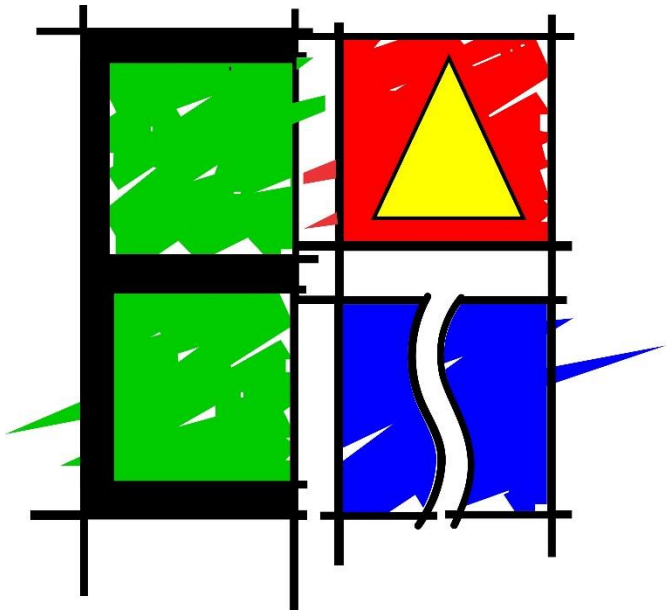
FINAL ENVIRONMENTAL MANAGEMENT PROGRAMME

PROPOSED GREATER GRABOUW HOUSING PROJECT – PORTION A OF RE/9/313 IN GRABOUW, THEEWATERSKLOOF LOCAL MUNICIPALITY, WESTERN CAPE

DEA&DP Reference: 16/3/3/6/1/E4/11/1069/25



Report Prepared by:

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Report Prepared for:

Theewaterskloof Municipality

October 2025

Prepared for:

Theewaterskloof Local Municipality

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EAS Project Number: **2191**
Date: October 2025

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Our Ref: F:\2100-2199\2191\Environmental\Erf 313\Reports\BAR Report\Final\2191 - APPENDIX H - Final EMPr.docx		

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3. ACRONYMS AND DEFINITIONS

DEA&DP	Department of Environmental Affairs and Development Planning
DMR	Department of Mineral Resources
DWS	Department of Water and Sanitation
ECDOT	Eastern Cape Department of Transport
ECO	Environmental Control Officer
EO	Environmental Officer
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
Environment	The surroundings within which humans exist could be made up of: the land, water and atmosphere of the earth; micro-organisms, plant and animal life; any part of combinations of the aforementioned and the interrelationships among and between them as well as the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing
Environmental Impact	The change to the environment, whether desirable or undesirable, that will result from the effect of a construction activity. An impact may be the direct or indirect consequence of a construction activity
Invasive Alien Vegetation	An undesirable plant growth which shall include, but not be limited to, all declared category 1 and 2 listed invader species as set out in the Conservation of Agricultural Resources Act (Act 43 of 1983).

MSDS	Material Safety Data Sheets
NO-GO Areas	Generally, those areas outside the designated working areas, including but not limited to: existing services and infrastructure, occupied property, grave sites, cultivated lands, wetland areas, 'Special or Sensitive Environments' as defined in the EMP
RE	Resident Engineer
Topsoil	Natural soil covering, including all the vegetation and organic matter, with variable depth
Working Areas	Working areas are those areas required by the Contractor to construct the works, as approved by the Resident Engineer

4. EMPR REQUIREMENTS

EMPr Requirements		
1.	**An EMPr must comply with section 24N of the Act and include--**	Relevant Section/s:
a)	details of	
i.	The EAP who prepared the EMPr; and	2.1
ii.	the expertise of the EAP to prepare an EMPr, including a curriculum vitae;	Appendix A
b)	a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	1
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;	1.1
d)	a description of the impact management outcomes, 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–	4
i.	planning and design	4
ii.	pre-construction activities	4
iii.	construction activities	4
iv.	rehabilitation of the environment after construction and where applicable post closure; and	18 & 24
v.	where relevant, operation activities;	21
f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to —	4
i.	avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	4, 16 & 17
ii.	comply with any prescribed environmental management standards or practices;	3
iii.	comply with any applicable provisions of the Act regarding closure, where applicable; and	18.8

EMPr Requirements		
iv.	comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	NA
g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	10
h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	10
i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	6
j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	17, 18, 20
k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	10
l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	3, 10
m)	an environmental awareness plan describing the manner in which—	8
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	√
n)	and specific information that may be required by the competent authority.	√
2.	Where a government notice gazette by the Minister provides for a generic EMPr, such generic EMPr as indicated in such notice will apply.	Noted

5. INTRODUCTION

5.1. Project Background

Theewaterskloof Municipality (TWK Municipality) proposes to develop a housing project called the Greater Grabouw Housing Project in Portion A of RE/9/313, Grabouw, Western Cape. Portion A of RE/9/313 has been identified as the next priority area for housing development within the implementation of the Greater Grabouw Housing Project. Portion 9 of Farm Oude Brug 313, located on the southern side of Grabouw. The proposed site is bordered by the Snake Park township to the north and west, degraded fynbos to the east, and the N2 to the south (**Figure 1**).

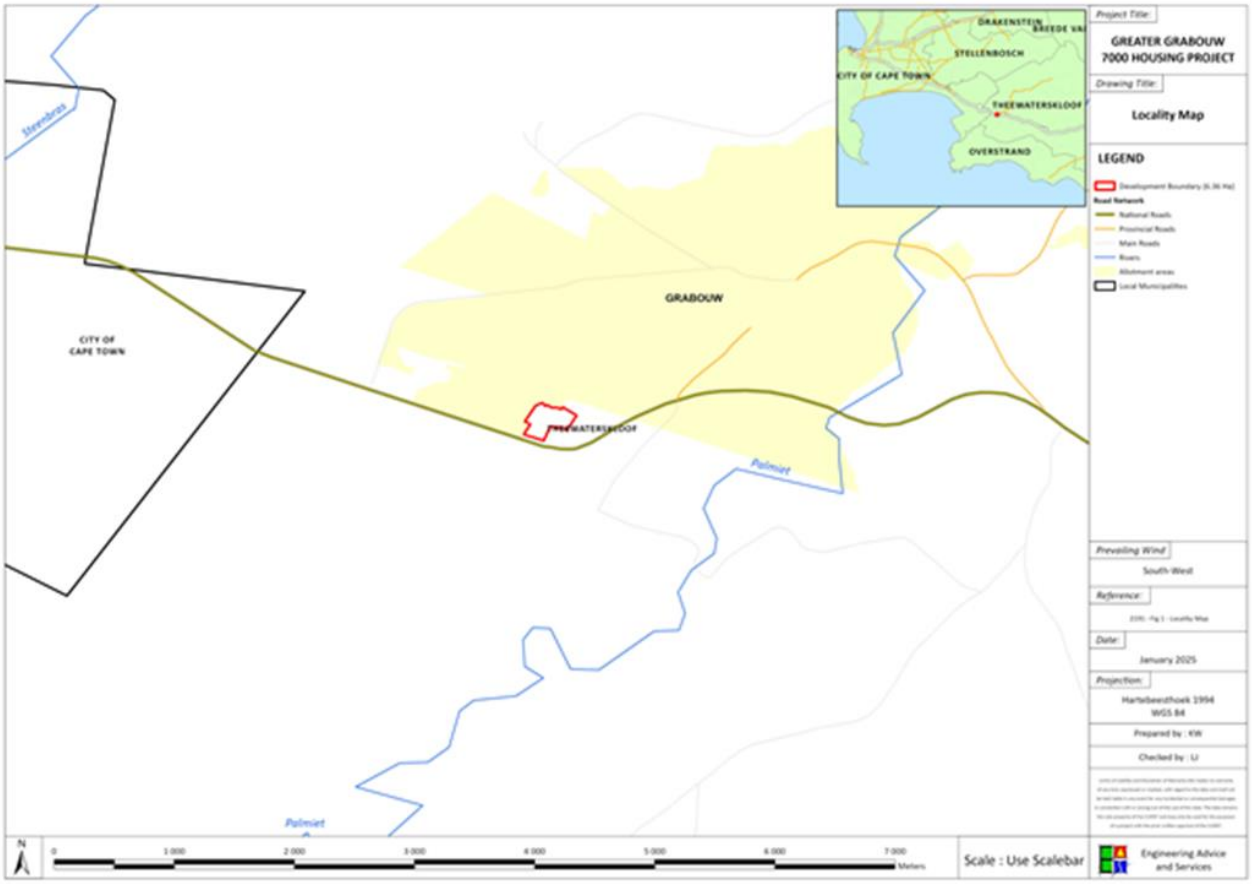

Figure 1. *Locality map*

5.2. Brief Project Description

The site (6.4 ha) will accommodate approximately 254 subsidised housing units, and the proposed layout includes Single Residential Zone 2 (SRZ2) erven for freestanding, semi-detached, and duplex units, Private Open Space (OSZ2) for a park and associated recreational and urban agriculture uses, and Transport Zone 2 (TUZ2) for internal roads (**Figure 2**). Engineering services will be installed as new, including water, sewer, stormwater infrastructure, and road networks.

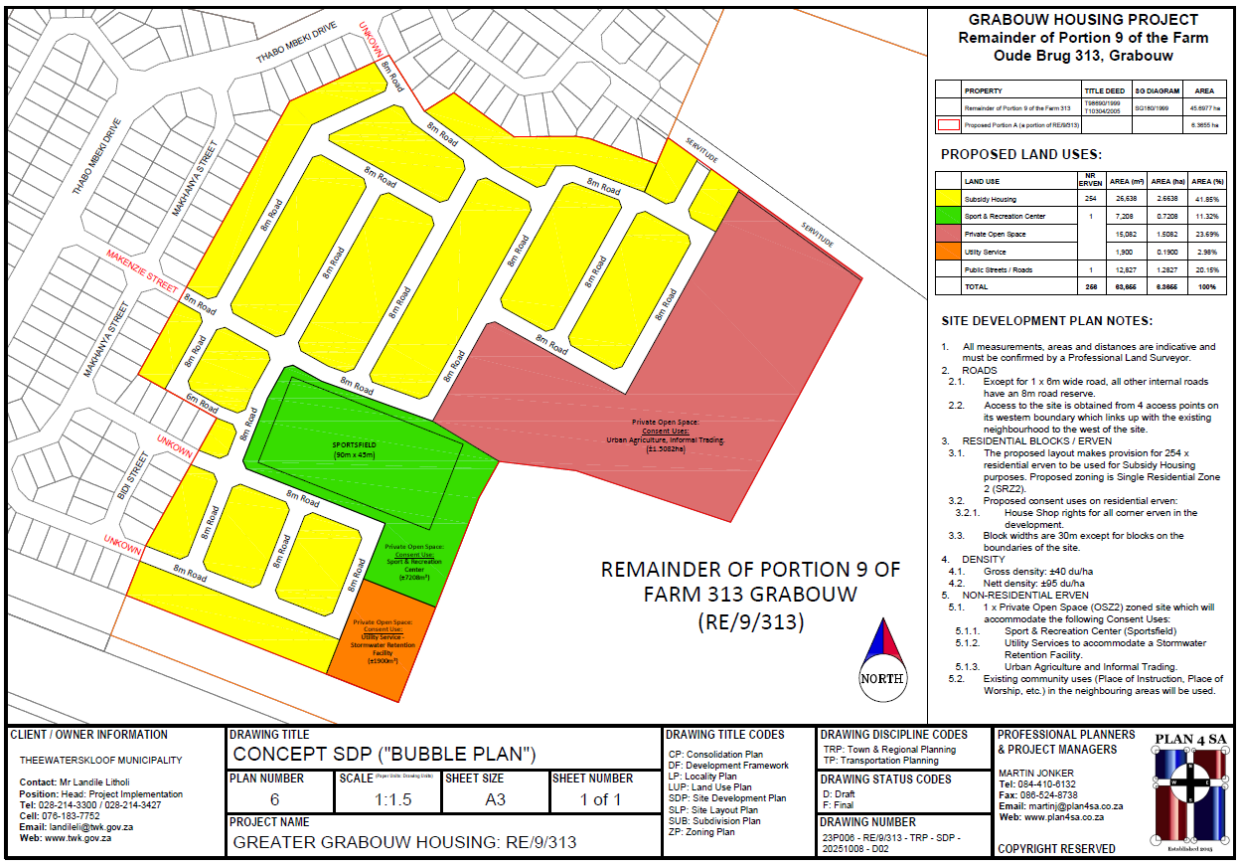

Figure 2. *Conceptual Site Development Plan*

5.3. Site Status

The area generally slopes gently to moderately from northwest to southeast, with the southern portion showing exposed surface outcrops. Portion A of RE/9/313 is mainly uninvaded and largely vacant, with only a small portion of the land being used as an informal sports field on the western side of the site, as well as livestock pens. According to the 2018 SA Vegetation Map, the site is located within the Kogelberg Sandstone Fynbos. Western Cape Biodiversity Spatial Plan (2023) maps the western part of the site as a critical biodiversity area (CBA1: Terrestrial) and the eastern part as a degraded critical biodiversity area (CBA2: Terrestrial). The site is highly degraded and has been severely impacted by past forestry and urban-related activities, with only a few patches of degraded fynbos left (Berry, 2025). Several alien invasive species classified as Category 1b and 2 under NEMBA are present (Berry, 2025). The majority of the site has very low ecological importance (Berry, 2025).

5.4. Ecological Sensitivities and "No-Go" Areas

The Open Space was positioned to protect sensitive features identified by specialists. The botanical specialist identified isolated patches of degraded fynbos on the property, which are of medium ecological importance (**Figure 3**). The aquatic specialist identified an ephemeral drainage line (EDL) on the western side of the site, which flows towards the Palmiet River approximately 1.3 km downstream (**Figure 4**). Although the EDL was found to be in a Seriously Modified ecological condition (PES Category E) with low ecological importance and sensitivity, it was recognised as a potential conduit for water and pollutants to the highly sensitive Palmiet River. The proposed development is to maintain a minimum 15 m ecological protection buffer around the EDL.

Figure 3. *Botanical ecological importance map of Erf 313*

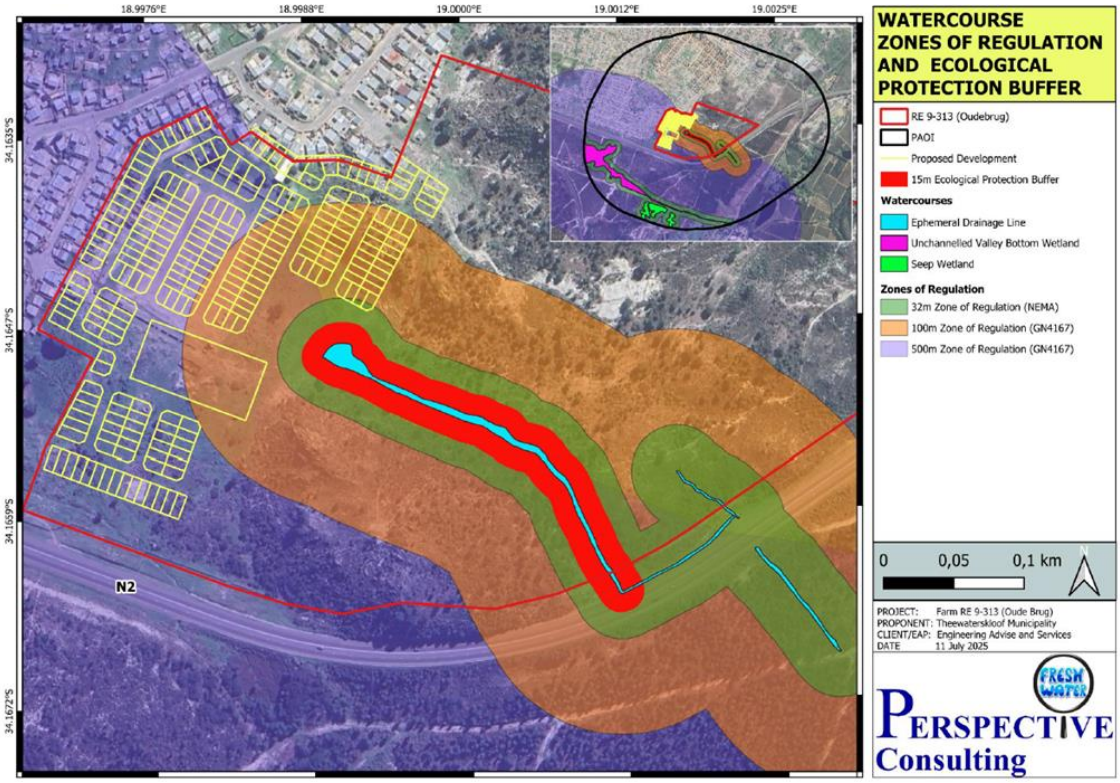

Figure 4. *Watercourse zones of regulation within the project area of interest (PAOI) according to NWA and NEMA*

6. INTERPRETATIONS

6.1. Details of the EAP

Lea's graduate qualifications include geology in sedimentology, structural geology, and petrography as well as Environmental Sciences. Lea has been instrumental in compiling and editing environmental reports for a range of projects in the Eastern Cape within the roads and transport, mining, housing, and agricultural

sectors. Lea's primary experience since joining EAS has been related to facilitating application processes for environmental authorisations for borrow pits in various areas of the Eastern Cape, involving site assessments, research, and report writing. Most of the processes involve facilitating formal basic assessment applications through public participation processes, managing environmental studies, and interpreting and compiling specialist reports related to these studies, utilising spatial tools and technologies.

