.3.2 Recycling

Recycling should be practiced whenever waste prevention or reuse is not possible, provided that any such recycling is cost effective, taking into consideration environmental benefits, financial costs and community interests.

Potential priority recyclable waste streams include:

- Used Oil.
- Paper.
- Glass.
- Tyres.
- Plastics.
- Building rubble; and
- Electronic waste.

The following actions must be implemented:

- To reduce or avoid the need for sorting after collection, the categories of distinctively marked waste receptacles must be provided to receive waste as it is generated.
- These receptacles shall be fitted with a tight cover.
- All types of waste collection receptacles shall be clearly marked with the type of waste they are receiving.
- Obtain and label recycling containers for office waste, aluminium, steel, glass, ferrous metals, nonferrous metals, waste timber.
- Locate these containers within office buildings and trailers.
- Establish a recycled material collection schedule.
- Arrange full bins to be hauled away.

9.3.3 Waste Disposal

The contractor is responsible for removal of all waste from the site, generated through the contractor's activities. The contractor shall ensure that all waste is removed to an appropriately licensed waste management facilities (the following source may be utilised – www.sawic.org.za). During operation, waste that is not collected for recycling must be collected by the municipality or by a municipality approved 3rd party collector.

In addition, it should be noted that the classification of waste determines the handling methods and the ultimate disposal of the material. All **hazardous waste** that may be generated by construction and operation must be managed as follows:

- Characterise the waste to determine if it is general or hazardous (Use the Appendix 1 of the Norms and Standards for the Classification of Waste for landfill to determine whether additional classification is required).
- Obtain and provide an acceptable container with a label.
- Place hazardous waste material in the container.
- Inspect the container on a regular basis.

- Haul the full container to the licenced and correct disposal site.
- Provide documentary evidence of proper disposal of the waste.

In addition, the following actions must also be undertaken:

- Provide waste skips on site. These skips should be sufficient in number, the skip storage area should be kept clean, skips should be emptied and replaced before overflowing or spillage occurs.
- Skips should be covered to prevent waste blowing away.
- Vermin / weatherproof bins will be provided in sufficient numbers and capacity to store domestic waste. These bins must be kept closed to reduce odour build-up and emptied regularly to avoid overfilling and other associated nuisances.
- Ensure that solid waste is transported to avoid waste spills en-route.
- No waste shall be buried or burned anywhere on the site.
- Permits to transport/dispose of waste must be in place.

10 EMERGENCY PREPAREDNESS PLAN

10.1 Potential Emergencies

The following potential emergencies that may occur on site include:

- Environmental Incidents:
 - Fuel and hydrocarbon spillages; and
 - Fire Hazards.
- Safety Incidents:
 - Injuries related to operation of heavy machinery such as Front-End Loaders, Excavators, Mobile Crushers etc. during construction.
 - Driving related accidents and incidents from Trucks on site during construction.
 - Accidents during earth moving, levelling and rehabilitation activities; and
 - Criminal incidents such as theft or potential violent crime during construction and operation.

10.2 Emergency Plan

10.2.1 Emergency Assemblage Area

A central area on site must be demarcated with appropriate signage for the gathering of all employees and visitors on site in the event of an emergency.

10.2.2 Emergency Procedures

The following procedures must be compiled for the identified potential emergencies to be managed effectively:

- Drill and evacuation procedure for any emergency related incidents containing information on the following:
 - Reporting structure for all incidents
 - Emergency contact information (e.g., telephone numbers)
 - Procedure to be followed for the specific emergency.
 - First Aid information
- Spillages of fuel and hydrocarbons:
 - Immediate action plan (e.g., use of spill kits) to prevent spill for spreading.
 - Reporting of incident to manager and supervisor to advise on next steps.
- Procedure for Theft and Crime:
 - Details on security system on site
 - Emergency response units
 - Panic alarms
 - Details of community response units

10.2.3 Emergency Contact Information

A list of potential emergency contact centres specific to the area must be drawn up and displayed on common notice boards for all employees to access. The following emergency centres must be sourced:

- Nationwide emergency response.
- Cell phone Emergency.
- Ambulance.
- Hospitals.
- Fire Response; and
- Police.

This list must be checked and updated at least quarterly to ensure that the information remains up to date.

11 MONITORING PROGRAMME

Monitoring is required to ensure that the receiving environment at the proposed Development is suitably safeguarded against the identified potential impacts, and to ensure that the environmental management requirements are adequately implemented and adhered to during the execution of the project.

The method of monitoring the implementation of the management and mitigation measures stipulated within the EMPr are indicated in **Table 11-1**.

Table 11-1: Method of monitoring implementation of EMPr

Method	Frequency	Responsibility	Main Topics	Outcome
Internal Inspections	Daily – Weekly	Project Manager	<ul style="list-style-type: none"> Observe housekeeping practices. Check for spillages, leaks, or any other sources of pollution. Observe waste management. Observe stormwater control 	<ul style="list-style-type: none"> Based on observations identify need for protocols / procedures and compile where needed to comply with EMPr Verbally inform employees on any identified issues
External Inspections	Bimonthly	ECO	<ul style="list-style-type: none"> Check compliance with management measures in EMPr 	<ul style="list-style-type: none"> Based on observations identify need for protocols / procedures and compile where needed to comply with EMPr Verbally inform employees on any identified issues. Information from inspections will be used to compile monthly report. Photos from inspections to be utilised in monthly reporting.
External audits	Annual	ECO	<ul style="list-style-type: none"> Check compliance with management measures in EMPr 	<ul style="list-style-type: none"> Compile audit report with recommendations / actions where non-compliance was identified

Method	Frequency	Responsibility	Main Topics	Outcome
Management Meetings	Quarterly – Bi-annually	Management	<ul style="list-style-type: none"> Discuss (problem solve) recurring issues or actions that require management intervention 	<ul style="list-style-type: none"> Record minutes of main points of discussion Implement outcome actions of meeting

11.1 Compliance Monitoring and Auditing

11.1.1 Environmental Audits

The mechanism for monitoring compliance with the management and mitigation measures stipulated within the EMPr must include an audit undertaken by an independent Environmental Control Officer (ECO) as discussed in Section 7.5.

The objective of the environmental audit is to:

- Report on the level of compliance with the conditions of the environmental authorisation and the management and mitigation measures stipulated within the EMPr;
- The extent to which the avoidance, management and mitigation measures provided in Section 12 achieve the objectives and outcomes in Section 6;
- Identify and assess new impacts and risks because of undertaking the activities.
- Evaluate the effectiveness of the management and mitigation measures generated in the EMPr;
- Identify shortcomings in the EMPr;
- Identify the need for any changes to the avoidance, management and mitigation measures provided for in the EMPr.

11.1.2 Procedure

The following methodology or procedure is to be used for assessment of the management and mitigation measures of the EMPr:

- **Pre-site preparation:** prior to the site inspection a review of the management measures contained in the EMPr, and a checklist must be drawn up.
- **Site inspection:** The Development must be traversed on foot and must include an assessment of each major component of the facility.
- **Documentation review:** after the site inspection a documentation review must be undertaken by requesting specific key documentation relating to the proposed development.

11.1.3 Evaluation Criteria

During evaluation of the EMPr, the following criteria must be used:

- Management measures stipulated in the plan.
- Environmental monitoring required.
- Legal requirements; and
- Best practice observations.

The scores and description used in the evaluation of the EMPr are indicated in Table 11-2. Where any indication of non-compliance is determined, recommended actions will be provided.