She has experience in borrow pit screening and assessing the feasibility and environmental impacts surrounding the activities related to mining, as well as public consultation. She has been involved with and helped to facilitate licensing applications for more than 200 borrow pits throughout the Eastern Cape. Her responsibilities included environmental compliance auditing for road maintenance projects and borrow pit assessments during these operations. She assisted with ecological assessments, search and rescue operations, and facilitated Environmental Management Programmes and applications.

Through competent mentoring, Lea has become familiar with the applicable legislation for different projects' required application formats and procedures. Lea has gained valuable knowledge of the National Environmental Management Act (NEMA) and its related Regulations, the Mineral and Petroleum Resources Act (MPRDA), the National Water Act (NWA), and the Spatial Planning and Land Use Management Act (SPLUMA). Lea is a registered member of the International Association for Impact Assessment South Africa (6471) and has recently attended a SACNASP-accredited two-day Online EIA Law Course as well as a Continuing Professional Development-accredited Introductory EIA Report Writing Course hosted by IAIAsa. She is a Certified Natural Scientist with the South African Council for Natural Scientific Professions (Reg No. 129284).

6.2. Supporting Documents

The following documents shall inter alia be read in conjunction with this document:

1. Statutory requirements of the National Environmental Management Act (Act No 107 of 1998) (NEMA) and regulations promulgated in terms of Section 24 of NEMA;
2. Statutory requirements of the Regulation Notice 983 and 985 respectively, as per regulations 19 and 20 of the NEMA 2014 EIA Regulations (as amended 2017), and Regulation Notice 984 as per regulations 21, 22, 23, and 24 of the NEMA 2014 EIA Regulations (as amended 2017);
3. Statutory requirements of the National Water Act (Act No 36 of 1998) (NWA);
4. Statutory requirements of the National Forests Act (Act No 84 of 1998) (NFA);
5. Statutory requirements of the National Heritage Resources Act (Act No 25 of 1999) (NHRA); and
6. Statutory requirements of the National Environmental Management: Waste Act (Act No 59 of 2008) (NEMWA):

Note 1: In the Western Cape Province, the NEMA falls under the authority of the Department of Environmental Affairs and Development Planning. (DEA&DP).

6.3. Assumptions and Limitations

The following assumptions and limitations apply to the Impact Assessment Process as well as the compilation of the EMPr:

- This EMPr constitutes the EMPr for the proposed project as indicated in the project description.

- All the technical data and information provided by the Engineering team, their appointed consultants, and specialists are accurate and up to date.
- The contractors to be appointed to undertake the proposed activities will implement the measures as indicated in the Basic Assessment Report and EMPr.
- A monitoring and evaluation system, including auditing, will be established to track the implementation of the approved Final EMPr, to ensure that management measures are effective to avoid, minimise, and mitigate impacts; and corrective action is undertaken to address shortcomings and/or non-conformances.
- The Theewaterskloof Local Municipality, contractors, and consultants will adopt a process of continual improvement when managing and/or mitigating negative environmental impacts arising from the project. The approved Final EMPr will serve as the basis for environmental management and will be continually improved and refined.
- It has been assumed that the information provided by the Applicant is comprehensive, accurate and unbiased. The report assumes that the Applicant will comply with the outcome of the assessments undertaken, particularly in terms of implementation of the mitigation measures and the recommendations indicated in the EMPr to limit any adverse impacts.
- The conditions stipulated in the EA can only be effective if the Applicant or persons in control continually monitor and enforce compliance during the construction and operational phases of the project.
- Due in part to a rigorous public participation process being undertaken, it is the opinion of the EAP that there should not be uncertainties in terms of the compilation of this report or regarding the impact of management, mitigation, and monitoring measures proposed.

6.4. Applications

The provisions of this EMP shall apply to all Contractors, Sub-contractors, and their site personnel, workforce, or suppliers who are engaged in the execution of the works.

7. STATUTORY REQUIREMENTS

The Environmental Management Programme should be read in conjunction with the conditions of any environmental authorisation issued by the Department of Environmental Affairs and Development Planning (DEA&DP), as well as the conditions of the water use license issued and any permits that may be required for the proposed project. The Water Use License for the proposed works (to be) obtained from the Berg-Olifants Catchment Management Agency (BOCMA), in parallel to the environmental authorisation. It should be noted that the authorisations and licenses, and conditions attached to these, are legally binding. The following list describes legislation, policies and/or guidelines of any sphere of government that are applicable to the application as contemplated in the EIA regulations:

Activity No(s):	Provide the relevant **Basic Assessment Activity(s)** as set out in **Listing Notice 1**	Describe the portion of the proposed development to which the applicable listed activity relates.
12	The development of— (xii) infrastructure or structures with a physical footprint of 100 square metres or more; where such development occurs— (a) within a watercourse; (b) in front of a development setback; or **(c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse;**	The site falls within 32m of a non-perennial drainage line (EDL).
19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a **(i) a watercourse;** (ii) the seashore; or (iii) the littoral active zone, an estuary or distance of 100 metres inland of the high-water mark of the sea or estuary, whichever distance is the greater-] but excluding where such infilling, depositing, dredging, excavation, removal or moving— (a) will occur behind a development setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies. (d) occurs within existing ports or harbours that will not increase the development footprint of the port or harbour; or (e) where such development is related to the development of a port or harbour, in which case activity 26 in Listing Notice 2 of 2014 applies.	Material will potentially be removed and deposited within 32m of the edge of the ephemeral stream found on site. However, according to the Aquatic Biodiversity Impact Assessment, the drainage line has a 15m "No-Go" boundary zone, where no development is allowed. The "No-Go" zone and ephemeral drainage line have been accommodated within the proposed development layout as open spaces.
24	The development of a road— (i) for which an environmental authorisation was obtained for the route determination in terms of activity 5 in Government Notice 387 of 2006 or activity 18 in Government Notice 545 of 2010; or (ii) with a reserve wider than 13,5 meters, or where no reserve exists, where the road is wider than 8 meters; but excluding a road— (a) which is identified and included in activity 27 in Listing Notice 2 of 2014; (b) where the entire road falls within an urban area; or	Roads will be developed as part of the proposal in areas located outside urban areas, which comprise indigenous vegetation.

27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation, except where such clearance of indigenous vegetation is required for— (i) the undertaking of a linear activity; or (ii) maintenance purposes undertaken in accordance with a maintenance management plan.	Approximately 6,4 hectares of indigenous vegetation will be cleared for the proposed development.
Activity No(s):	Provide the relevant **Basic Assessment Activity(s)** as set out in **Listing Notice 3**	Describe the portion of the proposed development to which the applicable listed activity relates.
4	The development of a road wider than 4 metres with a reserve less than 13,5 metres. **i. Western Cape** i. Areas zoned for use as public open space or equivalent zoning; ii. Areas outside urban areas; (aa) Areas containing indigenous vegetation; (bb) Areas on the estuary side of the development setback line or in an estuarine functional zone where no such setback line has been determined; or iii. Inside urban areas: (aa) Areas zoned for conservation use; or (bb) Areas designated for conservation use in Spatial Development Frameworks adopted by the competent authority.	Roads will be developed as part of the proposal, in areas located outside of an urban area, which comprises indigenous vegetation.
12	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan. <u>Western Cape</u> Within a critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;	The development will have a footprint of approximately 64000 m^2. This means more than 300 m^2 of indigenous vegetation (Kogelberg Sandstone Fynbos) will be cleared.
14	The development of - (xii) infrastructure or structures with a physical footprint of 10 square metres or more; where such development occurs - a) within a watercourse; b) in front of development setback; or c) if no development setback has been adopted, within 32 metres of a watercourse, measured from the edge of a watercourse; **i. Western Cape** i. Outside urban areas: (ff) Critical biodiversity areas or ecosystem service areas as identified in systematic biodiversity plans adopted by the competent authority or in bioregional plans; (gg) Core areas in biosphere reserves; or	According to the Western Cape Biodiversity Spatial Plan (2023), the western part of the site has been mapped as a critical biodiversity area (CBA1: Terrestrial) and the eastern part as a degraded critical biodiversity area (CBA2: Terrestrial) According to the DFFE Protected Areas Register (PAR), the site falls within the Kogelberg Biosphere Reserve.
Activity No(s):	Provide the relevant **Scoping and EIR Activity(ies)** as set out in **Listing Notice 2**	Describe the portion of the proposed development to which the applicable listed activity relates.
N/A	N/A	No affected Triggers

Other Applicable Legislation	
Legislation	**Relevance**
Constitution of the Republic of South Africa (1996)	Section 24(a) of the Constitution states that everyone has the right 'to an environment that is not harmful to their health or well-being'. Construction activities must comply with South African constitutional law by conducting their activities with due diligence and care for the rights of others.
Occupational Health and Safety Act (Act 85 of 1993), as amended	Sets out the framework for the health and safety of persons at work, the health and safety of persons in connection with the activities of persons at work, and the requirements for the advisory council for occupational health and safety.
EIA Regulations (08 December 2014; GN R. 982 as amended (07 April 2017)	Published in terms of NEMA. Triggers the need for applicants to undertake either a Basic Assessment or Scoping and Environmental Impact Assessment if the proposed activity is included in one or more of the three Listing Notices; and Listing Notice 3 (listing activities and sensitive areas per province, for which a Basic Assessment process must be conducted).
Water Use Authorisations: National Water Act (No. 36 of 1998)	Requires that provision is made both in terms of water quantity and quality for 'the reserve', namely to meet the ecological requirements of freshwater systems and basic human needs of downstream communities. It is essential in preparing an EMP that any impacts on water resources be they surface water or groundwater resources, and/ or impacts on water quality or flow, are carefully assessed and evaluated against both the reserve requirement and information on biodiversity priorities. This information will be required in applications for water use licenses or permits and/or in relation to waste disposal authorisations.
National Environmental Management Act, Act 107 of 1998 (NEMA)	Environmental management principles set out in NEMA, and other Specific Environmental Management Acts (SEMAs) should guide decision making throughout the project life cycle to reflect the objective of sustainable development. One of the most important and relevant principles is that disturbance of ecosystems, loss of biodiversity, pollution and degradation of environment and sites that constitute the nation's cultural heritage should be avoided, minimised or as a last option remedied. This is supported by the National Environmental Management: Biodiversity Act 10 of 2004 (NEMBA) as it relates to loss of biodiversity.
Western Cape Land Use Planning Act, 2014 (Act 3 of 2014)	The Theewaterskloof Municipality's SDF identified "Remainder of Portion 9 of Farm 313, Grabouw" and earmarked it for medium-density residential development and for subsidised housing purposes. The proposed development is therefore compliant with the SDF as specified in Section 19(1) of the Western Cape Land Use Planning Act (Act 3 of 2014). Section `19(1) of the Western Cape Land Use Planning Act (Act 3 of 2014) stipulates that if a spatial development framework or structure plan specifically provides for the proposed utilisation or development of land in a land use or land development application, the proposal is deemed to comply with that framework or plan.

8. OBJECTIVES OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME

The Environmental Management Programme, in accordance with the Client's Environmental Policy, is intended primarily as a management tool to guide the Consulting Engineers, the Contractor, and Subcontractors. The EMPr has been compiled to provide recommendations and guidelines for compliance monitoring during the construction and operation of the proposed development. The objective of the EMPr is also to ensure that all relevant factors are considered to ensure environmentally responsible development. The purpose of the EMPr is to provide specifications for "good environmental practice" applicable during the construction and operational phases.

The Environmental Management Programme outlines the structures and procedures to be implemented by the Contractor and their subcontractors to minimise and manage potential environmental impacts that the Contractor's construction-related activities may have on the receiving environment.

An independent Environmental Control Officer (ECO) will be appointed by the Client to ensure that the Environmental Management Programme and approved EMPr are being effectively implemented. The ECO shall undertake monthly site inspections, the results of which will be reported to the Client, the Consulting Engineer, the Contractor and the relevant government departments.

This EMPr informs all relevant parties (the Engineer, the Contractor, the Designated Environmental Officer (DEO), the Environmental Control Officer (ECO) and all other staff employed by the contractor at the site as to their duties in the fulfilment of the legal requirements for the construction and operation of the project with particular reference to the prevention and mitigation of anticipated potential environmental impacts. All parties should note that obligations imposed by the EMPr are legally binding in terms of the environmental authorisation, should one be granted by the relevant environmental permitting authority.

The objectives of an EMPr are to:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international;
- Ensure that there is sufficient allocation of resources on the project budget so that the scale of EMPr-related activities is consistent with the significance of project impacts;
- Verify environmental performance through information on impacts as they occur;
- Respond to unforeseen events;
- Provide feedback for continual improvement in environmental performance;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts to minimal or insignificant levels;
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project;
- Identify measures that could optimise beneficial impacts;
- Create management structures that address the concerns and complaints of I&APs with regard to the development;
- Establish a method of monitoring and auditing environmental management practices during all phases of the activity;
- Ensure that safety recommendations are complied with;
- Specify time periods within which the measures contemplated in the final environmental management programme must be implemented, where appropriate;

9. ROLES AND RESPONSIBILITIES

9.1. Responsibilities of the Resident Engineer

Specific to environmental management, the role of the Resident Engineer (RE) will be to ensure enforcement of the EMPr and any conditions of approval from the competent authority. An independent environmental control officer (ECO) must be contracted to objectively monitor the implementation of the EMPr in accordance with relevant environmental legislation and the conditions of environmental authorisation (EA). The RE is further responsible for providing and giving mandate to enable the ECO to perform responsibilities, and must ensure that the ECO is integrated as part of the project team while remaining independent. The Resident Engineer (RE) must ensure the enforcement of the Environmental Management Programme and supplementary recommendations made by the ECO. They must also review and approve the Method Statements submitted by the Contractor and liaise with the Contractor, the ECO, and DEA&DP on environmental matters as necessary.

Responsibilities of the RE will include, but not be limited to:

- communicating the advice of the ECO and/or contents of the ECO's reports;
- issuing site instructions where applicable;
- communicating to the ECO any new/amended construction activities;
- informing the ECO of any infringements/accidents, or incidents that have occurred on/off site;
- implementing any Temporary Work Stoppages where serious environmental infringements and non-compliances have occurred;
- issuing penalties as and when necessary; and
- maintaining a record of complaints and communicating these to the Contractor and ECO.

Should the RE be of the opinion that the environmental management measures are not being adhered to, and that the appropriate corrective action is not being implemented, the RE, advised by the ECO, will be at liberty to instruct the Contractor to cease the related operations until the Contractor complies with the relevant requirements. The Contractor will not be entitled to any extension of time for such stoppages and related expense claims.