Table 11-2: Description of scoring during evaluation of the findings.

Score	Evaluation	Description
N/A	Not Applicable	Not applicable and will not be implemented or discussed/assessed.
0	Major Non-Compliance	Relates to the absence of a requirement needed to be implemented or the total breakdown of a process. Several minor non-compliances listed against the same requirement may represent a total breakdown of a process and thus could collectively be a major non-compliance.
1	Minor Non-Compliance	The requirement is partially implemented or non-compliant.
2	Observation	Relates to a matter about which the Assessor is concerned but which cannot be clearly stated as non-compliance. Observations also indicate trends which may result in a future non-compliance.
3	Compliant	The project management plans and procedures are executed in a managed fashion (planned, tracked, verified, and adjusted) based upon defined activities, inputs, and outputs. Objective evidence is available for each process.

11.1.4 Reporting

All inspections undertaken as part of internal / external auditing must be provided in the form of a report. External audits will be submitted to the competent authority as required by the EIA Regulations, 2014.

11.2 Penalties

To ensure that there is adequate motivation for the contractor to comply with the conditions set out in the EMPr, the following applies with regards to penalties:

- The Contractor will comply with the environmental requirements on an ongoing basis, and any failure on their part to do so will entitle the Project Manager, in consultation with the Environmental Manager and ECO, to certify the imposition of a fine subject to the details set out in the EMPr.
- The Project Manager, Environmental Manager and any other specific personnel as designated by the Project Manager may alter the Schedule of Fines for this specific project.
- Fines may be issued per incident at the discretion of the Project Manager. Such fines will be issued in addition to any remedial costs incurred because of noncompliance with the requirements of the EMPr and documents supporting thereof. Fines may be omitted from construction guarantees as supplied by the contractor.
- The Project Manager and ECO will be the judge as to what constitutes a transgression in terms of the above clause. Further, note that if transgressions continue to an unacceptable level the client may cancel the contract.
- Where the Contractor inflicts non-repairable damage upon the environment or fails to comply with any of the environmental requirements, he will be liable to pay a penalty fine over and above any other

contractual consequence. This may also lead into a Rectification Application in terms of Section 24G of the NEMA, which could lead to certain fines and / or prosecution.

- The Contractor is deemed NOT to have complied with this specification if: -
 - Within the boundaries of the site, site extensions and access roads there is evidence of contravention of the requirements of the EMPr.
 - Environmental damage ensues due to negligence.
 - The Contractor fails to respond adequately to complaints from the public.
 - Legal action is instituted against the developer in terms of Environmental laws due to any action / activities undertaken by the Contractor.
- Payment of any fines in terms of the contract will not absolve the offender from being liable from prosecution in terms of any law.
- A record of penalties will be maintained within the procurement department and may influence later commissions awarded to the contractor.

12 EMPr

12.1 Pre-Construction

General requirements during the pre-construction phase include the following:

- Design to consider and incorporate environmental requirements.
- Define and communicate roles and responsibilities for the implementation of the EMPr;
- Ensure that all structures within the construction area are identified and recorded.
- Determine and document the road conditions; and
- Develop and implement an environmental awareness programme.

Specific management measures related to the identified environmental aspects follow:

Table 12-1: Management measures to be implemented during pre-construction.

Potential Impact	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
LEGISLATIVE REQUIREMENTS AND DOCUMENT CONTROL				
General Requirements	All relevant authorisations, licences and approvals are in place prior to the commencement of construction.	<ul style="list-style-type: none"> • Approvals to be in place prior to construction. 	Once off prior to construction	Project Manager
	A formal document control system is in place to ensure all relevant documents are in place prior to commencement.	<ul style="list-style-type: none"> • An environmental file/document control system must be designed and put in place. • Prior to construction, the following documents must be included in the file: <ul style="list-style-type: none"> ○ WUL ○ EMPr ○ EA 	Once off prior to construction	Project Manager
	Site specific method statements are compiled and approved.	<ul style="list-style-type: none"> • Based on the EMPr, the contractor must compile specific method statements which must be approved by the Project manager prior to construction. At a minimum this should include: <ul style="list-style-type: none"> ○ Method Statement for site clearing. ○ Method Statement for establishing the construction camp. ○ Method Statement about waste and wastewater management. ○ Method Statement to show procedures for dealing with possible emergencies that can occur, such as fire and accidental leaks and spillage of carbon fuels and oils. ○ Method Statement for dust control. ○ Method Statement for the storage and handling of hazardous substances. ○ Method Statement for controlling alien invasive species and noxious weeds; and ○ Method Statement for rehabilitation of construction footprint. 	Prior to construction	EO to compile. Project manager to approve

Potential Impact	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
BARRICADING OF SENSITIVE FEATURES				
Loss/disturbance of sensitive features	Proper management of sensitive features through identification and barricading.	<ul style="list-style-type: none"> Prior to construction, the ECO should peg/demarcate the 15m wetland buffer so that all construction related activity (other than authorised activities) remains outside this sensitive area. All barricades must be in place prior to construction. Prior to construction, a site walk must be undertaken by the ECO and all <i>Hypoxis hemerocallidea</i> and <i>Boophone disticha</i> must be identified and demarcated. The Search, Rescue and Relocation Plan included in Appendix 13.1 must be implemented. 	Once off prior to construction	ECO/Specialist
SITE PLANNING AND LAYOUT				
Loss/disturbance of sensitive features	Planning and layout of construction site is undertaken responsibly to ensure protection of sensitive environmental features.	<ul style="list-style-type: none"> Contractor to submit a site plan to the ECO and Project Manager for comment. The site plan must be approved by the Project Manager prior to the establishment of the site. The plan must show the following): <ul style="list-style-type: none"> Sensitive environmental features. Buildings and structures. Contractors' camp and lay down areas. Site offices. Roads and access routes. Temporary waste storage areas Site toilets and ablutions. Topsoil stockpiles areas. Construction materials stores areas. Workshops; and Hazardous substance stores. Authorised construction footprint to be pegged. Ablution facilities must be located at outside 15m buffer area. 	Once off prior to construction	Contractor to compile plan, ECO to comment, Project Manager to approve.
ENVIRONMENTAL AWARENESS CREATION – INDUCTION				
General Requirements	Environmental awareness creation and training is undertaken prior to construction commencement to	<ul style="list-style-type: none"> ECO to induct relevant contractor managers at the start of the project. This induction should provide an overview of the authorisation and the EMPr. The environmental awareness training course for management shall include all management and foremen. 	Once off prior to construction	ECO to induct construction managers/ Environmental officer (EO)

Potential Impact	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
	<p>minimise environmental impacts and ensure compliance to relevant legislation and authorisations.</p>	<ul style="list-style-type: none"> • The Contractor must arrange that all his/her employees and those of his sub-contractor go through the project specific environmental awareness induction before the commencement of construction and as and when new staff or sub-contractors are brought on site. • A system must be in place to ensure all new employees have received training. • All attendees shall remain for the duration of the course and sign an attendance register that clearly indicates participant's names on completion. A copy of the attendance register is to be retained by the ECO/Project Manager. 		<p>Contractor to induct all workers</p>

12.2 Construction

Mitigation measures for all activities related to construction are provided below. The mitigation measures included in the Baseline Ecological Status Assessment, Wetland Assessment and Heritage Impact Assessment undertaken as part of the Basic Assessment Report have also been incorporated below. Management actions are linked to a specific impact and overall management objective. Information on the institutional responsibilities and the frequency of the actions is also provided.

Table 12-2: Management measures to be implemented during construction.

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
ATMOSPHERIC EMISSIONS					
Dust emissions	Site Clearing General construction activities	Ensure that all possible causes of dust are mitigated as far as possible to minimise impacts to the surrounding environment	<ul style="list-style-type: none"> A speed limit of 20km/h must be maintained on all dirt roads. Dust suppression by means of either water or biodegradable chemical agent is required. 	Daily	Contractor to implement actions. ECO to monitor
Emissions from vehicles and equipment (CO ₂ , NO _x , SO _x , VOC's etc.)	Use of vehicles and plant during construction	All vehicles/plant on site must be properly maintained to reduce emission sources.	<ul style="list-style-type: none"> All vehicles used during the project should be properly maintained and in good working order. A maintenance schedule should be drawn up to ensure all vehicles are serviced at the proper interval. All vehicles and other machinery should comply with road worthy requirements and comply with legislation in terms of allowable emissions. 	As required by maintenance schedule	Contractor to implement actions. ECO to monitor
NOISE					
Noise increases due to construction activities	General construction activities	Ensure that noise disturbance to surrounding areas are minimised and that construction activities comply with the Noise Control Regulations and the provisions of South African National Standards; Environmental, Health and Safety (EHS) Guidelines, World Health Organisation (WHO, 2002).	<ul style="list-style-type: none"> The provisions of SANS 10103:2008 will apply to all areas within audible distance of residents or adjacent landowners. Equipment and/or machinery which will be used must comply with the manufacturer's specifications on acceptable noise levels. Construction activities should be limited to daytime only. 	Daily	Contractor to implement actions. ECO to monitor
DISCHARGE TO SURFACE WATER					
Water Quality	Site Camp Workshop	Construction activities are managed correctly to ensure no negative	<ul style="list-style-type: none"> The following mitigation measures suggested by the wetland specialist apply: 	Daily	Contractor to implement actions.

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
	Concrete mixing Construction activities	impacts to water quality. This includes proper management of ablution facilities, workshop and equipment and concrete batching and mixing.	<ul style="list-style-type: none"> ○ Stock piling outside the wetland area, stormwater management, dry season construction, filtration. ● In addition, the following general measures should be implemented: ● Toilets <ul style="list-style-type: none"> ○ Chemical toilets must be supplied and maintained during the construction phase. ○ Ablution facilities (chemical toilets) are to be provided by the Contractor, at a ratio of 1:10. ○ Ablution facilities (chemical toilets) must be erected within 100m from all workplaces but within the development footprint. ○ Toilets are to be secured to the ground and must have a closing mechanism. ○ Toilet paper must be provided at these facilities and must be serviced once per week. ○ Certified contractors to maintain and remove chemical toilets regularly. ○ The contractor must ensure that spillage does not occur when toilets are cleaned/serviced, and contents must be properly stored and disposed of. ○ Discharge of waste into the environment and/or burial of waste are strictly prohibited. ○ Sanitary arrangements must be to the satisfaction of the PM, ECO, the local authorities, and the applicable legal requirements. ● Proper storage of hazardous material <ul style="list-style-type: none"> ○ Hazardous materials to be suitably stored to prevent environmental contamination and visual impacts. Storage requirements to be determined based on chemical qualities of material and Material Safety Data Sheets (MSDS). At a minimum, hazardous chemical substances (HCS) must be stored at a designated area that meets the following requirements: <ul style="list-style-type: none"> ▪ Earthed ▪ Fire extinguisher must be present. 		ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> <ul style="list-style-type: none"> ▪ Relevant signage to be displayed including No Smoking/ No open flames; Hazardous Chemical Substance Store; Type of HCS (e.g., Diesel); Maximum contents volume and Fire extinguisher. ○ Storage areas should be located outside of the 15m buffers. ○ Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 of 1993), relevant associated Regulations, and applicable SANS and international standards. ○ Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor. Suitable ventilation to be provided. ○ All storage tanks containing hazardous materials must be placed in bunded containment areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material. • Spillages <ul style="list-style-type: none"> ○ In the event of spillages of hazardous substances, the appropriate clean up and disposal measures are to be implemented. ○ The contractor must ensure that necessary materials and equipment are available on site to deal with spills of any hazardous materials present. ○ The ECO and Project Manager must be notified of all significant spillages. • Training <ul style="list-style-type: none"> ○ Staff that will be handling hazardous materials must be trained to do so. • General <ul style="list-style-type: none"> ○ Drip trays must be placed under all vehicles when immobile for longer than 24 hours. Vehicles 		

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<p>suspected of leaking must be monitored and conduct a pre-start-up inspection checklist.</p> <ul style="list-style-type: none"> ○ Drip trays must be checked and replaced for vehicles standing (parked) for prolonged periods. ○ Drip trays must be of a sufficient size and volume to collect any hydrocarbon leakages from a stationary vehicle. ○ Spill kits (absorbent material) must be available on site and in all vehicles that transport hydrocarbons for dispensing to other vehicles on the construction site. ○ Spilled substances must be contained in impermeable containers for removal to a licensed hazardous waste site. 		
Flow regime	Construction activities Stormwater management	Ensure minimal impacts to the flow regime of the wetland through poor stormwater management	<ul style="list-style-type: none"> ● The following mitigation measures suggested by the wetland specialist apply: <ul style="list-style-type: none"> ○ Stock piling outside the wetland area, stormwater management, dry season construction, filtration. ● The following mitigation measures suggested by the Hydropedological Assessment apply: <ul style="list-style-type: none"> ○ It is suggested that suitable infill for benching be afforded, primarily as the site holds the entire hillslope (via the plug) in balance. Infilling of suitable materials will provide for the increased capacity of the site to mitigate future envisaged developments along the bottom of the site (i.e. the construction of the Metro Boulevard and intersection with Christiaan de Wet Road), simultaneously allowing for minimal destruction of the existing hillslope 'plug'. ○ Where shallow interflow is dominated by deep interflow (Unit 4, Figure 6 9), a separate/unique mitigation must be afforded. The implicit flowpath is of high flux and reduction value, 	Daily	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<p>relative to the surrounding soils (Unit 4, Figure 6 9).</p> <ul style="list-style-type: none"> ○ The following are recommended: <ul style="list-style-type: none"> ▪ Onsite consultation with hydrogeologist prior and during services installation ▪ Onsite consultation with hydrogeologist prior and during cut and fill design (levels to be determined) ▪ Bedrock was not encountered during the survey. (Geo-tech report also corroborates same). Soil rock interface was not encountered due to limitation of the use of TLB machinery. Hand auguring was not permissible due to the hardness of the material. It is thus recommended that a mechanical (drill type) investigation be conducted to confirm bedrock conditions. ▪ The topological backslope area (Unit 4, Figure 6 9) should be further investigated in terms of the annual duration of saturation as factor for the reduction i.e. maturation of the soil (gleying). ▪ It should be attempted to enhance the current wetland function. <ul style="list-style-type: none"> • Wetland drivers should be maintained as far as possible. • Water quality preservation is key • In addition, the following general measures should be implemented: <ul style="list-style-type: none"> ○ Instability and erosion of steep slopes must be stabilised immediately. Re-vegetation in consultation with landscape architect and ECO should be done if and where required. 		