9.2. Responsibilities of the Environmental Control Officer (ECO)

The role of the ECO will be to independently monitor, review, and verify the implementation of the EMPr, liaising with the RE and/or Client, and DEA&DP to confirm the level of compliance achieved and make appropriate recommendations on improvements/actions required.

The responsibilities of the ECO will include, as a minimum:

- The responsibility of the pre-commencement audit of the conditions of the EA, which must be submitted prior to the notice of commencement,
- advising the RE on the interpretation and enforcement of the Environmental Specifications;
- assisting with the review of Method Statements;
- ECO is to attend monthly progress meetings in order to report on the outcomes of the audits;
- demarcating particularly sensitive areas;
- monitoring any basic physical changes to the environment as a consequence of the construction works - e.g. evidence of erosion, dust generation and littering;

- undertaking **monthly** site inspections on the level of compliance to the EMPr demonstrated by the Contractor and submitting reports to the Client, Consulting Engineer, Contractor and to the relevant government departments;
- compliance monitoring reports to be submitted to the project team by the ECO every month
- undertaking any damage assessments with the RE where incidents, accidents and/or serious infringements have occurred on/off site, and advising on remedial actions required; and
- appropriate and communicating these changes to the Resident Engineer and Contractor.

9.3. Responsibilities of the Independent Auditor

The developer must, for the period during which the EA and EMPr remain valid, ensure that compliance with the EA and EMPr is audited by an Independent Auditor. An Independent Auditor must be a person/entity distinct from the ECO, with suitable qualifications and experience in environmental auditing.

The responsibilities of the Independent Auditor include the following, at a minimum:

- audit the compliance of construction with the conditions of the Environmental Authorisation, the EMPr, and, where applicable, the closure plan.
- verify that the measures in the EMPr (and if applicable, closure plan) sufficiently provide for the avoidance, management and mitigation of the associated environmental impacts.
- After each inspection, the auditor will produce an environmental audit report that will be submitted to the Competent Authority, Client, Resident Engineer and Contractor
- The frequency of auditing and submission of the environmental audit reports must be on a quarterly basis (every three months)

9.4. Responsibilities of the Environmental Officer

The Contractor shall, upon commencement of the Project, appoint an Environmental Officer who, in addition to their normal duties, shall have direct responsibility for implementing and monitoring the Environmental Management Programme and the approved EMPr. The Environmental Officer cannot also serve as the Site Agent (Contract Manager).

The responsibilities of the EO include the following, at a minimum:

- The Environmental Officer shall liaise with the RE, the ECO and the Contractor in order to ensure effective implementation of the EMPr at the site level.
- The Environmental Officer will be responsible for the practical implementation and daily monitoring of the EMPr and shall report to the Contractor and RE in this regard.
- The Environmental Officer shall inspect daily and monitor operations on and off-site and shall take the necessary action where required to ensure compliance with the environmental management requirements.
- The Environmental Officer shall attend all regular site works meetings for reporting, discussing and reviewing the performance of the Contractor (which shall be a standard item on the agenda).
- The EO will compile and maintain an environmental file to be checked on a regular basis by the ECO.

9.5. Responsibilities of the Contractor

The Contractor will be contractually required to undertake their activities in an environmentally responsible manner. The role of the Contractor will include the following, at a minimum:

- to implement the Environmental Management Programme (and any subsequent revisions) and any environmental authorisations and permits (and any subsequent revisions) for the duration of the construction-related activities;
- to appoint an Environmental Officer for the daily implementation and monitoring of activities and liaison with ECO;
- to provide reasonable resources for the effective control and management of environmental risks associated with the construction-related activities, as per the EMP;
- to assign tasks to personnel as necessary and ensure appropriate accountability and responsibility are assigned to enable the carrying out of these duties;
- to maintain incident training and other relevant administrative records; and
- to ensure all personnel, sub-contractors and other workers appointed by the Contractor are aware of the environmental responsibilities on site.

These roles will, at a minimum, translate into the following environmental responsibilities:

- be familiar with the contents of all the respective environmental authorisations and permits, as well as the approved EMPr, and comply with the EMP;
- submit the necessary Method Statements and plans to the RE for approval;
- Review the ECO Reports and undertake corrective actions for non-compliance and take cognisance of the information/recommendations made;
- notify the RE immediately in the event of any accidental infringements of the Environmental Management Programme and ensure appropriate remedial action is taken;
- Identify the need and be responsible for the implementation of an environmental awareness training programme for the construction staff;
- notify the RE in advance of any amendments/changes to the proposed work activities to enable environmental impacts to be confirmed and mitigation measures to be identified; and
- ensure that any problems identified during environmental audits or inspections are addressed and rectified as soon as reasonably possible; and
- maintain records - e.g., photographic records, complaints records, training records and incident records.

10. METHOD STATEMENTS

The Contractor shall be required to submit Method Statements to the RE outlining proposed construction activities, phasing, procedures and methods to comply with the targets stipulated in the Environmental Management Programme and any EMPs. Method Statements shall, where applicable, include Site Establishment Drawings with sufficient detail to assess the potential impact of the site facilities or to assess the degree of safeguarding provided against pollution.

Method Statements shall indicate how the procedures will be applied in order to meet the relevant targets and are central to the proper implementation of the EMPr. It is anticipated that, in addition to assessing the systems and performance of the Contractor, the ECO will monitor the Contractor's adherence to Method Statements.

Method Statements must be submitted at least 10 days prior to the proposed commencement of related activities and must be approved by the RE, in consultation with the ECO. The Environmental Officer shall keep copies of these Method Statements and letters of approval (including conditions attached) in an

Environmental file. Any deviations from the approved Method Statements must be submitted to the RE for approval and in consultation with the ECO.

The following Method Statements shall be submitted by the Contractor 14 days prior to commencement:

1. Layout and preparation of the construction camp, including facilities required for personnel and plant;
2. Storage and handling of materials, including cement/concrete, and hazardous substances;
3. Waste management and pollution prevention, including solid waste, hazardous waste and contaminated water;
4. Operational activities, including stockpiling, dust control, control of erosion during bulk earthwork operations, and construction water;
5. Construction methods including vegetation clearing, removal and replacement of an existing municipal water line, internal roads, walkways, storm water, sewer and irrigation network installation, material sources, construction of and site rehabilitation;
6. Statutory Requirements, including obtaining relevant permits;
7. Public and Worker Health and Safety;
8. Environmental Awareness and Training; and
9. Emergency Procedures for spillage procedures, including hydrocarbons, compounds to be used and fire prevention/management.

11. ENVIRONMENTAL AWARENESS TRAINING

Before any work is commenced on the Site, the Contractor's site staff, including foremen, shall attend an environmental awareness training course as approved by the ECO. The induction is to include aspects such as the need to avoid littering, the reporting and cleaning of spills and leaks and general good "housekeeping". The Contractor shall also provide ongoing environmental awareness training to all employees throughout the duration of the contract. The information presented at the course shall be communicated to the Contractor's employees on site, to any new employees joining the site after the initial training course, and to their suppliers as required by the Project Specification. The Contractor shall ensure that all attendees sign an attendance register and provide the ECO with a copy of the register on the day following each course.

The Contractor shall erect and maintain informational posters for the benefit of their employees, depicting actions to be taken to ensure compliance with aspects of the Specifications. These information boards shall be erected at the locations agreed upon by the RE and should contain the following symbols:

- At working areas: Use drip trays, use toilets, no eating, no littering, no swimming, no picking of flowers or any indigenous vegetation, no dogs, no veld fires, no loud noise, smoking only in designated areas.
- At eating areas: Use toilets, no littering, no loud noise and no veld fires.

12. EMERGENCY PROCEDURES

The Contractor's procedures for the following emergencies shall include:

12.1. Fire

The Contractor shall advise the relevant authority of a fire as soon as one starts and shall not wait until he can no longer control it. The Contractor shall ensure that his employees are aware of the procedure to be followed in the event of a fire. Emergency numbers must be clearly displayed at the sites.

- The Contractor shall take all reasonable steps to avoid increasing the risk of fire through activities on site.
- The Contractor shall ensure that basic fire-fighting equipment is available at all construction activities on site and that the equipment is easily accessible.
- The Contractor shall ensure that all site personnel are aware of the procedure to be followed in the event of a fire.

12.2. Accidental Leaks and Spillages

The Contractor shall ensure that his employees are aware of the procedure to be followed for dealing with spills and leaks, which shall include notifying the RE and the relevant authorities. The Contractor shall ensure that the necessary materials and equipment for dealing with spills and leaks are available on the Site at all times. Treatment and remediation of the spill areas shall be undertaken to the reasonable satisfaction of the RE and ECO.

In the event of a hydrocarbon spill, the source of the spillage shall be isolated, and the spillage contained. The area shall be cordoned off and secured. The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown and, where possible, be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 litres of hydrocarbon liquid spill. In the event of a fire or accidental leak/spillage, the Contractor shall notify the RE as soon as possible, but no later than 48 hours after the incident is noticed. The telephone numbers for the closest Hazmat service providers' offices should be prominently displayed, as bitumen and diesel spillage on construction and road building sites are fairly common. The clean-up procedure is critical to prevent contamination. Hydrocarbon material that has been cleaned up must be stored in a hazardous waste facility on-site and then removed and disposed of at a licensed hazardous waste facility.

13. EXTERNAL AUDITING AND EVALUATION

To ensure the effective implementation of the EMPr, it is crucial that monthly external audits of the EMPr are conducted. An ECO will be appointed by the Client to undertake these audits. The RE shall arrange for these external audits to take place and formulate a system for addressing any problems identified during these audits. The relevant documentation shall be maintained and made available to the public. The developer must, for the period during which the EA and EMPr remain valid, ensure that compliance with the EA and EMPr is audited by an Independent Auditor every three months.

13.1. Pre-commencement requirements

Before works commence, the following will need to be undertaken by the appointed ECO in liaison with the Contractor and Engineer:

1. Any necessary permits must be obtained prior to the removal of protected and threatened species (fauna and flora)
2. A two-week notification of commencement of the respective department (DEA&DP) will be required. This may include a pre-commencement audit by the ECO.
3. Contractors' EMP and/or Method Statements to be submitted and approved by ECO, at least 3 weeks before commencement – this may require submission to DEA&DP with the 2-week commencement notification.
4. Contractor to undertake pre-commencement environmental awareness and training and induction of all staff.

5. Ward councillors, representatives of the affected communities, must be consulted before commencement to address any issues raised in the authorisation processes.

13.2. Environmental Monitoring during construction

Monitoring and compliance with applicable standards are typically overseen by environmental control officers (ECOs), who are responsible for ensuring that the conditions outlined in the EIA, EMPs, and other relevant regulations are met throughout the construction process. Regular reporting and audits (once a month) are also required to ensure ongoing compliance.

The appointed external Environmental Control Officer (ECO), in conjunction with the Contractor's Designated Environmental Officer (DEO), will oversee construction to ensure that all aspects of the Environmental Authorisation and EMPr are implemented on site. This will be done by implementing the following measures:

- Daily environmental inductions and toolbox talks will be conducted by the DEO with all staff on site.
- DEO will do multiple daily checks around site during construction.
- DEO will report any issues, problems or incidents to the ECO immediately.
- DEO to keep all waste disposal slips on file during construction.
- External ECO will conduct at least one monthly audit of the site.
- All incidents and complaints are to be kept on file.

13.3. Environmental Management during Closure/Decommissioning

Environmental Management associated with the closure of this project will ensure that the following items are addressed at closure and during the defects liability period:

- All cleared sites are rehabilitated with indigenous grass material with a cover of at least 80%;
- All visible alien plants are removed from disturbed sites;
- All recyclable rubble and waste (for example: scrap metal, bottles, cans and plastics) are collected and disposed of through a registered recycling company;
- All non-recyclable rubble and non-recyclable solid waste must be collected and disposed of at a registered waste disposal facility;
- Provision will be made for stormwater control to prevent erosion from taking place post-construction.

14.TOLERANCES

Environmental management is concerned not only with the final results of the Contractor's operations to carry out the works, but also with the control of how those operations are carried out. Tolerance with respect to environmental matters applies not only to the finished product, but also to the standard of the day-to-day operations required to complete the works. It is thus required that the Contractor shall comply with the environmental requirements on an ongoing basis.

15.MEASUREMENT AND PAYMENT

The Contractor shall not be separately reimbursed or compensated in respect of his compliance with the provisions of this Section. All costs so incurred are deemed to be included in the rates tendered for the various items of work listed in the Bill of Quantities.

16. WORK STOPPAGES

The RE shall have the right to order work to be stopped in the event of significant infringements of the Environmental Management Programme, until the situation is rectified in compliance with the Specifications. In this event, the Contractor shall not be entitled to claim for delays or incurred expenses. Any failure on the part of the Contractor to comply with the EMPr will entitle the RE to certify work stoppage, subject to the details set out.

The RE shall be the judge as to what constitutes a transgression, subject to the provisions of the General Conditions of Contract. In the event that transgressions continue, the Contractor's attention is drawn to the provisions of the General Conditions of Contract, under which the Contract Supervisor and/or Client may cancel the Contract.
In addition to work stoppage, penalties may be issued where there is damage to the natural or human environment, as a consequence of the transgression(s) and/or non-compliance(s). In such an event, the Contractor may be liable to pay a penalty at the RE's instruction. A list of incidents that may lead to work stoppage is indicated below, and this list is regarded as non-exhaustive:

- Failure to submit Method Statements timeously.
- Failure to stockpile topsoil properly or materials in designated areas.
- Pollution of water bodies, which includes increased sediment loads.
- Failure to maintain basic safety measures on site.
- Animal poaching (wildlife or domestic).
- Failure to provide waste disposal facilities or services.
- Excess dust or excess noise levels emanating from the Contractor's Camp and construction areas.
- Any person, vehicle, plant or item related to the Contractor's activities causing a public nuisance.
- Failure to carry out liaison with adjacent landowners, causing damage to property without prior negotiation and/or compensation, and/or causing other social infringements.
- Failure to control the pollution risks from dispensing fuel or the storage of vehicles and plant (drip trays).
- Failure to mitigate/remediate an environmental incident in a timely manner.

The Contractor shall be responsible for the costs associated with repairing any damage to the natural or human environment that may result from the transgression and/or the result of the work stoppage.

17. PLANT AND FACILITIES (PLANNING, DESIGN & PRE-CONSTRUCTION)

17.1. Site Camp

- The position of the site camp must take note of any important microhabitats within/near the development footprint and should try to avoid these as far as possible.
- All site establishment components (as well as equipment) shall be positioned to limit visual intrusion on neighbours and the size of the area disturbed.
- The Contractor shall provide the RE with a plan of the site camp showing the layout and the positioning of all infrastructure, including wash bays, fuel storage areas, materials storage areas, sewage infrastructure and buildings. The Contractor shall maintain a map of the site layout that indicates the locations of the wash bays, fuel storage areas, topsoil sites, etc. The RE must approve this in consultation with the ECO.

- Where site camps are to be established, the feasibility of removing topsoil from the site before site establishment shall be investigated by the ECO. The removed topsoil should then be stockpiled for use in the rehabilitation of the site camp.
- The site camp shall not be located in an environmentally sensitive area.
- All water requiring discharge, including wastewater and ablution facilities, should be discharged in a manner approved by the RE and in compliance with the National Water Act. No wastewater shall be discharged into rivers or streams.
- Site camps and surrounds shall be maintained in a clean, tidy and orderly condition at all times.
- The Contractor shall restore the site camp to its former condition upon completion of the works. This will include removal of all rubble and foundations, loosening of compacted soils and re-establishing groundcover. Where a homestead has been used as a site camp, the Contractor may be required to renovate the buildings to their former or better condition as agreed with the landowner once the works are complete.
- Silt traps must be installed at all relevant discharge or runoff points prior to the commencement of any construction activities, including site clearance.

17.2. Lights

The Contractor shall ensure that any lighting installed on the Site for his activities does not interfere with road traffic or cause a reasonably avoidable disturbance to users or residents of the area. Lighting installed shall be down lighting. Lighting used along the development area, close to the water treatment works, or at any other locations along the development route (should any be used) must make use of a soft light that is directed downwards rather than scattered into the night sky. Solar-powered lights are recommended.