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> ○ To reduce the loss of material by erosion, disturbance must be kept to a minimum. ○ Where possible, natural vegetation should be retained to reduce the risk of erosion. ○ Silt fences must be used to stabilise the site, reduce erosion and silt entering the natural environment. No unchecked silt may enter the natural environment. ○ Proper stormwater management as per the approved stormwater management plan. ○ Increased run-off during construction should be managed using berms, temporary cut-off drains, attenuation ponds or other suitable structures, in consultation with the ECO and resident Engineer. ○ Stormwater management system is to be installed as soon as possible following site establishment, to attenuate stormwater during the construction phase, as well as during the operational phase. ○ Surface-water run-off and stormwater must be directed away from trenches and areas of excavation. 		
Habitat	General construction activities	Ensure minimal impact to wetland habitat	<ul style="list-style-type: none"> ● The following mitigation measures suggested by the wetland specialist apply: <ul style="list-style-type: none"> ○ Stock piling outside the wetland area, minimal ingress, and egress. ● In addition, the following general measures should be implemented: <ul style="list-style-type: none"> ○ The wetland area should be declared 'no-go' area's during the construction and must be demarcated prior to construction. ○ All laydown, storage areas etc. should be restricted to within the development footprint. ○ Compilation and implementation of a Wetland Rehabilitation Plan. 	Once off (design and approval) Implementation – ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
Biota	General construction activities	Ensure minimal impact to wetland biota	<ul style="list-style-type: none"> • The following mitigation measures suggested by the wetland specialist apply: <ul style="list-style-type: none"> ○ Stock piling outside the wetland area, minimal ingress, and egress. • In addition, the following general measures should be implemented: <ul style="list-style-type: none"> ○ The wetland area should be declared ‘no-go’ area’s during the construction and must be demarcated prior to construction. ○ Waste management must be a priority and all waste must be collected and stored adequately. It is recommended that all waste be removed from site on a weekly basis to prevent rodents and pests entering the site. ○ No trapping, killing, or poisoning of any wildlife should be allowed on site. ○ Staff should be educated about the sensitivity of faunal species and measures should be put in place to deal with any species that are encountered during the construction process. The intentional killing of any animals including snakes, insects, lizards, birds, or other animals should be strictly prohibited. 	Daily	Contractor to implement actions. ECO to monitor
Geomorphology	General construction activities Stormwater management	Ensure that minimal disturbance of geomorphology during construction.	<ul style="list-style-type: none"> • The following mitigation measures suggested by the wetland specialist apply: <ul style="list-style-type: none"> ○ Stormwater management design and erosion control measures. • In addition, the following general measures should be implemented: <ul style="list-style-type: none"> ○ Instability and erosion of steep slopes must be stabilised immediately. Re-vegetation in consultation with landscape architect and ECO should be done if and where required. ○ To reduce the loss of material by erosion, disturbance must be kept to a minimum. ○ Where possible, natural vegetation should be retained to reduce the risk of erosion. 	Daily	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> ○ Proper stormwater management as per the approved stormwater management plan. ○ Increased run-off during construction should be managed using berms, temporary cut-off drains, attenuation ponds or other suitable structures, in consultation with the ECO and resident Engineer. ○ Stormwater management system is to be installed as soon as possible following site establishment, to attenuate stormwater during the construction phase, as well as during the operational phase. ○ Surface-water run-off and stormwater must be directed away from trenches and areas of excavation. 		
WASTE GENERATION					
Domestic Waste	Waste generation, storage, and disposal	Domestic waste must be managed properly to ensure minimal impacts.	<ul style="list-style-type: none"> ● Waste recycling to be put in place. ● Domestic waste must be stored in containers labelled or colour coded for general waste. ● Vermin / weatherproof bins will be provided in sufficient numbers and capacity to store domestic waste. ● Containers must be emptied frequently before reaching capacity. ● Solid waste shall only be stored in the designated general waste storage area which must be enclosed and impermeable. ● No waste shall be buried or burned anywhere on the construction site. ● All solid waste shall be disposed of by a certified contractor, off-site, at an approved landfill site if no municipal services is available. The Contractor shall supply the ECO with a certificate of disposal for auditing purposes. ● Avoidance, reduction, and reuse should be practiced wherever possible – see waste management plan. ● Waste may not cause any nuisance (e.g., odour) 	Daily	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> Records of waste manifest documents must be retained at the administration office 		
Construction Waste	Waste generation, storage, and disposal	Construction waste must be managed properly to ensure minimal impacts.	<ul style="list-style-type: none"> Construction waste must be collected and put into suitable closed bins daily. Provide waste skips on site. These skips should be sufficient in number, the skip storage area should be kept clean, skips should be emptied and replaced before overflowing or spillage occurs. Skips should be covered to prevent waste blowing away. Construction rubble must be disposed of at a registered landfill site. Avoidance, reduction, and reuse should be practiced wherever possible – see waste management plan. Records of waste manifest documents must be retained at the administration office. 	Daily	Contractor to implement actions. ECO to monitor
Hazardous waste	Waste generation, storage and disposal	Hazardous waste must be managed properly to ensure minimal impacts.	<ul style="list-style-type: none"> The classification of waste determines the handling methods and the ultimate disposal of the material. The contractor shall manage hazardous waste that are anticipated to be generated by his operations as follows: <ul style="list-style-type: none"> Characterise the waste to determine if it is general or hazardous (Use the Appendix 1 of the Norms and Standards for the Classification of Waste for landfill to determine whether additional classification is required). Obtain and provide an acceptable container with a label. Place hazardous waste material in the container. Inspect the container on a regular basis. Haul the full container to the licenced and correct disposal site. Provide documentary evidence of proper disposal of the waste. Only temporary storage of waste is allowed (once of storage of waste for a period less than 90 days). The volume of material should be limited to less than 80m³ of hazardous waste. Should this be exceeded the Norms and 	Daily	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<p>Standards for the Storage of Waste will need to be complied with.</p> <ul style="list-style-type: none"> Containers must be emptied frequently before reaching capacity. All hazardous waste must be disposed of at the nearest hazardous landfill. Waste may not cause any nuisance (e.g. contamination) Records of waste manifest documents must be retained at the administration office. Certificates of registration must be retained for transporters of hazardous waste and retained in record at the administration office. 		
SOIL ALTERATION					
Loss of topsoil	Site clearing	Effective management of topsoil, to minimise the impact of construction activities.	<ul style="list-style-type: none"> During site preparation, topsoil and subsoil must be stripped separately from each other and must be stored separately from spoil material for use in the rehabilitation phase. Topsoil should be protected from wind and rain, as well as contamination from diesel, concrete or wastewater. Topsoil stockpiles should be checked monthly to ensure that this is the case. Topsoil should be used in landscaping and rehabilitation where possible. 	At start of construction. Checks to occur monthly	Contractor to implement actions. ECO to monitor
Alteration of topography	Site clearing Landscaping Construction activities	Changes to topography to be planned properly to prevent negative impacts.	<ul style="list-style-type: none"> Changes to topography must be properly designed and landscaped. Stormwater management measures must be implemented to ensure these changes to not impact on stormwater. 	Ongoing	Contractor to implement actions. ECO to monitor
Soil erosion	Site clearing Landscaping Construction activities	Ensure that all possible causes of erosion are mitigated as far as possible to minimise impacts to the site and surrounding environment	<ul style="list-style-type: none"> Instability and erosion of steep slopes must be stabilised immediately. Re-vegetation in consultation with landscape architect and ECO should be done if required. To reduce the loss of material by erosion, disturbance must be kept to a minimum. If clearing of slopes occur within the rainy season, earth berms must be created along the up-slope side of the construction area. 	Ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> Where possible, natural vegetation should be retained to reduce the risk of erosion. Should erosion occur due to negligence on the part of the Contractor, the Contractor will be responsible for reinstatement of the eroded area to its former state at his own expense. Any surface water pollution occurring as a result of this negligence will be cleaned up by the Contractor or a nominated clean up organisation at the expenses of the Contractor. 		
Soil pollution	Site camp Storage of materials Ablution facilities Storage of Waste Workshop area	Ensure that all possible causes of soil pollution are mitigated as far as possible to minimise impacts to the site and surrounding environment	<ul style="list-style-type: none"> All vehicle/equipment maintenance and washing must be done in the workshop area, equipped with a bund wall and grease trap oil separator. Workshop area must be monitored for fuel and oil spills. Spills must be cleaned up immediately and remediated to the satisfaction of the ECO and PM. Spill kits must always be comprehensive and available on site. An adequate supply of absorbent material must be available to accommodate emergency spills. Also see mitigation measures related to water quality and storage of hazardous material. 	Ongoing	Contractor to implement actions. ECO to monitor
RESOURCE CONSUMPTION					
Electricity consumption	General site activities	Electricity reduction mechanisms to be implemented.	<ul style="list-style-type: none"> Enforce electricity reduction strategies. Environmental awareness training 	Ongoing	Contractor to implement actions. ECO to monitor
Water consumption	General site activities	Water conservation mechanisms to be implemented.	<ul style="list-style-type: none"> Enforce water saving strategies including design of recycling and reuse, rainwater harvesting etc. Environmental awareness training. 	Ongoing	Contractor to implement actions. ECO to monitor
Fuel consumption	Fuelling of plant, vehicles, and generators	Fuel conservation mechanisms to be implemented.	<ul style="list-style-type: none"> Record and monitor fuel consumption regularly. Reduce theft of fuel (increase security) 	Ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
Raw materials consumption	General construction activities requiring raw materials	Raw materials conservation mechanisms to be implemented.	<ul style="list-style-type: none"> Promote effective use of raw materials. 	Ongoing	Contractor to implement actions. ECO to monitor
EFFECTS ON BIODIVERSITY					
Loss of habitat due to Clearing due to digging and laying foundations, Construction camps & lay down areas and Stochastic events such as fire	Site clearing Construction activities.	No loss of habitat outside the approved footprint.	<ul style="list-style-type: none"> Proper management of site establishment: <ul style="list-style-type: none"> Locate construction camp in area where sensitive environmental features will not be impacted on. The location should be approved by the ECO, Project Manager and EO. Construction camp should be fenced, and access control should be exercised. The extent of the site should be limited, to avoid any additional clearance of vegetation. Construction and laydown areas should be established outside of the wetland 15m buffer. All construction activities (other than those authorised) must be outside of the wetland 15m buffer. Fires shall only be permitted in specially designated areas and under controlled circumstances. Proper management of site clearing: <ul style="list-style-type: none"> Restrict site clearing activities to construction area /domain. Clearing of vegetation to be conducted in a phased manner (where possible). All laydown, storage areas etc should be restricted to within the Project area and all access roads must be kept within this area or from existing access roads. A qualified environmental control officer must be on site when construction begins to identify species that will be directly disturbed and to relocate fauna/flora that is found during construction (including all reptiles and amphibians). 	Ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> • Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species. • Compilation of and implementation of an alien vegetation management plan for the entire site. • It is recommended that all <i>Hypoxis hemerocallidea</i> and the one <i>Boophane disticha</i> species should be removed prior to construction activities and either relocated to a similar type of environment or implemented within the landscaping plan of the proposed development. A Search, Rescue and Relocation plan has been compiled and should be implemented. 		
Loss of fauna - Staff or construction workers poaching and hunting, Intentional killing of fauna and Vegetation and ground clearing	Site clearing Construction activities.	Minimal disturbance to fauna occurs during construction.	<ul style="list-style-type: none"> • No sensitive faunal species were identified on site and the Ecological Specialist noted that the site is disturbed. The following recommendations by the specialist will be implemented: <ul style="list-style-type: none"> ○ Snaring and hunting of fauna by construction workers on or adjacent to the study area are strictly prohibited. ○ Killing of fauna on or adjacent to the study area are strictly prohibited. Should any fauna species be found on site, the ECO should be conducted asap to provide recommendation or mitigation measures. ○ Clearing of vegetation is not allowed within the 15m buffer of the wetland area other than for authorised activities. <p>In addition, the following general requirements should be adhered to:</p> <ul style="list-style-type: none"> ○ Before construction starts, construction workers must be educated with regards to littering and poaching. ○ Environmental awareness training should be provided to contractors regarding disturbance to 	Ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			animals. Emphasis should be placed on talks regarding snakes.		
Disruption of ecological life cycles due to the restriction of species movement	Site clearing Construction activities.	Ensure that minimal disturbance of ecological systems and natural corridors takes place during construction.	<ul style="list-style-type: none"> • The Ecological Specialist noted that the site is disturbed. The following recommendations by the specialist will be implemented: <ul style="list-style-type: none"> ○ Trenches and other linear barriers should not be kept open for too long, especially not staying open overnight. ○ Stormwater and road infrastructure should be designed in such a way that it will have minimal impact on the environmental, especially the wetland area. ○ Clearing of vegetation is not allowed within the 15m buffer of the wetland area (other than for authorised activities). • In Addition, the following should be undertaken: <ul style="list-style-type: none"> ○ All laydown, storage areas etc should be restricted to within the Project area. ○ Areas that are denuded during construction need to be re-vegetated with indigenous vegetation to prevent erosion during flood events. This will also reduce the likelihood of encroachment by alien invasive plant species. ○ Compilation of and implementation of an alien vegetation management plan for the entire site. 	Ongoing	Contractor to implement actions. ECO to monitor
Disruption of ecological life cycles due to noise and lighting	Site clearing Construction activities.	Ensure that minimal disturbance of ecological life cycles due to noise and lighting.	<ul style="list-style-type: none"> • Construction must be restricted to hours of 07:00 and 17:00. Should construction activities need to continue over a public holiday or is expected to be excessively noisy, all Interested and Affected Parties and the ECO must be notified in advance. 	Ongoing Contractor to implement actions	ECO to monitor
Introduction of alien flora affecting native faunal assemblages	Site clearing Construction activities.	Ensure proper management of alien invasive species	<ul style="list-style-type: none"> • Compilation of and implementation of an alien vegetation management plan for the entire site. 	Ongoing Contractor to implement actions	ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> 'Alien, invasive species found within the construction area should be eradicated as far as possible and disposed of at a registered site. Measures to prevent siltation from entering the wetland area, should be implemented throughout the construction phase. 		
INCIDENTS, ACCIDENTS, AND POTENTIAL EMERGENCY SITUATIONS					
Pollution incidents	Workshop Site Camp Storage of Hazardous material Use of plant and vehicles	Minimise potential pollution incidents due to construction.	<ul style="list-style-type: none"> Proper emergency response procedure to be in place for dealing with spill or leaks at the construction site. Ensure that the necessary materials and equipment for dealing with spills and leaks are available on site, where practicable. Remediation of the spill areas will be undertaken to the satisfaction of the Project Manager. In the event of a hydrocarbon spill, the source of the spillage will be isolated and contained. The area will be cordoned off and secured. The Contractor will ensure that there is always a supply of an appropriate absorbent material readily available to absorb, breakdown and where possible, encapsulate a minor hydrocarbon spillage. All staff on site will be made aware of actions to be taken in case of a spillage. Provide contact details of person to be notified in a case of spillages – signage to be displayed at strategic points within the construction domain (e.g., workshop, fuel storage area, hazardous material containers). 	Daily	Contractor to implement actions. ECO to monitor
Health and safety	General construction activities	A safe working environment for contractors/construction workers and the public is provided.	<ul style="list-style-type: none"> Appointed Safety Agent. Contractor to submit a Health and Safety Plan, prepared in accordance with the Health and Safety Specification, for approval prior to the commencement of work. All construction personals must be clearly identifiable. All employees must also be issued with employee cards for identification purposes. 	Appointment and Plan – once off at start, other actions, ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> • All workers will be supplied with the required Personal Protective Equipment as per the Occupational Health and Safety Act (Act No. 85 of 1993). • Fencing and barriers will be in place in accordance with the Occupational Health and Safety Act (Act No. 85 of 1993). • Applicable notice boards and hazard warning notices will be put in place and secured. Night hazards will be indicated suitably (e.g., reflectors, lighting, traffic signage). • Maintain access control to prevent access of the public to the construction areas, as far as practicable. • 24-hour security and access control. • Health and Safety awareness training. • A Dedicated Occupational Health and Safety system to be implemented by Contractor's Safety Officer. To be monitored and audited by the Client's Safety Agent, in terms of the Construction Regulations (2003). 		
Storage of hydrocarbons	Storage of fuel Site Camp Workshop areas	Effective and safe storage of hydrocarbons on site, to minimise the impact of hydrocarbons on the environment	<ul style="list-style-type: none"> • Proper storage of hydrocarbons <ul style="list-style-type: none"> ○ Storage requirements to be determined based on chemical qualities of material and Material Safety Data Sheets (MSDS). At a minimum, hazardous chemical substances (HCS) must be stored at a designated area that meets the following requirements: <ul style="list-style-type: none"> ▪ Earthed ▪ Fire extinguisher must be present. ▪ Relevant signage to be displayed including No Smoking/ No open flames; Hazardous Chemical Substance Store; Type of HCS (e.g., Diesel); Maximum contents volume and Fire extinguisher. • Storage areas should be located 100m from the edge of wetlands. • Hazardous substances must be stored and handled in accordance with the appropriate legislation and standards, which include the Hazardous Substances Act (Act No. 15 of 1973), the Occupational Health and Safety Act (No. 85 	Ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<p>of 1993), relevant associated Regulations, and applicable SANS and international standards.</p> <ul style="list-style-type: none"> • Any hazardous materials (apart from fuel) must be stored within a lockable store with a sealed floor. Suitable ventilation to be provided. • All storage tanks containing hazardous materials must be placed in bunded containment areas with impermeable surfaces. The bunded area must be able to contain 110% of the total volume of the stored hazardous material. • Spillages <ul style="list-style-type: none"> ○ In the event of spillages of hazardous substances, the appropriate clean up and disposal measures are to be implemented. ○ The contractor must ensure that necessary materials and equipment are available on site to deal with spills of any hazardous materials present. ○ The ECO and Project Manager must be notified of all significant spillages. 		
Fire	Storage of fuel Site Camp Workshop areas General Construction Activities	Minimise potential fire incidents during construction.	<ul style="list-style-type: none"> • Appropriate emergency response to be in place for dealing with fire at the construction site. • All fire control mechanisms (firefighting equipment) will be routinely inspected by a qualified investigator for efficacy thereof and be approved by local fire services. • All staff on site will be made aware of general fire prevention and control methods, and the name of the responsible person to alert to the presence of a fire. • Burning of waste is not permitted. • Suitable precautions will be taken (e.g., suitable fire extinguishers, water bowsers, welding curtains) when working with welding or grinding equipment. • Designated smoking areas should be provided, with special bins for discarding of cigarette butts 	Ongoing	Contractor to implement actions. ECO to monitor
SOCIAL					