17.3. Workshop, Equipment Maintenance and Storage

- Where practical, all maintenance, including servicing and repairs of equipment and vehicles on Site, shall be performed in the workshop. If it is necessary to do maintenance outside of the workshop area, the Contractor shall obtain the approval of the RE prior to commencing activities.
- The Contractor shall ensure that in his workshop and other plant maintenance facilities, including those areas where, after obtaining the RE's approval, the Contractor carries out emergency plant repairs to ensure there is no contamination of the soil or vegetation.
- The workshop shall have a smooth impermeable concrete floor. The floor shall be bunded and sloped towards an oil trap or sump to contain any spillages of substances (e.g. oil).
- When maintaining and servicing equipment, drip trays shall be used to collect the waste oil and other lubricants.
- Drip trays shall also be provided in construction areas for stationary plant (such as compressors) and for "parked" plant (such as scrapers, loaders, and vehicles).
- All vehicles and equipment shall be kept in good working order and serviced regularly. Leaking equipment shall be repaired immediately or removed from the Site.
- The washing of equipment shall be restricted to urgent or preventative maintenance requirements only. All washing shall be undertaken in a wash bay area which must be equipped with a suitable impermeable floor and sump/oil trap. The use of detergents for washing shall be restricted to low phosphate and nitrate-containing, low-sudsing-type detergents.

17.4. Drinking water

Water for drinking purposes should be obtained from a designated supply or an approved source of treated water.

17.5. Ablution Facilities

- A sufficient number of chemical toilets shall be provided by the Contractor in the construction camp area and at appropriate locations agreed by the RE. The ratio of toilets to site staff shall not exceed 1:20, and the closest toilet shall never be further than 200 m away from the area where work is currently underway.
- Use of ablution facilities should be enforced to avoid unnecessary trampling through the environment
- Toilets shall not be located within 50 m of any watercourses.
- Washing, whether of the person or of personal effects and acts of excretion and urination are strictly prohibited other than at the facilities provided.
- All temporary/portable toilets shall be secured to the ground to the satisfaction of the RE to prevent them from toppling due to wind or any other cause.
- All toilets are to be maintained in a clean, sanitary condition. The Contractor shall be responsible for cleaning, maintenance, servicing and emptying the toilets on a regular basis. The Contractor shall supply adequate toilet paper at all toilets.
- The Contractor shall ensure that no spillage occurs when the toilets are cleaned or emptied and that the contents are properly stored and removed from the Site.
- Discharge of waste from toilets into the environment and burial of waste is strictly prohibited. Conservancy tanks may be used only once the soil conditions have been checked and found to be suitable. Septic tanks may not be used.

17.6. Materials Handling, Use and Storage

- The Contractor shall ensure that any delivery drivers are informed of all procedures and restrictions required to comply with the EMPr.
- The Contractor shall ensure that these delivery drivers are supervised during off-loading by the Contractor's Environmental Officer.
- Materials shall be appropriately secured to ensure safe passage between destinations. Loads include but are not limited to sand, stone chip, fine vegetation, refuse, paper and cement, shall have appropriate cover to prevent them from spilling from the vehicle during transit. The Contractor shall be responsible for any clean-up resulting from the failure by his employees or suppliers to properly secure transported materials.
- All lay-down areas for manufactured/imported material shall be incorporated inside the construction camp as approved by the RE. In the event that additional areas outside of the construction camp are required, this shall be subject to the RE's approval (in consultation with the ECO), which shall not unreasonably be withheld.
- Fuel lubricants, solvents, paints, and other chemicals must be stored within the Contractor's camp in a facility secured with a lock and key. Storage should be on an impervious bunded site (secondary containment).
- • Contractor laydown areas and equipment/material/vehicular storage must remain outside of the prescribed watercourse ecological protection buffers (15 m development setback) which must be enforced by the ECO who should have a good understanding of the watercourses on site and the quality and flow of surface water and can limit impacts to all watercourses as far as possible
- All chemicals, construction materials and toxicants to be used for the construction must be stored within bunded areas;

17.7. Storage and Handling of Hazardous Substances

Hazardous chemical substances (as defined in the Hazardous Chemical Substances Regulations, Regulation 1179 of 1995 in terms of the Occupational Health and Safety Act) used during construction shall be stored in secondary containers and in an impermeable bunded area which has a roof and is under lock and key. The relevant Material Safety Data Sheets (MSDS) shall be available on-site. Procedures detailed in the Method Statement for Emergency Incidents shall be followed in the event of an emergency situation. Potentially hazardous substances shall be stored, handled and disposed of in a suitable manner.

17.8. Fuel (petrol and diesel), Oil and Hydraulic fluids

- The Contractor shall ensure that all fuels and chemicals are handled and stored in a manner so as to minimise the risk of spills, leaks or structural failures and in compliance with SANS 10089.
- Fuel may be stored on Site, and the fuel storage area shall be located at the workshop or a fuel storage depot located within the construction camp. The fuel storage area is not to be within 100m of a watercourse.
- The Contractor shall ensure that all liquid fuels (petrol and diesel) are stored in tanks with lids, which are kept firmly shut or in bowsers.
- The tanks/bowsers shall be situated on a smooth impermeable surface (sealed concrete) base with an impermeable bund (no plastic may be used). The impermeable lining shall extend to the crest of the bund, and the volume inside the bund shall be 110 % of the total capacity of all the storage tanks/bowsers.
- The bunded area shall have a roof covering to prevent the ingress of rain water. The Contractor shall prevent unauthorised access to the fuel storage area.
- The Contractor shall have on Site all the necessary materials and equipment (i.e., spill kits) to deal with spills of any of the substances stored on Site.
- The Contractor shall set up a procedure to deal with a spillage or pollution event; this is to include immediate communication with the RE and ECO. A number of the Contractor's staff shall be appropriately trained to deal with any minor spills or pollution threats.
- No smoking shall be allowed within the vicinity of the fuel storage area.
- The Contractor shall ensure that there is adequate fire-fighting equipment at the fuel stores. Gas and fuels shall not be stored in the same storage area.
- Where reasonably practical the plant shall be refuelled at the depot or at the workshop as applicable. If it is not reasonably practical then the surface under the refuelling area shall be protected against pollution to the reasonable satisfaction of the RE prior to any refuelling activities.
- Drip trays to be used during refuelling procedures.
- The Contractor shall ensure that there is always a supply of absorbent material readily available to absorb/breakdown and where possible be designed to encapsulate minor hydrocarbon spillage. The quantity of such materials shall be able to handle a minimum of 200 litres of hydrocarbon liquid spill. This material must be approved by the RE prior to any refuelling or maintenance activities.
- Drip trays shall be inspected and emptied daily into a hazardous waste container and serviced when necessary. Drip trays shall be closely monitored during rain events to ensure that they do not overflow and a small spill absorbent sock should be placed within the drip tray for such occasions.
- The appropriate signage must be erected at the diesel bowser and workshops.

18. WASTE MANAGEMENT

18.1. Prevention of Pollution

The Contractor should ensure that pollution of the soil or water (i.e. surface and ground) does not occur as a result of any activities on Site. Pollution could result from the release, accidental or otherwise, of chemicals, oils, fuels, sewage, wastewater containing kitchen waste, detergents, solid waste and litter, etc. Specific measures to be taken to prevent the pollution of the environment include:

- Immediately report and manage any leakage or spillage with appropriate spill contingency equipment and measures.
- All fuels, oils, lubricants and other petrochemical products must not be stored within 100 m of any wetlands and/or rivers.
- Maintenance of vehicles must only take place in a designated workshop with a concrete base and drip trays for the collection of waste lubricants. Emergency maintenance vehicles must be equipped with drip trays and absorbent material, such as Spillsorb, to collect and contain waste oils.
- No rock, silt, cement, grout, asphalt, petroleum product, timber, vegetation, domestic waste, or any deleterious substance should be placed or allowed to disperse into any stream, river, pond, storm, sanitary sewer, or any other watercourse.
- Ensure all construction equipment is free of oil, fuel or hydraulic fuel leaks and is cleaned in an area with a suitable controlled runoff.
- Refuelling activities should not be conducted where runoff could carry contaminants into drainage pathways, which include stormwater drains, trenches and sewers.
- Washing of vehicles must be kept to a minimum and must only take place in a designated area on an impervious surface which drains into an oil sump.
- Cleaning of concrete mixers and trucks must take place on a properly designated site where there is no opportunity for the pollution of water bodies.

18.2. Solid Waste Management

- No on-site burying or dumping of any waste materials, vegetation, litter or refuse shall occur.
- All recyclable rubble and waste (for e.g. scrap metal, bottles, cans and plastics) are to be collected and disposed of through a registered recycling company.
- Recyclable waste, including: glass, paper and plastic, must be separated at the construction camp, stored and recycled, where economically feasible.
- Waste must be appropriately stored in secure and sealed receptacles that are emptied often enough so as not to overflow.
- All non-recyclable rubble and solid waste will be collected and disposed of at a registered waste disposal facility.
- The Contractor shall provide sufficient bins with secure lids on Site to store the solid waste produced on a daily basis. These bins shall not be allowed to become overfull and shall be emptied a minimum of once daily.
- The waste may be temporarily stored on Site in a central waste depot area that is weatherproof and scavenger-proof, and which the RE has approved.
- Construction material may not be left at site post construction
- No burning of refuse is permitted.
- All solid waste (including spilt or excess concrete) shall be disposed of off-site at a registered landfill site.

- The Contractor shall supply the RE with a certificate of disposal.
- All records of collection and disposal are to be kept on file on site.

18.3. Disposal of Hazardous Waste Material

The objectives of the Minimum Requirements for the disposal of a Hazardous Waste are to:

- ensure that any adverse impacts on the environment are minimised;
- prevent hazardous substances from leaching or moving into the environment, in particular the ground and surface waters;
- ensure that Hazardous Waste is disposed of in accordance with the class and the Hazard Rating;
- to act as a mechanism ensuring the disposal of Hazardous Waste in an orderly manner, thus avoiding detrimental effects both in the short- and long-term to man and to the environment.

The following minimum requirements must be adhered to:

- Hazardous materials used on site may include cement, shutter oil, asphalt, retro-reflective road paint, lime, petrol/diesel/lubricants/hydraulic fluids, used oil, creosote (pre-treated poles), herbicides and ant poison, epoxies and epoxy resins, coatings and grouts.
- The Contractor shall have in place a hazardous waste management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of hazardous waste.
- Cement bags must be disposed of in demarcated hazardous waste receptacles;
- No hazardous material shall be disposed of on site or left behind on completion of works.
- Any waste hazardous material shall be disposed of in an appropriate manner as per the material safety data sheet specifications.
- All records of hazardous waste collection and disposal are to be kept.

18.4. Contaminated Water

- The Contractor shall set up a contaminated water management system, which shall include collection facilities to be used to prevent pollution, as well as suitable methods of disposal of contaminated water.
- The Contractor shall notify the RE immediately of any pollution incidents on Site.
- The Contractor shall prevent discharge of any pollutants, such as cements, concrete, lime, chemicals and fuels into any watercourses or stormwater channels.
- Water that has been contaminated with suspended solids, like soils and silt, may be released into natural watercourses or stormwater channels provided that the minimum regulatory requirements in terms of the NWA are met. However, all suspended solids shall be removed from water before it is discharged by settling out these solids in settling ponds.

19.CONSTRUCTION ACTIVITIES

19.1. Working Areas

The associated project activities may be conducted only in designated working areas. Limiting these activities to specific working areas minimises the impact on the surrounding environment and facilitates control of the works. Sites should be divided into working areas and "no- go" areas:

- Working areas are those areas required by the Contractor to undertake the works and as approved by the RE. These areas include the area of work, borrow areas and haul roads between the working site and borrow areas. If necessary, the working areas may be demarcated during the period. The

Contractor and his staff are not permitted to move around outside the designated working areas. The Contractor shall ensure that, insofar as he has the authority, no person, machinery, equipment or material enters the "no go" areas (if any are indicated) at any time.

- "No-go" areas are those areas outside of working areas.
- Within the overall working area, the RE shall designate specific areas for the following:
- Site Camp.
- Stockpiling and storage of construction materials.
- Stockpiling of topsoil for rehabilitation purposes.
- Spoiling of cleared vegetation (alien invasive species).
- Sites for spoil materials.

19.2. Conservation and Stockpiling of Topsoil

Topsoil shall be removed from the following areas no longer than 10 days before construction begins:

- All areas to be excavated;
- Areas to be occupied by roads or buildings, including the temporary haulage roads;
- Areas for the storage of fuels;
- Areas to be used for batching/mixing of concrete:
- Areas for stockpiling of construction materials;
- Areas for stockpiling of crushed rock; and
- Areas for spoiling material.

Document the soil profile on removal and ensure the soil is backfilled in the same horizon order in which it was removed (last out, first in principle). This is ultimately to ensure the success of revegetation by maintaining the most carbon-rich soil layer at the surface.

The following should be implemented:

- Topsoil shall be removed from all areas where physical disturbance of the surface will occur
- Ensure that topsoil is appropriately stored and protected from weathering and reused during the rehabilitation process;
- The topsoil stockpiles shall be clearly demarcated and vehicle access restricted. The topsoil shall not be contaminated with any fuels, oils or other construction waste or materials.
- The stockpiled topsoil shall be protected from being blown away or eroded. The application of a suitable grass seed/runner mix will facilitate soil protection and minimise weeds/weed growth
- Topsoil is to be stored separately from subsoil during construction and replaced in the correct order during rehabilitation.
- Topsoil shall not be mixed with any other material (construction rubble, subsoils, etc), and wind erosion of the topsoil stockpiles must be prevented.
- Topsoil stockpiles shall not be higher than 2 m with slopes of 1 m vertical to 2 m horizontal and convex (rounded) at the top.
- Topsoil shall be kept separate from overburden and shall not be used for building or maintenance of roads.
- All available topsoil shall be removed after consultation with the botanist and horticulturalist prior to commencement of any operations

19.3. Erosion, Sedimentation and Geomorphology Control

- Erosion prevention and sediment control measures must be implemented. Temporary and permanent erosion control methods may include silt fences, interceptor ditches, seeding and sodding, riprap of exposed embankments, and mulching.
- Temporary soil stabilisation measures must be used in areas susceptible to erosion until vegetation is established. These include the use of gravel bags, hydro seeding and straw mulching.
- Soil erosion shall not be tolerated on the Site. Uncontrolled erosion will cause siltation and pollution and result in the loss of valuable topsoil.
- The Contractor should take all reasonable measures to prevent soil erosion and protect areas susceptible to erosion. Erosion prevention measures must be implemented to the satisfaction of the RE.
- Bare soil must be immediately restocked with indigenous vegetation in areas that will not be developed, else protected from erosion or from being swept away by covering the soil with hessian sheeting or similar
- Areas exposed to erosion must be protected through the use of sandbags, berms and efficient construction processes, i.e., limiting the extent (footprint) and duration period that areas are exposed;
- Areas affected by construction-related activities must be monitored regularly for evidence of erosion. Areas particularly susceptible to erosion include: areas stripped of topsoil, soil stockpiles and steep slopes (gradients > 8 %).
- The management of stormwater during construction should be given consideration. Stormwater and erosion control infrastructure should be installed. Stormwater must be prevented from running off-site.
- The Contractor shall take reasonable measures to control the erosive effects of stormwater runoff. Cut-off drain(s) or low berm(s) will be constructed where necessary to lead run-off rain water away from steep exposed slopes, ensuring that the water does not flow over the slopes and cause erosion. Water from these drains will be disposed of in such a way that the erosive force of the water in the drains is dissipated and erosion does not occur at the drain discharge point(s).
- Temporary drainage works may be required to prevent silt laden surface water from draining into river systems in proximity of the site
- The Contractor shall reinstate areas where erosion took place and/or where areas are damaged as a result of erosion at his own cost to the satisfaction of the RE and ECO. Topsoil that has been washed away shall be replaced at the Contractor's expense.
- After ripping the access and/or haul roads must be topsoiled and hydroseeded with an appropriate hydroseeding mix and the same specifications apply as in the other areas that require hydroseeding.
- The order for the seeds must be placed timeously to ensure availability at the time required.
- Excess soil that was generated during the construction phase must be disposed of at an appropriate registered waste facility.
- Make sure that the soil is backfilled and compacted to appropriate geotechnical specifications for the project area.
- Any exposed earth must be rehabilitated promptly by planting suitable indigenous vegetation to protect the exposed soil from weathering and/or erosion.
- Landscape and re-vegetate all cleared areas as soon as possible to limit erosion potential.
- Sandbags, sediment drift fences or other appropriate structures as determined by the Environmental Control Officer (ECO) must be placed between the proposed works and any downgradient watercourses in case of sudden rainfall events that could potentially generate sediment-laden runoff into the receiving watercourse.