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
Visual impact	General Construction activities Site camp	Proper management of construction activities to minimise disturbance to visual environment.	<ul style="list-style-type: none"> • Suitable screening to be put in place during construction to minimise visual impacts. • No littering to be allowed. • Good housekeeping practices to be followed 	Ongoing	Contractor to implement actions. ECO to monitor
Safety and security	General construction activities	Proper management of labour force is undertaken to ensure that there are no security-related issues or disturbance to tenants or landowners outside the construction footprint.	<ul style="list-style-type: none"> • 24-hour access control to the site and 24-hour security. • Workers found to be engaging in activities such as excessive consumption of alcohol, drug use or selling of any such items on site must be disciplined. 	Ongoing	Contractor to implement actions. ECO to monitor
Traffic disruptions	General construction activities	Minimal disturbances to traffic due to road upgrades.	<ul style="list-style-type: none"> • Traffic warning and calming measures will be put in place when construction activities may impact on traffic flow. 	Ongoing	Contractor to implement actions. ECO to monitor
Loss of cultural heritage	General Construction activities Site clearing	No adverse impact on the historical and cultural inheritance of the area.	<ul style="list-style-type: none"> • A Heritage Impact Assessment was undertaken, and the following mitigation measures recommended: <ul style="list-style-type: none"> ○ Implementation of a chance find procedure. <ul style="list-style-type: none"> ▪ If during the pre-construction phase, construction, operations or closure phases of this project, any person employed by the developer, one of its subsidiaries, contractors and subcontractors, or service provider, finds any artefact of cultural significance or heritage site, this person must cease work at the site of the find and report this find to their immediate supervisor, and through their supervisor to the senior on-site manager. ▪ It is the responsibility of the senior on-site Manager to make an initial assessment of the extent of the find and confirm the extent of the work stoppage in that area. ▪ The senior on-site Manager will inform the ECO of the chance find and its immediate 	Ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			impact on operations. The ECO will then contact a professional archaeologist for an assessment of the finds who will notify the SAHRA.		
Loss of sense of place	General Construction activities Site camp	Proper management of construction activities to minimise disturbance to sense of place.	<ul style="list-style-type: none"> • Suitable screening to be put in place during construction to minimise visual impacts. • No littering to be allowed. • Good housekeeping practices to be followed. 	Ongoing	Contractor to implement actions. ECO to monitor
ECONOMIC					
Decline/increase in economy	Supplier and contractor selection	Preferential use of local contractors and suppliers.	<ul style="list-style-type: none"> • Local contractors and suppliers to be used during the construction phase as far as possible. 	Ongoing	Contractor to implement actions. ECO to monitor
Employment	Employment of construction workers	Proper management of labour force is undertaken to ensure that there is optimal use of local labourers and local contractors.	<ul style="list-style-type: none"> • Wherever possible labour, materials and services must be sourced locally. 	Ongoing	Contractor to implement actions. ECO to monitor
REHABILITATION AND LANDSCAPING					
General	Rehabilitation and landscaping activities	Adequate reinstatement and rehabilitation of construction areas	<ul style="list-style-type: none"> • In line with the requirements the National Environmental Management: Biodiversity Act (Alien and Invasive Species Regulations, 2014), the following must be undertaken: <ul style="list-style-type: none"> ○ Eradicate all Listed Invasive Species (Category 1a), if present. ○ Control all Listed Invasive Species (Category 1b), if present. ○ Apply for a permit for all Listed Invasive Species (Category 2), if present. ○ Apply for exemption for all Listed Invasive Species (Category 3), if present. 	Ongoing	Contractor to implement actions. ECO to monitor