19.4. Stormwater management

- Temporary stormwater control measures (such as berms, swales, and cut-off trenches) must be constructed before major earthworks begin.
- All stormwater must be directed into temporary detention or settlement ponds to trap silt and allow infiltration.
- Energy dissipation (e.g., rock riprap, gabion baskets) must be installed at discharge points to prevent erosion.
- No cement wash water, hydrocarbons, or contaminated stormwater may be discharged into natural drainage lines or the environment.
- Polluted runoff must be contained in lined sumps or sediment traps and disposed of at a licensed waste facility.
- Refuelling and cement mixing must occur at least 32 m away from the EDL, within bunded areas.
- Construct silt fences, straw bales, or geotextile barriers below disturbed areas.
- Stabilise exposed soil using mulching, brush packing, or erosion control blankets.
- Compact and re-vegetate all disturbed areas immediately after works.
- The ECO must inspect all stormwater controls weekly and after rainfall events.
- Silt traps must be maintained and cleaned out of sediment regularly.
- Any erosion or washout must be repaired within 48 hours of detection.

19.5. Dust Control

Dust is regarded as a nuisance when it reduces visibility and may retard plant growth. It is also aesthetically displeasing.

- The Contractor shall be responsible for the control of dust arising from his operations and activities at all times. Control measures could include regular spraying of working and/or bare areas with water at an application rate that will not result in soil erosion or runoff.
- Dust control is to be undertaken in compliance with SANS 69 and SANS 1929.
- Stockpiles should be covered if left for longer time periods.
- All construction vehicles must stay on demarcated access tracks and must not exceed a speed limit of 40 km/hr on site to reduce dust.

19.6. Noise Control

The Contractor shall limit noise levels. The Contractor's attention is drawn to the applicable regulations framed under the Machinery and Occupational Safety Act (Act No. 6 of 1983), as well as the requirements of the Occupational Health and Safety Specification, which forms part of these documents. All activities with high noise levels should be restricted to daylight hours in the residential areas and in the proximity of villages (e.g., Grabouw). The Contractor shall inform the residents of any high-noise events such as blasting. Contractor's camps should be located away from tourist operations and quiet rural villages. Crushing plants should be located as far as practical from residences, schools and social facilities.

19.7. Fire Prevention and Control

- The Contractor shall take all the necessary precautions to ensure that fires are not started as a consequence of activities on Site. The Contractor, subcontractors and all employees are expected to be conscious of fire risks. The Contractor shall hold fire prevention training sessions with staff to create awareness regarding the risks of fire. Regular reminders to his staff on this issue are required.
- The Contractor shall ensure compliance with the National Veld and Forest Fire Act (Act 101 of 1998).

- Smoking shall not be permitted in those areas where it is a fire hazard. Such areas shall include the workshop and fuel storage areas, and any areas where the vegetation or other material is such as to make liable the rapid spread of an initial flame. In terms of the National Environmental Management: Air Quality Act (Act No. 39 of 2004), burning is not permitted as a disposal method.
- No fires are to be allowed on site
- The Contractor shall appoint a Fire Officer who shall be responsible for ensuring immediate and appropriate actions in the event of a fire and shall ensure that employees are aware of the procedure to be followed. The Contractor shall forward the name of the Fire Officer to the RE for his approval.
- The Contractor shall ensure that there is adequate fire-fighting equipment (i.e., fire extinguishers and fire beaters) on Site and in all major working areas.
- Emergency numbers must be clearly displayed on site.
- The Contractor shall be liable for any expenses incurred by any organisations called to assist with fighting fires and for the costs involved in the rehabilitation process of burnt areas, properties and persons should the fire be the result of the Contractor's activities on Site.
- Removed plant material shall not be dumped across the fence line or along the fence line onto private property. If an abutting landowner requests this, the Client must be indemnified.

19.8. Water Abstraction and Construction Water

- Water for construction purposes should be obtained from an approved source. Unless approved by the local authority, the BOCMA or the landowner, water should not be extracted from nearby dams and rivers, and construction activities (other than those approved) should not be conducted in or directly adjacent to rivers and dams.
- Water is a scarce resource throughout South Africa and certain parts of the Western Cape Province, which are prone to water shortages during periods of drought. Water, whether drinking or for operational purposes, must be used in a responsible manner.

19.9. Earthworks

- Earthworks must follow SANS 1200 guidelines.
- All earthworks shall be undertaken in such a manner as to minimise the extent of any impacts caused by such activities.
- No equipment associated with earthworks shall be allowed outside of the site and defined access routes unless expressly permitted by the RE.
- Earthworks are to be restricted to the development footprint only.

19.10. Operation of Vehicles and Heavy Machinery

- All machinery and equipment must be inspected regularly for faults and possible leaks; these must be serviced in a designated area, outside of the prescribed watercourse protection buffer.
- Heavy vehicles must be parked outside of the prescribed watercourse protection buffer, except when in use for the construction process.
- Re-fuelling of vehicles must take place off-site, outside of the prescribed watercourse ecological protection buffer, preferably within a construction camp where spill kits are available, or on a non-permeable surface in case of a leak. The contractor is to have these spill kits in their possession.
- The construction vehicles and machinery must make use of existing access routes as much as possible before adjacent areas are considered for the creation of new access routes. In the case of a new access route that must traverse a watercourse (if applicable to a project), a single route must be strategised which will best provide proximate access to the working area, without the need to consider additional access routes.

- Prevent uncontrolled access of vehicles through the watercourses that can cause a significant adverse impact on the hydrology and alluvial soil structure of these areas;
- Operating heavy machinery in watercourses requires careful consideration to minimise environmental impact, and must be under the supervision of an ECO.
- Schedule operations during the dry season when ground conditions are more stable and less prone to damage.
- No heavy machinery shall be permitted within unauthorised water resource areas for any purpose, without the prior approval of the ECO (except emergency procedures, or when works are required within the watercourse).
- Operators must be trained in operating machinery in wetland/sensitive environments and be made aware of the sensitivity of the area, which itself must be demarcated so as to guide operators, labourers and contractors.
- Use machinery with low ground pressure to minimise soil compaction and damage to wetland/riparian vegetation. Tracked vehicles or specialised low-ground-pressure tyres can be used if feasible/available.
- Machinery can be equipped with attachments like swamp mats or bog mats to distribute weight and minimise disturbance to the watercourse areas.
- Implement sediment and erosion control measures such as silt fences, erosion control blankets, or sediment traps to prevent soil runoff into water bodies associated with vehicular movements and disturbed/hardened surfaces.
- Develop spill prevention and response plans to address potential leaks or spills of fuels, oils, or other hazardous substances.
- The contractor is responsible for cleaning up any spillages (e.g. concrete, oil, fuel) immediately.
- Develop a restoration and rehabilitation plan to mitigate any long-term impacts of operating heavy machinery in wetlands and/or riparian areas.
- Vehicles must be equipped with drip trays to avoid the spillage of oils and hydrocarbons into watercourses.
- No vehicle or machinery is allowed to be washed within a watercourse or its buffer area, and must take place off site.

19.11. Clearing of Vegetation

The Contractor shall minimise the extent of any vegetation removal other than that necessary to complete the works. The Contractor shall ensure that clearing of vegetation is not done in a manner that will result in excessive environmental damage or result in erosion. The contractor shall ensure that no unnecessary blanket clearing of vegetation is undertaken.

- Vegetation must be cleared in a phased approach and be limited to the essential clearing area under the directive of an alien invasive vegetation clearing management plan, to control and prevent the spread of invasive alien vegetation species
- Where areas become compacted during works, they shall be lightly scarified to ensure that vegetation regrowth will occur and suitable cover will be obtained.
- Where protected species are present, the relevant permits must be obtained for removal or relocation before any works are undertaken in consultation with the RE and ECO.
- When removing alien trees, the contractor shall ensure that any stumps are removed (where possible), as these may resprout. Alien tree control must be undertaken in consultation with the ECO. The contractor shall ensure that when alien trees and weeds are removed, it is undertaken in a manner that does not result in excessive spreading of seed or other material that will spread.

- Where reshaping or earthworks are required, topsoil with vegetation matter should be reapplied and spread on completion to maximise stabilisation and rehabilitation.
- Where steep slopes or embankments are present that may be susceptible to erosion, appropriate stabilising methods should be implemented, including gabions, benching, hydroseeding, planting of sods, contouring and scarifying.
- Cleared vegetation must be disposed of at a licensed facility and may not be mulched or burned on site
- Stockpiled vegetation must be stored outside of the prescribed watercourse ecological protection buffer, and for a limited time, to prevent the reestablishment of alien and invasive vegetation in the landscape

19.12. Bridges and Culverts

Conditions as per the Water Use Licenses, General Authorisations and the Environmental Authorisation are to be adhered to. This may include weekly water sampling and testing at a registered laboratory upstream and downstream of the construction work for the causeway, until completion and closure of crossing works. Water sample testing to include the following parameters – *pH, Electrical Conductivity (mS/M), Suspended Solids (mg/l) and Total Dissolved Solids (mg/l).*
In addition, the following must be adhered to:

- The Contractor shall minimise the extent of any damage to the flood plain or river banks other than that necessary to complete the works, and shall not pollute the river systems as a result of the construction activities. No construction materials shall be stockpiled on the floodplain.
- The Contractor shall not divert, dam or modify any watercourse or stream without the approval of the RE and ECO as well as approvals from the Department of Water Affairs and Sanitation.
- Care must be taken not to spill any fuel or hydraulic fluids in the vicinity of watercourses. Any spillages must be cleaned up immediately using standard Hazmat procedures. A spill kit to be kept on site.
- Any temporary works must be removed as soon as the crossing/bridge construction has been completed and opened to traffic. Rehabilitation of the disturbed areas must be carried out and all disturbed areas stabilised, topsoil replaced and vegetation re-established in consultation with the RE and ECO.
- The culvert installation and related activities should, where possible, be planned to take place during periods when stream flow is low.
- Avoid operating machinery in water bodies. Excavation for watercourse structures or a large culvert should not be performed in flowing water. The water should be diverted around the work site during construction with a cofferdam or stream diversion. Any diversion of a stream requires a separate investigation and an environmental approval of a water use licence from DWS.
- Avoid channel changes and protect the embankments of streams and rivers.

19.13. Road Bed Preparation and Blading

All road bed preparation and blading shall be undertaken in such a manner as to minimise the extent of any impacts to the environment caused by such activities.

- Stockpiled material shall be done in an appropriate manner in consultation with the RE and ECO, and stockpiles along the road shall not be left for excessive periods of time, especially during rainy periods, where fine material contained within the stockpile may wash into drains and watercourses.
- Any excess material shall be spread evenly on completion of works or removed from the site.
- Fine material accumulating in drains should be removed in areas where it may wash into watercourses and wetlands.
- Windrows shall be appropriately sited and shaped on completion of works.

19.14. Stockpiling and Spoiling of Materials

- The RE and ECO shall approve all stockpiling and spoiling sites and confirm the end-use or rehabilitation for these sites.
- The stockpiles should be located within demarcated areas within the construction site. Material stockpiled should be done in such a way as to minimise the spread of materials and the impact on the natural vegetation. The Contractor should ensure that no materials creep into 'no-go' areas.
- No spoiling of material should take place below the 1:100-year flood line of any river, stream, wetland or water course.
- Stockpiling of removed soil/construction material must take place outside of the prescribed watercourse ecological protection buffers (i.e. no stockpiling within 15m of the EDL)
- Stockpiles must be protected using hessian sheeting or similar and surrounded by bunds to prevent them from becoming a source of windborne dust, sediment-laden surface runoff, or habitat for the infestation of alien and invasive vegetation
- Stockpile storage on a level ground and not exceeding 2 m in height is critical to their successful management and containment
- Stockpiles must be safeguarded from all forms of contamination
- All removed soil and material must not be stockpiled downstream of watercourses so as to limit sedimentation of these systems
- All stockpiles must be protected from erosion, stored on flat areas where run-off will be minimised
- Install sandbags around soil stockpiles to prevent soil from washing into watercourses;
- The Contractor, upon completion of the project, shall reinstate areas used for stockpiling to their former states.

19.15. Cement and Concrete Batching

The permitted location of the batching plant (including the location of cement stores, sand and aggregate stockpiles) will be indicated by the RE and approved by the ECO. The concrete/cement batching plant shall be kept neat and clean at all times.

- Ready mix concrete is preferred over batching concrete on site as this minimises the handling of concrete on site, and thereby the potential for environmental spillage.
- The batching plant shall be located on a smooth impermeable surface (concrete). The area shall be bunded and sloped towards a sump to contain any spillages of substances.
- Mixing of fresh concrete must be done within a construction camp, at least 30 m away from watercourses, on a batter board/platform mixing tray, or else within a lined, bound or bunded portable mixer.
- No batching activities shall occur directly on the ground. All wastewater resulting from the batching of concrete shall be disposed of via the wastewater management system and shall not be discharged into the environment.
- Used cement bags shall be stored in weatherproof containers to prevent windblown cement dust and water contamination. Used cement bags shall be disposed of on a regular basis via the solid hazardous waste management system, and shall not be used for any other purpose.
- Unused cement bags shall be stored so as not to be affected by rain or runoff events. In this regard, closed steel containers should be used for the storage of cement powder and any additives.
- The Contractor shall ensure that sand, aggregate, cement or additives used during the mixing process are contained and covered to prevent contamination of watercourses, the surrounding vegetation and natural rock through wind or water dispersion.

- All runoff from the batching plant shall be strictly controlled, and cement-contaminated water shall be collected, stored and disposed of off-site, at a location approved by the RE.
- Contaminated water storage areas shall not be allowed to overflow, and appropriate protection measures from rain and flooding shall be implemented.
- All visible remains of excess concrete shall be physically removed on completion of the plaster or concrete pour section and disposed of. Washing the remains into the ground is not acceptable. All excess aggregate shall also be removed and disposed of in an approved landfill site.
- Where feasible, as much material must be prefabricated and then transported to the site to avoid the risks of contamination associated with mixing, pouring and the storage of chemicals and compounds on site. This is particularly applicable to the use of concrete, which in its wet form is highly toxic to aquatic life, for which the following mitigation measures must be applied:

19.16. Protection of Flora and Fauna

Natural features, indigenous flora and fauna in the vicinity of the project works should be protected, and damage or disturbance should be prevented or minimised, specifically:

- The construction area must be fenced off where it borders on fynbos.
- No plant species may be removed without the proper approvals from the relevant authorities unless agreed by the ECO or unless they are listed as alien invasive species.
- The minimum amount of vegetation must be removed. Excessive clearing of a site must be avoided if possible. Disturbance outside of the immediate construction area must be avoided.
- No construction staff may have access to indigenous vegetation outside of the working corridor.
- The use of indigenous plants as firewood is prohibited.
- Where protected or Red Data Species are encountered and require removal, the ECO should be consulted and the plant(s) then replanted in a nearby 'safe' area of similar habitat. Permits are to be obtained from the DEA&DP regarding protected plant species and the Department of Agriculture, Forestry and Fisheries (DFFE, Western Cape) regarding protected trees.
- All fauna (including domestic livestock) within and surrounding the site shall be protected; they shall not be caught, poisoned, trapped, snared or killed.
- Site and surrounding areas to be inspected regularly for signs of poaching; if snares are found, they are to be reported and removed.
- No domestic animals shall be brought onto the site.
- No deep trenches/excavations must be left open overnight. Trenches/excavations must be inspected daily to check if fauna have been trapped. Provision must be made for fauna to pass over open trenches or excavations by means of a ramp.