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<ul style="list-style-type: none"> • After the construction phase, the area to be reinstated to the same or better condition than it was prior to construction. • Clear and completely remove from site all construction plant, equipment, storage containers, temporary fencing, temporary services, and fixtures. • Ensure that all access roads utilised during construction are returned to a usable state and/or a state no worse than prior to construction. • Inert waste and rubble <ul style="list-style-type: none"> ○ Clear the site of all inert waste and rubble, including surplus rock, foundations, and batching plant aggregates. After the material has been removed, the site shall be re-instated and rehabilitated. ○ Remove from site all domestic waste and dispose of in the approved manner at a registered waste disposal site, or with a registered service provider. • Hazardous waste and pollution control <ul style="list-style-type: none"> ○ Remove from site all pollution containment structures. ○ Remove from site all temporary sanitary infrastructure and wastewater disposal systems. ○ Take care to avoid leaks, overflows and spills and dispose of any waste in the approved manner. • Control of Invasive Plant species: <ul style="list-style-type: none"> ○ Control invasive plant species and noxious weeds by means of extraction, cutting or other approved methods. ○ Encroachment of alien vegetation should be monitored regularly and controlled; the area must be kept clear of all invader plants as per the Conservation of Agricultural Resources Act, 1983 (Act No 43 of 1983). Rehabilitation measures must be employed until such a time as indigenous species is established. ○ As much vegetation growth as possible should be promoted within the proposed replacement to 		

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<p>protect soils and to reduce the percentage of the surface area which is left as bare ground. In this regard special mention is made of the need to use indigenous vegetation species as the first choice during landscaping</p> <ul style="list-style-type: none"> • Landscaping <ul style="list-style-type: none"> ○ Make safe all excavations outside of the construction area by backfilling and grading, as required. ○ In general, no slopes steeper than 1(V):3(H) is permitted in cut-and-fill areas, unless otherwise specified by the landscaping plan. ○ Programme the backfill of excavations so that subsoil is deposited first, followed by the topsoil. ○ Monitor backfilled areas for subsidence (as the backfill settles) and fill depressions using available material. ○ Shape the area surrounding the development to blend in with the surrounding landscape, where possible. Landscaping shall be done using indigenous plant species, following water conscious design principles. ○ Ensure that no excavated material or stockpiles are left on site and that all material remaining after backfilling is landscaped to blend in with the surrounding landscape. • Topsoil replacement and soil amelioration <ul style="list-style-type: none"> ○ Execute top soiling activity prior to the rainy season or any expected wet weather conditions. ○ Execute topsoil placement only after all construction work has ceased. ○ Replace and redistribute stockpiled topsoil together with herbaceous vegetation, overlying grass, and other fine organic matter in all disturbed areas of the construction site, including temporary access routes. Replace topsoil to the original depth. ○ Place topsoil in the same area from where it was stripped. If there is insufficient topsoil available 		

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
			<p>from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas of similar quality.</p> <ul style="list-style-type: none"> ○ The suitability of substitute material will be determined by means of a soil analysis addressing soil fraction, fertility, pH and drainage. ○ Do not use topsoil suspected to be contaminated with the seed of alien vegetation. Alternatively, the soil is to be appropriately treated. ○ Ensure that storm water run-off is not channelled alongside the gentle mounding, but that it is taken diagonally across it. ○ Shape remaining stockpiled topsoil not utilised elsewhere in an acceptable manner to blend in with the local surrounding area. ○ After topsoil placement is complete, spread available stripped vegetation randomly by hand over the top-soiled area. ● Ripping and scarifying <ul style="list-style-type: none"> ○ Rip and/or scarify all areas following the application of topsoil to facilitate mixing of the upper most layers. Whether ripping and/or scarifying is necessary will be determined based on the site conditions immediately before these works begin. ○ Rip and/or scarify all disturbed areas (and other specified) 		

12.3 Operation

Mitigation measures for all activities related to operation are provided below. Management actions are linked to a specific impact and overall management objective. Information on the institutional responsibilities and the frequency of the actions is also provided.

Table 12-3: Management measures to be implemented during operation.

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
NOISE					
Noise increase	General operational activities	Residential development must comply with acceptable noise levels.	<ul style="list-style-type: none"> The proposed residential development is in line with activities and uses in the area and will not provide significant noise pollution. The Body corporate should develop rules and regulations to manage noise in line with applicable by-laws. 	Ongoing	Authorisation Holder
DISCHARGE TO WATER					
Water quality	General operational activities Stormwater	Proper maintenance of connection to sewer line and proper management of stormwater	<ul style="list-style-type: none"> An Outline Scheme Report has been undertaken and noted that sewer will connect to an existing sewer line and be treated at an existing Treatment works. Maintenance and management of the sewer line must be undertaken as per Johannesburg Metropolitan Municipalities' requirements. In addition, the following mitigation measures from the Wetland specialist must be implemented: <ul style="list-style-type: none"> Rehabilitation of construction impacted area, continuous monitoring. Storm water management. 	Ongoing	Authorisation Holder
Flow Regime	General operational activities Stormwater	Ensure Stormwater is properly managed	<ul style="list-style-type: none"> The following mitigation measures from the Wetland specialist must be implemented: <ul style="list-style-type: none"> Rehabilitation of construction impacted area, continuous monitoring. Storm water management. 	Ongoing	Authorisation Holder
Habitat	General Operational activities	Limited impact to habitat during operation	<ul style="list-style-type: none"> The following mitigation measures from the Wetland specialist must be implemented: <ul style="list-style-type: none"> Rehabilitation of construction impacted area, continuous monitoring. Storm water management. 	Ongoing	Authorisation Holder
Biota	General Operational activities	Limited impact to biota during operation	<ul style="list-style-type: none"> The following mitigation measures from the Wetland specialist must be implemented: <ul style="list-style-type: none"> Rehabilitation of construction impacted area, continuous monitoring. Storm water management. 		
Geomorphology	General Operational activities	Limited impact to geomorphology during operation	<ul style="list-style-type: none"> The following mitigation measures from the Wetland specialist must be implemented: Rehabilitation of construction impacted area. 		

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
WASTE GENERATION					
Domestic Waste	Waste management	Proper management of waste.	<ul style="list-style-type: none"> Recyclable waste streams must be separated from other waste streams. Waste to be separated into recyclable and non-recyclable waste. Waste separation needs to occur before waste is collected. Solid waste shall only be stored in the designated general waste storage area which must be enclosed and impermeable. All solid waste shall be disposed of by a certified contractor, off-site, at an approved landfill site if no municipal services are available. Avoidance, reduction, re-use, and recycling should be practiced wherever possible. 	Ongoing	Authorisation holder
SOIL ALTERATION					
Soil erosion	General operational activities	Ensure that all possible causes of erosion are mitigated as far as possible to minimise impacts to the site and surrounding environment	<ul style="list-style-type: none"> Stormwater management system to be implemented to reduce erosion. Landscaping to minimise soil erosion. 	Ongoing	Authorisation holder
EFFECTS ON BIODIVERSITY					
Loss of existing habitat due to loss of vegetation due to fire	General operational activities	Minimal loss of vegetation to fire	<ul style="list-style-type: none"> Fire extinguishers must be placed on the property. 	Ongoing	Authorisation holder
Direct mortality of fauna	General operational activities	Minimal disturbance of fauna	<ul style="list-style-type: none"> 'It is not expected that any fauna will be found on site during operation. The Body Corporate must include the requirement in their rule book that should any be found that the relevant organisation be called to safely remove the species. 	Ongoing	Authorisation holder
Disruption of ecological life cycles due to the restriction of species movement	General operational activities	Minimal disturbance of ecological life cycles	<ul style="list-style-type: none"> 'Stormwater and road infrastructure should be designed in such a way that it will have minimal impact on the environmental, especially the wetland area. Maintenance should be undertaken as per the requirements of the stormwater management plan. 	Ongoing	Authorisation holder