19.17. Sites of Archaeological and/or Cultural Interest

The Contractor shall take responsible precautions to prevent any person from removing or damaging any items and infrastructure of heritage importance, such as fossils, coins, articles of value or antiquity, structures (older than 60 years) and other remains of archaeological interest if discovered on the Site, immediately upon discovery thereof and before removal.

- Should any archaeological sites be identified, they must be demarcated with safety netting and placed out of bounds. Should disturbance of these sites be unavoidable, then an application must be made to the South African Heritage Resource Agency (SAHRA) via a qualified archaeologist.
- Should an archaeological or cultural significance be identified during construction or any associated infrastructure, it should immediately be reported to the SAHRA. Failure to report a site of

archaeological and/or cultural significance is a contravention of the National Heritage Act (Act No 25 of 1999).

- All construction site staff must be briefed to immediately report any potential sites which are encountered during the construction. In the event of finding what appears to be an archaeological site or a cultural and/or historic site or object, work should be temporarily suspended and/or terminated until a qualified archaeologist or historian can examine the item or find.
- The Contractor must check the area carefully for any graves. The relocation of graves must be undertaken in consultation with the affected families and through the Project Steering Committee. The correct procedures for the exhumation and reburial of the remains must be strictly adhered to.
- The contractor and construction site employees must be informed of the cultural importance of any archaeological sites found. It must be emphasised that the work on the structures must be done with care in order to preserve the architectural integrity.

19.18. Protection of Natural Features

The Contractor shall not deface, paint, damage or mark any natural features (e.g. rock formations) situated in or around the Site for survey or other purposes. Any features affected by the Contractor in contravention of this clause shall be restored and/or rehabilitated to the satisfaction of the RE. The Contractor shall not permit his employees to make use of any natural water sources (e.g. springs, streams and open water bodies) for the purposes of swimming, personal washing and the washing of machinery or clothes.

19.19. Alien Invasive Vegetation

- Alien invasive vegetation shall be removed from any working areas and the site camp. These vegetation species shall also be eradicated when they begin to establish themselves in disturbed areas (disturbance of the natural vegetation will encourage the establishment of invasive species).
- In order to discourage the spread of alien species, soil should not be moved from one part of the site to another without the consent of the ECO.
- The ECO shall assist in the identification of alien plant species.
- The Contractor is responsible for the removal and eradication of alien plant species.
- Methods of removal and eradication may involve hoeing by hand or the controlled application of herbicides.
- An alien invasive plant (AIP) management plan (see Section 19.4) must be implemented to control current invaded areas and prevent the growth of AIPs on cleared areas.
- Alien vegetation must not be allowed to encroach on the sites and must be continually removed during construction.
- Construction must not promote further alien plant disturbances in the surrounding area.
- Imported material must be alien seed-free, and the stockpiled infill must be continuously monitored (together with soil stockpiles) for the encroachment of alien and invasive vegetation and managed in a timely manner.

19.20. Watercourses

- Watercourses must be continuously visually monitored by the ECO during the construction phase, especially in the unlikely event of rainfall, to ensure that sedimentation of these watercourses is avoided.
- Development must coincide with the summer to autumn dry season (December (year 1) – April (year 2) as far as possible to avoid or maximise control of polluted surface runoff related complications to the receiving EDL and ultimately, the Palmiet River.

- During this dry period, it is strongly suggested that all concrete works be completed and that batching may not take place on the ground. Batching of concrete within the building is supported on condition that the concrete is contained within walls.
- In line with the above, all construction activities must be undertaken during the low flow (dry summer season) period as much as possible to limit surface flow transporting contaminants to the downstream reach of watercourses. This period is between December – March in the Western Cape.
- The Contractor shall minimise the extent of any damage to the EDL and shall not pollute the river system as a result of the construction activities.
- No construction materials shall be stockpiled within 15 m of the watercourses.
- Measures must be implemented at alterations (including at existing structures or activities) to 1) prevent detrimental changes to the breeding, nesting or feeding patterns of aquatic biota, including migratory species (if present), 2) allow for the free up and downstream movement of aquatic biota, including migratory species (if present), and 3) prevent a decline in the composition and diversity of the indigenous and endemic aquatic biota.
- All permanently created hardened surfaces that are associated with any project area must be structurally stable, must not induce sedimentation, erosion or flooding, must not cause a detrimental change in the quantity, velocity, pattern, timing, water level and assurance of flow in a watercourse, must not cause a detrimental change in the quality of water in the watercourse, must not cause a detrimental change in the stability or geomorphological structure of the watercourse; and must not create nuisance conditions, or health or safety hazards;
- Conditions as per the Water Use Licenses and General Authorisations and the Environmental Authorisation are to be adhered to.
- Care must be taken not to spill any fuel or hydraulic fluids in the vicinity of watercourses; any mobile machinery (such as generators) used within watercourses must be free of any leaks and placed in drip trays.
- Any spillages must be cleaned up immediately using standard Hazmat procedures.
- Rehabilitation of the disturbed areas must be carried out and all disturbed areas stabilised, topsoil replaced, and vegetation re-established in consultation with the RE and ECO.
- A washout area must be designated outside of the delineated extent of watercourses and wash water must be treated on site or discharged to a suitable landfill site. Chain of custody documentation in this regard is required.

19.21. Excavations

Whenever any excavation is undertaken, the following procedures shall be adhered to:

- Topsoil shall be handled as described in this EMP.
- Excavations shall take place only within the approved demarcated site.
- Excavations must follow the contour lines where possible.
- The construction site will not be left in any way to deteriorate into an unacceptable state.
- The excavated area must serve as a final depositing area for waste rock and overburden during the rehabilitation process.
- Once excavations have been filled with overburden, rocks and coarse natural materials and profiled with acceptable contours (including erosion control measures), the previous stored topsoil shall be returned to its original depth over the area.

- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with a local or adapted indigenous seed mix in order to propagate the locally occurring flora.
- Excavations should be done by hand in sensitive areas as far as possible. Should this not be possible, this needs to be communicated to the authorities to find an amicable solution.

On completion of construction, the surface of the processing areas especially if compacted due to hauling and dumping operations shall be scarified to a depth of at least 200 mm and graded to an even surface condition and the previously stored topsoil will be returned to its original depth over the area.

- The area shall be fertilised, if necessary, to allow vegetation to establish rapidly. The site shall be seeded with suitable grasses and local indigenous seed mix.
- Excavations may be used for the dumping of construction wastes. This *shall* be done in such a way as to aid rehabilitation.
- Waste (non-biodegradable refuse) will not be permitted to be deposited in the excavations.
- If a reasonable assessment indicates that the re-establishment of vegetation is unacceptably slow, the Regional Manager may require that the soil be analysed and any deleterious effects on the soil arising from the activity be corrected and the area be seeded with a vegetation seed mix to his or her satisfaction. This *must* be done in conjunction with the ECO.
- Final rehabilitation *must* comply with the requirements mention in the Rehabilitation Plan.

19.22. Site Security During Construction

- Ensure appropriate security measures are implemented at all times.
- On-call staff should be available 24 hours a day in case of emergencies.
- Likely disturbance to neighbours as well as security implications shall be considered.

19.23. Open Space Management

- The Open Space areas (not being utilized for the stormwater pond or sport field) and 15 m ecological buffer around the EDL must be clearly demarcated as No-Go Zones prior to any site clearance.
- Temporary fencing or hazard tape with signage must be erected and maintained by the contractor and verified by the ECO.
- Stockpiles, laydown areas, and vehicle parking must be outside these demarcated areas.
- No vehicle or machinery access is permitted within the Open Space, and it must be avoided by access routes to construction areas
- Strictly prohibit any dumping of waste or spoil in the Open Space
- Implement erosion control measures along the boundary of the Open Space to prevent runoff or sedimentation impacts.
- Rehabilitation must occur within the degraded fynbos patches within this space

19.24. Standard Environmental Emergency Response

	Type of Incident	Action to be taken	Notify the following
Minor	Minimal environmental impact • No disruption of project • No public concern or attention • Low risk of compliance and legal issues • Immediate remediation	• Ensure spillage/fire is contained • Ensure that no further damage takes place • Record all details of the incident • Take photographs • Consult Safety Data Sheets • Clean up spill with spill kit • Contaminated material to be disposed of correctly • Follow-up training & awareness	Within 24 hours: • Supervisor • Environmental Officer • Safety Officer • Environmental Control Officer (ECO)
Moderate	Moderate environmental impact • Brief/partial disruption to project • Local public attention and concern • Minor legal issues, non-compliance and breach of law • Short term remediation	• Ensure spillage/fire is contained • Ensure that no further damage takes place • Record all details of the incident • Take photographs • Consult Safety Data Sheets • Clean up spill with spill kit • Contaminated material to be disposed of correctly • Contact specialist spill response company if spill kit is inadequate • Follow-up training & awareness	Within 24 hours: • Supervisor • Safety Officer • Environmental Officer • Site management • HSE Director • Environmental Control Officer (ECO) • Spill response company (if required)
Major	Serious environmental impact • Partial or total shutdown of project or part there of • Regional/national public attention and concern • Medium to long term remediation	• Ensure no further spillage or damage • Cordon off and evacuate area • Notify specialist spill response company • Notify relevant authorities. • Record all details of the incident • Take photographs • Consult Safety Data Sheets • Follow-up training & awareness	Within 12 hours: • Supervisor • Safety Officer • Environmental Officer • Site management • HSE Director • Environmental Control Officer (ECO) • Spill response company (if required)

20. REHABILITATION PLAN

20.1. Rehabilitation Objective

The overall objective of the rehabilitation plan is to minimise adverse environmental impacts associated with the activity whilst maximising the future utilisation of the property. Significant aspects to be borne in mind in this regard are revegetation of the footprint, stability, and environmental risk. The construction footprint and immediate area of the work must also be free of alien vegetation. There is potential for accidental disturbance; therefore, guidelines for the rehabilitation of aquatic habitats are provided. The aim of the rehabilitation is to ensure the necessary procedures are appropriately implemented in the natural environment that may be negatively affected by the developments. The plan will promote the reestablishment of the ecological functioning of any area disturbed by construction activities.

Additional broad rehabilitation strategies/objectives include the following:

- Rehabilitating the worked-out areas to take place concurrently within the prescribed framework established in the EMPr.
- All infrastructure, equipment, plant, and other items used during the construction period will be removed from the site.
- Waste material of any description, including scrap, rubble, and tyres, will be removed entirely from the site and disposed of at a recognised landfill facility. It will not be permitted to be buried or burned on site.
- Final rehabilitation shall be completed within a period specified by the Regional Manager.
- All work outside of the road reserve/construction work corridor will be considered a No-Go area, and buffers are not required.
- The full extent of the site must be maintained through alien invasive plant species removal and, where necessary, the establishment of indigenous vegetation cover to stabilise soils.
- The solid domestic waste must be removed and disposed of off-site.
- Removal of vegetation must only be when essential for the continuation of the project. Do not allow any disturbance to the adjoining natural vegetation cover or soils.
- All post-construction building material and waste must be cleared in accordance with the EMPr

20.2. Site Rehabilitation

The Contractor shall be responsible for the complete rehabilitation of the site and areas demarcated for rehabilitation, including spoil sites, access roads, haul routes, site camp, stockpile, crusher area, ablution facilities and storage areas.

- Full rehabilitation shall be undertaken. Provision for rehabilitation must be made in the tender documents for the project so that an adequate budget is set aside by the contractor.
- Quarterly vegetation rehabilitation surveys must be conducted of the vegetation within the project footprint to establish whether alien invasive vegetation encroachment is stable or has become problematic once more.
- The Contractor should implement progressive rehabilitation once works are complete in a particular area, so that the rehabilitation and/or re-vegetation can begin. This would provide the opportunity to assess whether or not the methods employed are suitable, successful and would help prevent erosion in impacted areas.
- Where re-vegetation of an area is not successful, the Contractor will replant these areas at no additional cost to the Client.

- Only indigenous vegetation that occurs naturally on site is to be planted in site rehabilitation and landscaping activities
- The Contractor shall provide the ECO and RE with a comprehensive Method Statement for the rehabilitation of the entire site. This Method Statement must meet the approval of the ECO and RE.
- Rehabilitation in the Western Cape in terms of revegetation is most successful when planting is conducted immediately before the cold, wet winter season. This will ensure that vegetation is not exposed to drought stress and this permits plants sufficient time to anchor and adapt to their new environment. The onset of spring, which brings increased sunlight intensity and sunlight hours will then encourage growth of the newly planted vegetation.

The following points must be taken into account when drawing up the Rehabilitation Method Statement:

- The Method Statement should be flexible - where measures are found to be inefficient, the plan shall be modified at no additional cost to the Client.
- The Contractor shall be responsible for the successful rehabilitation and re-vegetation of any no-go areas which have been disturbed, where necessary, for a minimum period of 12 months after construction is complete.
- The Method Statement shall include the eradication of alien invasive plant species that may become established during the construction and defects notification period in the impacted and rehabilitated areas.
- The growth of alien invasive plant species shall be monitored and removed during the 12-month period following construction.
- The Method Statement shall include endemic grass seed mixes applicable to summer and winter.
- The Method Statement shall include suitable fertilisers and application rates.
- Successful re-vegetation means 80 % of the seeded area is covered with grass and groundcover.
- Consideration should be given to using established seedlings of indigenous grasses to augment the re-vegetation of bare areas.

20.3. Topsoil and Subsoil Replacement

- Topsoil and subsoil will be stripped separately from any excavations made for services and construction activities.
- The topsoil and subsoil removed from the initial cut will be stockpiled separately and only used in rehabilitation work towards the end of each section of the operation.
- This is in contract to the gravel activity where rehabilitation and topsoil replacement was earmarked at the completion of each phase.
- Stripped overburden will be backfilled into the worked-out areas where needed.
- Stripped topsoil will be spread over the re-profiled areas to an adequate depth to encourage plant regrowth.
- The vegetative cover will be stripped with the thin topsoil layer to provide organic matter to the relayed material and to ensure that the seed store contained in the topsoil is not diminished.
- Reseeding may be required should the stockpiles stand for too long and be considered barren from a seed bank point of view.
- Stockpiles should ideally be stored for no longer than a year.
- The topsoil and overburden will be keyed into the reprofiled surfaces to ensure that they are not eroded or washed away.
- The topsoiled surface will be left fairly rough to enhance seedling establishment, reduce water runoff and increase infiltration.

20.4. Revegetation

Any exposed earth should be rehabilitated promptly by planting suitable vegetation (vigorous indigenous grasses) to protect the exposed soil from moisture and subsequent carbon loss, or from becoming infested by alien invasive plants.

All prepared surfaces will be seeded with suitable grass species to provide an initial ground cover and stabilise the soil surface. The following grass seed is commonly available and suitable.

Botanical name	Common name	Approx seed mixture /Ha
Cynodon dactylon	Kweek	12 kg/ Ha
Eragrostis curvula	Weeping Love Grass	6 kg/ Ha
Eragrostis tef	Teff	2 kg/ Ha
Digitaria eriantha	Smuts Grass	4 kg/ Ha
Other indigenous veld grasses can be added to the seed mix	± 4 kg/Ha	

The overall revegetation plan will, therefore, be as follows:

- Ameliorate the aesthetic impact of the site.
- Stabilise disturbed soil and rock faces.
- Minimise surface erosion and consequent siltation of the natural water course located on the site.
- Control wind-blown dust problems.
- Enhance the physical properties of the soil.
- Re-establish nutrient cycling.
- Re-establish a stable ecological system.
- Every effort must be made to avoid unnecessary disturbance of the natural vegetation during operations.

20.5. Drainage and Erosion Control

To control the drainage and erosion at the site, the following procedures will be adopted:

- Areas where any work is completed should be rehabilitated immediately.
- Areas to be disturbed in future activities will be kept as small as possible (i.e., conducting the
- operations in phases), thereby limiting the scale of erosion.
- Slopes will be profiled to ensure that they are not subjected to excessive erosion but are capable of drainage runoff with minimum risk of scour (maximum 1:3 gradient).
- All existing disturbed areas will be re-vegetated to control erosion and sedimentation.
- Existing vegetation will be retained as far as possible to minimise erosion problems.

20.6. Watercourses

- Rehabilitation of the watercourses must be budgeted for within the worked areas and should be incorporated into the project life cycle, and must be completed as soon as construction is completed.
- Rehabilitation must be done following an approved Rehabilitation Plan and in consultation with a suitably qualified SACNASP professional who is familiar with the ecological importance of the local area.

20.7. Visual Impacts Amelioration

The overall visual impact of the proposed activities will be minimised by the following mitigating measures:

- Confining the footprint to an area as small as possible
- Re-topsoiling and vegetating all disturbed areas.

20.8. Monitoring and Reporting

Adequate management, maintenance and monitoring will be carried out annually by the applicant to ensure successful rehabilitation of the property until a closure certificate is obtained. To minimise adverse environmental impacts associated with operations it is intended to adopt a progressive rehabilitation programme, which will entail carrying out the proposed rehabilitation procedures concurrently with activity.

20.9. Closure objectives and extent of alignment to pre-construction environment

Closure Objectives

The closure of the site will involve removal of all debris and rehabilitation of areas disturbed during the construction phase of the project. This will comprise the scarification of compacted areas, reshaping of areas, topsoiling and rehabilitating all prepared surfaces.

21. FIRE MANAGEMENT PLAN

Fire is highly destructive in habitat types that are not adapted to fire including developed sites. Uncontrolled fires can also lead to damage of infrastructure, property or a loss of lives. In view of the above it is important that fire risk is managed in such a manner that fire risk is reduced in areas prone to fire damage.

The fire risk at the site is expected to be closely related to the fuel load in the area, which creates a potential source of ignition. The management of these factors, in addition to the adequate fire response capability form part of the on-site fire management strategy.

A. Minimise Fuel Load

- Eradicate and control exotic vegetation on the site, and dispose of the felled material in the appropriate fashion.
- Keep litter (cleared vegetation) piles, dumping and general waste on site to a minimum.
- Grass within Open space areas must be maintained and/mowed on a regular basis to reduce moribund vegetation.

B. Minimise Ignition Risk

- All firebreaks must be maintained as required by the local Fire Chief.
- A fire break around the outer perimeter of the site must be maintained to ensure that external fires do not spread over the development, until such time as surrounding areas are developed, in order to minimise the fire risk.
- No open fires are to be permitted on site.
- Smoking outside of designated safe areas or smoking areas is not permitted. Flicking of cigarette butts into adjacent vegetation will not be permitted.
- Designated smoking areas to be established with cigarette butt bins, which will be placed in strategic places to minimize ignition risk.

- Suitable signage must be provided on site, including entrance, warning of fire risk and warnings not to flick cigarette butts into vegetated areas.

22. BIODIVERSITY ENVIRONMENTAL MANAGEMENT PLAN

The impacts identified and listed in relation to Biodiversity will be managed/controlled as set out under mitigating measures and as detailed in this section for the more significant impacts during the operational phase.

- The footprint of the construction area must be kept to a minimum.
- Any use of herbicides in removing alien plant species is required to be investigated by the ECO before use, for the necessity, the type proposed to be used, effectiveness and impacts of the product on aquatic biota.
- A monitoring programme shall be in place, not only to ensure compliance with the EMPr throughout the construction phase, but also to monitor any post-construction environmental issues and impacts during the vegetation establishment phase.

22.1. Protection of Flora and Fauna

The following actions must be implemented at the construction phase.

- Search and rescue operations for Species of Conservation Concern *must* be undertaken before the commencement of site-clearing activities.
- The construction area must be fenced off where it borders the patches of degraded fynbos as per the Botanical Impact Assessment.
- It is important that clearing activities are kept to a minimum and take place in a phased manner. This allows animal species to move into safe areas and prevents wind and water erosion of the cleared areas.
- Stripped vegetation *should* be temporarily stored during operations and used later to stabilise slopes. This excludes exotic invasive species.
- No animals are to be harmed or killed during the course of operations.
- Workers are NOT allowed to collect any flora or snare any faunal species.
- All flora and fauna remain the property of the landowner and *must* not be disturbed, upset, or used without their expressed consent.
- It is the responsibility of the Contractor to provide sufficient fuel for cooking and heating as needed by the staff.
- No domestic animals are permitted on the sites.
- Trees and shrubs that are directly affected by the operations may be felled or cleared, but only by the expressed written permission of the ECO.
- It is the contractor's responsibility to continuously monitor the area for alien species during the contract and establishment period, which, if present, must be removed.
- Removal of these species shall be undertaken in a way which prevents any damage to the remaining indigenous species and inhibits the re-infestation of the cleaned areas.
- Rehabilitation of the vegetation of the site *must* be done as described in the Rehabilitation Plans.

22.2. Watercourses

- As far as possible, the amount of backwash water should be reduced and not exceed 20m3/day. It could be discharged in cycles to allow for infiltration and have sufficient erosion protection at the outlet point. It should be as far a distance away from the channel as possible.

- The proposed project, if completed in accordance with the site-specific EMPr, should not have heavy impacts on the aquatic habitats.
- Siltation of the EDL must be monitored during both the construction and operational phases of the proposed development

22.3. Flora Search and Rescue

The following flora relocation plan is recommended:

- Once the final layout has been determined, the botanist will be consulted in order to finalise the plant relocation and vegetation clearing plan.
- Respective permits to be obtained.
- Flora search and rescue is to be conducted before vegetation clearing takes place.
- Areas should only be stripped of vegetation as and when required, and once Species of Conservation Concern have been relocated from that area.
- Once site clearing commences, the area to be cleared of vegetation will be surveyed by the vegetation and plant search and rescue team, clearing under the supervision of the botanist to identify and remove species suitable for rescue and commence removal of plants.
- These species are to be replanted immediately in a suitable area of similar vegetation, where future development is unlikely to occur, or within a protected area.

22.4. Alien and Invasive Management Plan

The following mitigation measures have been identified in order to ensure that the introduction and spread of alien invasive vegetation is minimised:

- Alien species must be removed from the site as per the National Environmental Management: Biodiversity Act (No. 10 of 2004) requirements.
- A suitable weed management strategy must be implemented in the construction phase and carried through the operational phase. Weeds and alien species must be cleared by hand before the rehabilitation phase of the areas.
- Removal of alien plants is to be done according to the Working for Water Guidelines.
- The Contractor is responsible for the removal of alien species within all areas disturbed during construction activities. Disturbed areas include (but are not limited to) access roads, construction camps, site areas and temporary storage areas.
- In consultation with relevant authorities, the Engineer may order the removal of alien plants (when necessary). Areas within the confines of the site are to be included.
- All alien plant material (including brushwood and seeds) should be removed from the site and disposed of at a registered waste disposal site. Should brushwood be utilised for soil stabilisation or mulching, it must be seed-free.
- After clearing is completed, an appropriate cover crop may be required, should natural reestablishment of grasses not take place in a timely manner.
- In particular, the Open Space area must be kept clear of invasive aliens, focusing on species such as cluster pine, long-leaved wattle, black wattle, Spanish broom, castor-oil plant and olieboom (category 1b and 2 invaders).

22.4.1 Types of Alien Vegetation

According to the National Environmental Management: Biodiversity Act, 2004 (Act No.10 of 2004), the following categories of invasive plants exist:

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

The Project Manager and ECO must have a full list of each plant in the different categories and information on how to remove them.

22.4.2. Alien Control

Rehabilitation must involve control of invasive species. Alien species on site must be identified, categorised and removed, using one or a combination of methods. Invasive alien plant species are difficult to control. Methods should be used that are appropriate for the species concerned, as well as for the ecosystem in which they occur. When controlling invaders, damage to the environment must be limited to a minimum. There are three basic methods by which encroachers or weeds are controlled:

Physical (mechanical):

- Uprooting (hand pulling);
- Cutting back;
- Chopping, slashing and felling; and
- Ring-barking (girdling).

Chemical:

- Foliar application;
- Stem notching and application;
- Stump treatment; and
- Soil treatment.

Biological treatment:

- Involves the use of host-specific natural enemies of weeds or invaders from the plant's country of origin, to either kill or remove the invasive potential of these plants.

During the construction and operational phase of the proposed project, alien invasive plants must be actively identified and removed as per the identified methods above.

23.OPERATIONAL ACTIVITIES

23.1. Solid Waste Management

- Solid waste generated from the housing development must be managed in a safe, hygienic, and environmentally responsible manner to prevent littering, illegal dumping, and pollution
- A formal operational waste management system must be implemented and maintained to ensure responsible handling, storage, and disposal of all waste types generated on the estate (including domestic, recyclable, organic, and hazardous)
- A responsible person or team must be designated to oversee the proper use of bins by residents, staff, and contractors, and to discourage any littering or improper waste disposal.
- General good housekeeping should be practised on site. The property must be routinely cleaned and maintained. All litter or improperly discarded waste should be promptly collected and disposed of in accordance with the waste management system.
- All waste must be stored in sealed, impermeable bins that are animal-proof and weather-resistant
- Clearly marked general and recyclable waste bins should be provided throughout the housing development.
- A central waste holding area may be established for temporary storage prior to municipal pickup. This area must be clean, hard-surfaced, and well-drained.
- Waste collection must occur at least weekly by a registered waste service provider and must be disposed of at a registered disposal facility.
- All non-recyclable waste must be disposed of at a licensed municipal landfill. Recyclables must be sent to an accredited recycling facility.
- Green waste should be composted on-site where feasible or transported to a green waste facility.
- Waste recycling and sorting of recyclable materials should be encouraged
- All hazardous materials must be stored in a secure and ventilated storage area, away from drainage channels or sensitive vegetation.
- Hazardous waste must be collected and disposed of by a licensed contractor at an appropriate hazardous waste facility.
- No hazardous materials may be buried, burned, dumped on site, or placed in domestic or recycling bins.
- While transporting the waste, care should be taken so as not to spill waste between the source area and the disposal site.

23.2. Stormwater Management

- Stormwater infrastructure must be designed and operated in accordance with the principles of Sustainable Urban Design Principles (SUDs)
- Water quality releases must be within the specification of the Resource Quality Objectives of the B5 Overberg West reach of the Palmiet River.
- Stormwater management structures (including erosion control features) must be monitored and maintained throughout the operational phase (especially after heavy rain).
- Stormwater outflow points should be monitored for signs of erosion or undercutting. Should erosion be observed, additional stormwater management and erosion measures must be put in place
- Correct planning and maintenance for stormwater drainage and engineering of development to keep water accumulation to a minimum. stormwater systems should be designed to attenuate flow and reduce velocity.

- A stormwater management plan should be compiled by a professional engineer which must follow the correct stormwater infrastructure to be installed and continually monitored.
- The stormwater system must be kept clean, unobstructed, and functional. Should be inspected regularly to ensure there are no blockages and proper infiltration of stormwater
- Measures must be taken to mitigate stormwater runoff impacts which could enter the freshwater ecosystems.
- Increased surface area from hardened surfaces should not induce erosion, sedimentation, flooding, or degrade water quality.
- Adequate energy dissipation and erosion protection structures (e.g. gabions, riprap, vegetated swales) must be installed and maintained at all stormwater outlets
- If erosion or instability is detected, corrective actions must be implemented immediately

23.3. Sewerage Management

- The internal sewer pipelines must be monitored every 5 years for leaks, and an emergency repair plan must be in place in case of the detection of a leak.
- Sewerage management must aim at the prevention of pollution and must be maintained on a regular basis. Maintenance records must be kept.
- The disposal of any waste (including human waste, greywater, or wash water) directly into the natural environment is strictly prohibited.
- Systems must prevent nutrient enrichment and faecal contamination that could lead to algal blooms or invasive plant growth.

23.4. Protection of Flora and Fauna

- Removal or damage to any natural vegetation on site is strictly forbidden
- Trapping, poisoning, shooting or harming of wildlife is strictly forbidden
- All retained or rehabilitated indigenous vegetation must be protected from trampling, illegal clearing or dumping
- No further vegetation clearance is permitted beyond what was authorised and implemented during construction
- Vegetation in the Open Space must continue to be rehabilitated

23.5. Alien Management Control

Invasive alien plants are species introduced (either deliberately/accidentally) into a natural environment where they are not normally found and have a serious negative impact on the receiving environment by not only outcompeting indigenous species, but also impacting water resources, the health of the ecosystem and posing a fire hazard. Invasive species, especially, become prominent after disturbance and construction-related activities, posing a serious threat to the natural, endemic vegetation. Therefore, proper action must be taken to prevent invasive species from becoming prominent due to the development of the proposed project. The purpose of alien management control around the proposed site will be to:

- to ensure that alien plants do not become established on site (by removing alien species regularly);
- to ensure that alien plant species do not become dominant in all or parts of the landscape; and
- to implement a monitoring programme to detect the presence of alien plant species as well as to monitor the success of the alien management plan.

The following is proposed in terms of long-term alien invasive species control:

- The site must be rehabilitated with indigenous vegetation and monitoring for the potential encroachment of alien vegetation with the proposed development area, on a quarter-annual basis for the first year of operation, and then bi-annually during the second year of operation must be conducted.
- Once the site is stabilised in terms of indigenous vegetation then monitoring and associated rehabilitation may cease. This mitigation necessitates that an alien and invasive management plan is drafted for the project, for consideration by the Breede Gouritiz Catchment Management Agency.
- As a long-term maintenance requirement, keep the Open Space area clear of invasive aliens, focusing on species such as cluster pine, long-leaved wattle, black wattle, Spanish broom, castor-oil plant and olieboom. These species are category 1b and 2 invaders that require compulsory control as part of an invasive species control programme. Please note that it is a legal requirement for landowners to clear alien vegetation on their land.
- Alien invasive plants must be removed through appropriate methods such as hand pulling and cutting, in accordance with the NEMBA and must follow best practice guidelines: Alien Invasive Species Regulations (refer to AIP)
- A suitable weed management strategy is to be implemented in the operational phase.
- Clearing of invasives must not disturb indigenous species

23.6. Fire Prevention and Safety

- All flammable substances must be stored in dry areas that do not pose an ignition risk to the said substances.
- Smoking will only be permitted in designated smoking areas.
- Fire extinguishers must be available and visible throughout the complex.
- Fire-hoses and the correct storage allowance must be made for the fire water demand as per industry standards.
- Emergency exits and signage must be visible and maintained in working order
- No open fires are permitted anywhere on the housing development, including natural and open space areas.
- A Fire Safety Plan must be compiled and kept on file.

23.7. Conservation of Local Resources

- Rainwater harvesting should be implemented
- Where possible, the development should make use of water-saving products (e.g. water water-saving toilets with a dual-flush valve, water-saving taps with spray cartridges, water-saver shower heads, and timed turn-off taps)
- Irrigation of gardens and verges is to be done only with harvested rainwater or recycled water
- Excessive water use should be avoided where possible. Water consumption should be monitored and remain within municipal regulations
- All water reticulation infrastructure should be maintained regularly to avoid leaks and unnecessary water loss
- Energy should be conserved where possible (e.g., through sparing use of lights and heating elements).
- Energy-saving strategies (e.g., solar energy, gas cooking, and heating) should be implemented where possible

23.8. Open Space Management

- Disturbed areas within or adjacent to the open space must be rehabilitated with indigenous fynbos species sourced locally.
- The vegetation adjacent to and within the Open Space and No-Go (buffer) areas must be monitored continuously, post-construction, to ensure that no exotic or invasive species establish or spread from the disturbed and cleared areas or from the surrounding areas into the Open Space. This must be undertaken by a suitably qualified ecologist (Botanist or Ecologist)
- Any invasive Alien plants encountered must be removed and disposed of in an appropriate manner and at an approved disposal site.
- An attempt must be made by the municipality to rehabilitate and conserve the EDL. Fencing should be installed around the EDL 15 metre protection area to conserve it.
- Permanent fencing (e.g. low, non-intrusive fencing) and "No Dumping / Conservation Area" signage must be installed around the open space to prevent livestock access and informal dumping.
- The applicant should assign responsibility for long-term maintenance (alien clearing, litter removal, and erosion repair).
- Environmental awareness to inform residents about the importance of open spaces and prohibited activities (e.g., livestock grazing, dumping).