Potential Impact	Project Activities	Management Objective	Proposed Mitigation Measures/Management Actions	Frequency	Institutional Responsibility
INCIDENTS, ACCIDENTS, AND POTENTIAL EMERGENCY SITUATIONS					
Pollution incidents	General operational activities	Proper management of pollution sources to prevent pollution incidents on site.	<ul style="list-style-type: none"> Proper maintenance and management of sewer infrastructure to ensure no pollution incidents or spillages. 	Ongoing	Authorisation holder
Health and safety	General operational activities	Minimise potential impacts/incidents	<ul style="list-style-type: none"> 24-hour security and access control. 	Ongoing	Authorisation holder
SOCIAL					
Safety and security	General operational activities	Minimal safety and security issues.	<ul style="list-style-type: none"> 24-hour access control to the site and 24-hour security. 	Ongoing	Authorisation holder
Traffic Disruptions	General operational activities	Minimal traffic disturbances related to the operation of the dealership.	<ul style="list-style-type: none"> Road access as discussed in the Traffic Impact Assessment to be implemented. 	Ongoing	Authorisation holder
Decline/increase in economy	Supplier selection	Preferential use of local contractors and suppliers.	<ul style="list-style-type: none"> Local contractors and suppliers to be used during the construction phase as far as possible. 	Ongoing	Authorisation holder
Employment	Employment of permanent staff	Proper management of labour force is undertaken to ensure that there is optimal use of local labourers and local contractors.	<ul style="list-style-type: none"> Wherever possible labour, materials and services must be sourced locally. 	Ongoing	Authorisation holder

13 APPENDICES

13.1 Proposed Rescue and Relocation Plan for The Red Data Listed Plant Species, *Hypoxis Hemerocallidea* and *Boophone Disticha* Found on The Proposed Development Site

13.1.1 General information

Hypoxis hemerocallidea falls within the botanical family Hypoxidaceae. The members of this family are small to medium-sized herbaceous plants, with grass-like leaves and an invisible stem which is modified into a corm or rhizome (a rounded underground storage organ resembling a bulb). The flowers are borne on leafless shoots known as scrapes and are trimerous (arranged in whorls of three) and radically symmetric. The plant is easily recognizable by its yellow star-shaped flowers and strap-like leaves. *Hypoxis hemerocallidea* favours grassland, preferring full sunlight, although it is known to occur in other habitat types. The leaves of *Hypoxis hemerocallidea* are distinctly three-ranked and arching and are densely covered with hairs.

Hypoxis hemerocallidea is one of the most used species in the traditional medicinal plant trade and is currently also used in primary health care as an immune booster for patients with HIV/AIDS. The rootstock is used in the treatment of urinary infections, heart weakness, internal tumours, and nervous disorders. The plant is also currently used to alleviate many immune related ailments, such as colds, flu, arthritis tumours and cancers (www.plantzafrica.com).

As *Hypoxis hemerocallidea* is a relatively hardy bulbous plant, with a shallow root structure, it is suitable for relocation to areas of similar habitat. A “rescue and relocation” plan is therefore proposed for these individuals. This is perceived to be a viable mitigation measure for ensuring the ongoing survival of this species in the area, as an area is already designated for conservation on the site.

Boophone Disticha falls within the botanical family Amaryllidaceae. This family consists mostly of bulbous plants, which occurs naturally throughout the tropics and warm temperate regions of the world. All Amaryllidaceae are perennials and apart from *Clivia*, *Cryptostephanus* and *Scadoxus*, which have rhizomes, the majority have bulbous storage organs. While growing, the bulb is kept sufficiently deep below ground by special roots that lengthen and contract. Most often the leaves are strap-shaped and smooth but occasionally they have unusual shapes, markings, and coverings. Amaryllidaceae usually have numerous flowers held in an umbrella-like cluster at the end of a leafless stem, called a scape (www.plantzafrica.com).

Boophone disticha is a deciduous bulbous plant with a thick covering of dry scales above the ground. The large, round heads have short stems and appear to grow directly from the bulb, almost at ground level. The colour of the flowers varies from shades of pink to red and are sweetly scented (July to Oct.). The pedicels (flower stalks) elongate after flowering to form a large seed-head. This breaks off at the top of the scape (stalk) and tumbles across the veld, dispersing the seed. The greyish-green leaves are erect, arranged in

a conspicuous fan and are usually produced after flowering. This spring-flowering species will flower even if it does not receive any water in winter (www.plantzafrica.com).

Boophone disticha has many medicinal uses. Traditional healers use it to treat pain and wounds. Parts of the plant are used by certain African tribes and by some Europeans to cure various ailments: the outer covering of the bulb is applied to boils and abscesses; fresh leaves are used to stop bleeding of wounds (www.plantzafrica.com).

The plant thrives in full sun in well-drained, sandy soil and in rocky areas. It should be planted in a protected area, although it can stand drought it does not like frost. The bulb should be planted in such a way that the neck and part of the bulb show above the ground. The plants seem to grow equally well in well-drained, sandy soil and in hard ground, but they take a long time to flower after being moved. The bulbs do not produce flowers until they are quite large (www.plantzafrica.com).

The “rescue and relocation” plan must be undertaken prior to the onset of the construction phase of the development and must be completed by an appropriate service provider.

13.1.2 Proposed “Rescue and Relocation” Plan

13.1.2.1 Step 1:

An appropriate service provider must be appointed to conduct and manage the operation.

13.1.2.2 Step 2:

Each individual plant located outside the areas of medium ecological sensitivity needs to be located, correctly identified (*Hypoxis hemerocallidea* is sometimes confused with other species of *Hypoxis*, such as *Hypoxis iridifolia*) and marked, using a brightly coloured marker to ensure visual location later.

13.1.2.3 Step 3:

To safely remove each individual plant, minimal damage to the corm must be ensured. The hole must be dug approximately 30 cm from the base of the plant and at least 30 cm deep to ensure minimal damage. Removal of the plant from its site should be done with care, pushing the plant up from the corm/rootstock. The plant should not be pulled from the soil using the leaves.

13.1.2.4 Step 4:

Once removed, the plants must be placed in appropriately sized propagating bags (dependent on each individual plant), utilising soil directly from the site. Should the soil prove to be of poor quality, organic fertilizer or compost must be added to the soil. These plants must be cared for until completion of the construction phase of the development. As these plants can tolerate moderate bouts of water stress, caution must be taken not to over-water or drown the individuals. Over-watering would also cause leeching of the soil, reducing nutrients available to the plants.

13.1.2.5 Step 5:

Once the construction phase is complete, the plants must be relocated on the property. Plants can either be transferred to the existing *Hypoxis hemerocallidea/ Boophone disticha* community or may be incorporated into the cultivated gardens of the development. Should plants be transferred to the existing community, caution must be taken not to damage other species of plant in the area. Holes must be dug prior to transfer of plants and must be large enough to ensure plants do not become dislodged during heavy rainfall.