24. PUBLIC, WORKER HEALTH AND SAFETY

24.1. Vehicles and Access Roads

Site vehicles should be permitted access only within the demarcated construction sites or on existing roads, as would be required to complete their specific tasks. Vehicles are not permitted on re-vegetated areas. Site vehicle traffic should be limited to specific access roads to prevent unnecessary damage to the natural environment. On the Site the Contractor shall control the movement of all vehicles and plant including that of his suppliers so that they remain on designated routes, are distributed so as not to cause an undue concentration of traffic and that all relevant laws are complied with. In addition, such vehicles and plant shall be so routed and operated as to minimise disruption to regular users of the routes and not on the Site. All construction vehicles must stay on demarcated access tracks to avoid compaction of soil and roots. A speed limit of 40 km/hr on site, along the route must be set. On gravel or earth roads along Site and within 500 m of the Site, the vehicles of the Contractor and his suppliers shall not exceed a speed limit of 40 km/hr.

24.2. Traffic Control and Temporary Deviations

Access points to the construction site and demarcated work area must be strictly controlled. Increased traffic, especially heavy vehicle traffic, has the potential to draw complaints from nearby residents or regular road users.

The Contractor is expected to address any complaints received. The Contractor shall comply with all the applicable local, regional and national laws with regard to road safety and transport. The Contractor shall instruct his drivers and plant operators that vehicles will be expected to comply with all road ordinances, such as speed limits, roadworthiness, and load securing or covering. Where sections of the road are closed for construction/bridge refurbishing, barricades shall be constructed to prevent unauthorised access at all times. Suitable signage should be erected informing drivers of the road closure and warning of the possible dangers involved in trespassing within the closed areas. The safety of motorists should remain paramount at all times.

24.3. Community Relations

The Contractor shall erect and maintain information boards in the position, quantity, design and dimensions specified. Such boards shall include contact details for complaints by members of the public in accordance with details provided by the RE.
The Contractor shall keep a "Complaints Register" on Site. The Register shall contain all contact details of the person who made the complaint, information regarding the complaint itself and measures taken to address the complaint.

24.4. Social Disruption

Where construction activities require the removal of fences from around private land, the occupants shall be warned at least three days in advance and alternative fencing should be put in place. These fences and/or boundary markers shall be reinstated as soon as construction is complete. Care should be taken not to damage private property. No access to homesteads and farms or other such areas is permitted without permission of the resident and on agreement with the RE. The Contractor shall take measures to reduce disruption to users of the area abutting the Site.

24.5. Existing Services and Infrastructure

The Contractor shall ensure that existing services (road, rail, pipelines, power lines and telephone services) are not disrupted or damaged, unless required by the contract and with the permission of the RE.

24.6. Protection of the Public

The Contractor shall be responsible for the protection of the public and public property from any dangers associated with the road construction and associated activities, as well as for the safe and easy passage of pedestrians and traffic in areas affected by project activities. Any excavation material, spoil sites and other obstructions or excavations shall be suitably barricaded and/or demarcated with hazard tape.

24.7. Staff Safety and Education

All staff shall be given an induction course before beginning work on the site. Part of the induction course will be to make the staff aware of the potential dangers of the road construction activities. The Contractor must maintain a suitable First Aid Kit at the site office and will have a list of the emergency service contact numbers readily available. Telephone numbers of emergency services (including the local firefighting service and HAZMAT service providers) shall be posted conspicuously in the Contractor's office near the telephone. No authorised firearms are permitted on Site.

25.NON-COMPLIANCE

The contractors must act immediately when notice of non-compliance is received and take corrective action. Complaints received regarding activities on the construction site pertaining to the environment must be recorded in a dedicated register and the response noted with the date and action taken. The ECO should be made aware of any complaints.

- Any non-compliance with the agreed procedures of the EMPr is a transgression of the various statutes and laws that define the manner by which the environment is managed. Failure to redress the cause must be reported to the relevant authority for them to deal with the transgression, as it deems fit.
- The Contractor is deemed not to have complied with the EMPr if, inter alia:
- There is evidence of contravention of the EMPr specifications within the boundaries of the construction site, site extensions and roads;

- There is contravention of the EMPr specifications which relates to activities outside the boundaries of the construction site.
- Environmental damage ensues due to negligence;
- Construction activities take place outside the defined boundaries of the site; and/or
- The Contractor fails to comply with corrective or other instructions issued by the Engineer within a specific time period.

25.1. Penalties

The imposition of penalties will be at the discretion of the Client. The value of any penalty imposed shall be determined in light of the consequential damage caused and the costs required to rehabilitate the damaged area. Payment of any penalty in terms of the Contract shall not absolve the Contractor from being liable from prosecution in terms of the any appropriate law. Fines may also be imposed by the relevant authority (DEA&DP or DMR) in terms of NEMA if the Contractor is found to have unlawfully and intentionally or negligently committed any act or omission which causes significant pollution or degradation of the environment. The following list of fines should be used as a guideline for non-compliances:

RECOMMENDED FINES FOR TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	MIN. FEE	MAX. FEE
Failure to report environmental damage or transgressions to the ECO or RE.	R 1 000	R 2 000
Failure to carry out instructions of the ECO or RE regarding the environment	R 2 000	R 4 000
Failure to comply with prescriptions for the storage of imported materials within a designated contractors yard	R 500	R 1 000
Failure to comply with prescribed administration, storage or handling of hazardous substances	R 500	R 1 000
Failure to comply with fuel storage, refuelling, or clean-up prescriptions	R 500	R 1 000
Failure to comply with prescriptions for the use of ablution facilities	R 500	R 1 000
Failure to comply with prescriptions for the use of designated eating areas, heating sources for cooking or presence of fire extinguishers	R 500	R 1 000
Failure to comply with prescriptions regarding water provision	R 500	R 1 000
Failure to comply with prescriptions regarding fire control	R 500	R 1 000
Failure to comply with prescriptions for solid waste management (incl. paint chips, cement and concrete)	R 500	R 1 000
Failure to comply with prescriptions to prevent water pollution	R 500	R 1 000
Failure to comply with prescriptions regarding workshop equipment maintenance and storage	R 500	R 1 000
Failure to comply with prescriptions regarding lighting and aesthetics	R 500	R 1 000
Failure to comply with prescriptions regarding silt, debris and other obstruction removal	R 500	R 1 000
Failure to comply with prescriptions regarding water diversion and drainage	R 500	R 1 000
Failure to comply with prescriptions regarding erosion and scour protection	R 500	R 1 000
Failure to comply with prescriptions regarding tree and vegetation removal/damage and permit application	R 5 000	R 20 000
Failure to comply with prescriptions regarding method statements	R 500	R 5 000
Failure to comply with prescriptions regarding environmental awareness training	R 500	R 5 000

RECOMMENDED FINES FOR TRANSGRESSION OR RESULTANT ENVIRONMENTAL DAMAGE	MIN. FEE	MAX. FEE
Failure to comply with prescriptions regarding appointment of an Environmental Officer and monitoring of compliance	R 500	R 1 000
Failure to comply with prescriptions regarding site demarcation and erection of fences	R 500	R 5 000
Failure to comply with prescriptions regarding information posters	R 500	R 1 000
Failure to comply with prescriptions regarding procedures for emergencies and spills	R 1 000	R 5 000
Failure to comply with prescriptions regarding protection of natural features	R 500	R 5 000
Failure to comply with prescriptions regarding erosion and sedimentation control	R 500	R 5 000
Note: The maximum fine for any environmental damage will never be less than the cost of applicable environmental rehabilitation. For each subsequent similar offence committed by the same individual, the fine shall be doubled in value to a maximum value of R50 000.		

26. CLOSURE PLANNING

Final site cleaning - the contractor must clear and clean the site and ensure that all equipment and residual materials not forming part of the permanent works is removed from site before issuing the completion certificate or as otherwise agreed.
Rehabilitation - the contractor (landscape architect/horticulturist) must be responsible for rehabilitating and re-vegetation of all areas disturbed/areas earmarked for conservation and/or rehabilitation during construction to the satisfaction of the engineer and ECO.

Post-construction audit

A post-construction environmental audit must be carried out and submitted to DEA&DP at the expense of the developer so as to fulfil conditions of the Environmental Authorisation granted. Objectives should be to audit compliances with the key components of the EMPr, to identify main areas requiring attention and recommend priority actions. The audit should be undertaken annually and should cover a cross section of issues, including implementation of environmental controls, environmental management and environmental monitoring. Results of the audits should inform changes required to the specifications of the EMPr or additional specifications to deal with any environmental issues which arise on site and have not been dealt with in the current document.

Management review and revision of the EMPr

The EMPr is to be reviewed annually for the first three years and then once every five years thereafter, by an independent environmental consultant, unless otherwise specified by the authorities. The auditor is to highlight issues to be addressed in the EMPr or changes required during the annual audit. These points are to be included as an annexure to the EMPr and to be considered during the review process. Recommended changes to the EMPr must be forwarded to DEA&DP for approval and comment, before subsequently being incorporated into the EMPr.

General review of EMPr

The EMPr will be reviewed by the ECO on an ongoing basis. Based on observations during site inspections and issues raised at site meetings, the ECO will determine whether any procedures require modification to improve the efficiency and applicability of the EMPr on site. Any such changes or updates will be registered in the ECO's record, as well as being included as an annexure to this document. Annexure of this nature must be distributed to all relevant parties.

APPENDICES

27.APPENDIX A: EAP Curriculum Vitae

Name of firm	Engineering Advice & Services (Pty) Ltd
Name of staff	LEA STEYN
ID Number	9205230103083
Profession	Environmental Scientist
Years with firm	6 years
Nationality	South African
Membership to Professional Societies	International Association for Impact Assessment South Africa (IAIAsa Member Number 6471) Registered EAP (EAPASA) Cert.Sci.Nat (129284)

KEY QUALIFICATIONS

Lea's graduate qualifications include geology in sedimentology, structural geology and petrography as well as Environmental Sciences.

Since Lea joined EAS in 2016 she has been instrumental in compiling and editing environmental reports for a range of projects in the Eastern Cape within the roads and transport, mining, housing, and agricultural sectors. Lea's primary experience since joining EAS has been related to facilitation of application processes for environmental authorisations for borrow pits in the different areas of the Eastern Cape through site assessments; research and report writing. Most of the processes include the facilitation of the formal basic assessment applications through facilitating public participation processes, and managing environmental studies as well as interpreting and compiling specialist reports relating to these studies with the availability of spatial tools and technologies.

She has experience in borrow pit screening and assessing the feasibility and environmental impacts surrounding the activities related to mining as well as public consultation. She has been involved with, and helped to facilitate licensing applications for more than 200 borrow pits throughout the Eastern Cape. Her responsibilities relating to environmental compliance auditing for road maintenance projects and borrow pit assessments were included during these operations. She assisted with ecological assessments, search and rescue operations, facilitating Environmental Management Programmes, and applications.

Through competent mentoring Lea has become familiar with the applicable legislation for different projects' required application formats and procedures. Lea has gained valuable knowledge of the National Environmental Management Act (NEMA) and its related Regulations, The Mineral and Petroleum Resources Act (MPRDA), the National Water Act (NWA), and the Spatial Planning and Land Use Management Act (SPLUMA). Lea is a registered member of the International Association for Impact Assessment South Africa (6471) and has recently attended a SACNASP Accredited two-day Online EIA Law Course as well as a Continuing Professional Development accredited Introductory EIA Report

Writing Course hosted by IAIAsa. Lea is a registered Scientist with the South African Council for Natural Scientific Professions (Reg No. 129284).

EDUCATION

Stellenbosch University Bachelor of Science (Earth Science) 2011-2016

EMPLOYMENT RECORD

March 2016 – Present Engineering Advice and Services Environmental Scientist

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LANGUAGES

	Speak	Read	Write
Afrikaans	Excellent	Excellent	Excellent
English	Excellent	Excellent	Excellent

PROJECT EXPERIENCE

MINING PERMIT ENVIRONMENTAL MANAGEMENT PLAN APPLICATIONS

2016

- Mining BAR/EMP's for Nkonkobe LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Mbhashe LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Mbizana LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Senqu LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Elundini LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Emalahleni LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Ikwezi/Baviaans LM Borrow Pits – (DRPW)

2017

- Mining BAR/EMP's for Ingquza Hill LM Borrow Pits – (SANRAL)
- Mining BAR/EMP's for Baviaans LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Inkwanca (Enoch Mgijima) LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Kouga/Koukamma LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Sakhisizwe/Engcobo LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Raymond Mahlaba LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Camdeboo LM Borrow Pits – (DRPW)

- Mining BAR/EMP's for Elundini LM Borrow Pits – (DRPW)
- Mining BAR/EMP's for Emalahleni/Intsika Yethu LM Borrow Pits – (DRPW)

2018

- Mining BAR/EMP's for 24 Borrow Pits in 6 districts within the Eastern Cape– (SANRAL)

2019

- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Sakhisizwe LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Engcobo LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Kouga & Kou-Kamma LM's Borrow Pits – (DoT)
- Mining BAR/EMP's for Senqu LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Elundini LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Engcobo LM Borrow Pits – (DoT)

2020

- Mining BAR/EMP's for Makana LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Dr Beyers Naude LM Borrow Pits – (DoT)
- Mining BAR/EMP's for Blue Crane Route LM Borrow Pits – (DoT)

BASIC ASSESSMENT REPORT PROJECTS

2017

- Basic Assessment Application for Erf 14 Kabega, NMBM
- Basic Assessment Application for Hankey Housing, Kouga District Municipality
- Basic Assessment Application for Fairwest Rental Housing, Nelson Mandela Bay

2018

- Basic Assessment Application for South-End Precinct Mixed Use Development, Nelson Mandela Bay

2019

- Basic Assessment Application for Nelson Mandela University Access Road, NMB
- Basic Assessment Application for Erf 599 Walmer Mixed Use Development, Nelson Mandela Bay
- Basic Assessment Application for Cookhouse Bridge rehabilitation
- Basic Assessment Application for Parsonsvlei Erf 984 & 1134 Parsonsvlei
- Basic Assessment Application for Little Chelsea No. 10 Port Elizabeth

2020

- Basic Assessment Application for Proposed Crossflow Hydroelectrical Turbine Generators installation: Farm Klipfontein (29/76), Cookhouse
- Basic Assessment Application for Proposed Development on Erf 11667, Walmer for Bidfood Port Elizabeth
- Basic Assessment Application for Proposed Refurbishment of a Damaged Low-level Watercourse Structure Along the DR01812, Hankey, Eastern Cape
- Basic Assessment Application for Proposed Reconstruction of Undermined Bridge and Temporary Bypass Construction along the MR00391, Hankey, Eastern Cape
- Basic Assessment Application for Proposed Replacement of Four Damaged Watercourse

Structures and Temporary Bypass Construction along the MR00388, Tsitsikamma, Eastern Cape

SCREENING REPORTS

2016

- Report compilation, editing for: Marina Martenique Rezoning, Aston Bay

2020

- Site assessment, report compilation for Herbetsdale Pipeline, Mosselbay, Western Cape
- Site assessment, report compilation for Summerstrand Erf 2399, Port Elizabeth
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WATER USE LICENSE APPLICATIONS

2019

- Water Use License Application for Cookhouse Bridge rehabilitation

2020

- Water Use License Applications for Proposed Crossflow Hydroelectrical Turbine Generators installation: Farm Klipfontein (29/76), Cookhouse
- Water Use License Application for Proposed Development on Erf 11667, Walmer for Bidfood Port Elizabeth
- Water Use License Application for Proposed Refurbishment of a Damaged Low-level Watercourse Structure Along the DR01812, Hankey, Eastern Cape
- Water Use License Application for Proposed Reconstruction of Undermined Bridge and Temporary Bypass Construction along the MR00391, Hankey, Eastern Cape
- Water Use License Application for Proposed Replacement of Four Damaged Watercourse Structures and Temporary Bypass Construction along the MR00388, Tsitsikamma, Eastern Cape