



REPORT

The Canelands Extension Draft Environmental Management Programme

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Acronyms

BA	Basic Assessment [i.e. EIA process]
BAR	Basic Assessment Report
CA	Competent Authority
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
ECO	Environmental Control Officer
EDTEA	[Department of] Economic Development, Tourism and Environmental Affairs [Competent Authority]
EIA	Environmental Impact Assessment
EIS	Ecological and Importance Sensitivity
EM	Ethekewini Municipality
EMPr	Environmental Management Programme
ERP	Emergency Response Plan
FEPA	Freshwater Ecosystem Priority Area
GNR	Government Notice Regulation
I&AP	Interested and Affected Party
IEM	Integrated Environmental Management
MSDS	Material Safety Data Sheet
NCR	Non-Conformance Report
NEM:AQA	National Environmental Management: Air Quality Act [Act No. 39 of 2004]
NEM:BA	National Environmental Management: Biodiversity Act [Act No. 10 of 2004]
NEM:ICMA	National Environmental Management: Integrated Coastal Management Act [Act No. 24 of 2008]
NEM:PAA	National Environmental Management: Protected Areas Act [Act No. 57 of 2003]
NEM:WA	National Environmental Management: Waste Act [Act No. 36 of 1998] [as amended]
NEMA	National Environmental Management Act [Act No. 107 of 1998] [as amended]
NHRA	National Heritage Resources Act [Act No. 25 of 1999]
NWA	National Water Act [Act No. 36 of 1998]
PES	Present Ecological State
RoW	Right of Way
SANRAL	South African National Roads Agency Limited
SDC	Safe Disposal Certificate
SEF	Site Environmental File
SEMA	Specific Environmental Management Act
SHE	Safety, Health and Environmental
WMA	Water Management Area
WUL[A]	Water Use Licence [Application]

Glossary

Accident	A road vehicle accident.
Building and Demolition Waste	Building and demolition waste means waste, excluding hazardous waste, produced during the construction, alteration, repair or demolition of any structure, and includes rubble, earth, rock and wood displaced during that construction, alteration, repair or demolition.
Contractor	Companies appointed on behalf of the Developer to undertake activities, as well as their sub-contractors and suppliers.
Construction Project Management Team	The team consists of a Project Manager as well as a Safety, Health and Environmental officer.
Degradation	The lowering of the quality of the environment through human activities e.g. river degradation, soil degradation.
Domestic Waste	Domestic waste means waste, excluding hazardous waste, that emanates from premises that are used wholly or mainly for residential, educational, health care, sport or recreation purposes.
Emergency	An undesired event that results in a significant environmental impact and requires the notification of the relevant statutory body such as a local or provincial authority.
Environment	In terms of the National Environmental Management Act [NEMA] [Act No. 107 of 1998][as amended], “Environment” means the surroundings within which humans exist and that are made up of: <ul style="list-style-type: none"> [i] the land, water and atmosphere of the earth; [ii] micro-organisms, plants and animal life; [iii] any part or combination of [i] of [ii] and the interrelationships among and between them; and [iv] the physical, chemical, aesthetic and cultural properties and conditions of the foregoing that influence human health and wellbeing.
Environmental Control Officer	An individual nominated through the Developer to be present on-site to act on behalf of the Developer in matters concerning the implementation and day to day monitoring of the EMPr and conditions stipulated by the authorities.
Environmental Impact	A change to the environment, whether adverse or beneficial, wholly or partially resulting from an organisation’s activities, products or services.
Environmental Management Programme	A detailed plan of action prepared to ensure that recommendations for enhancing or ensuring positive environmental impacts and limiting or preventing negative environmental impacts are implemented during the life-cycle of the project.
General Waste	General waste means waste that does not pose an immediate hazard or threat to health or to the environment, and includes - <ul style="list-style-type: none"> [i] domestic waste; [ii] building and demolition waste; [iii] business waste; and [iv] inert waste.

General Waste Landfill Site	A waste disposal site that is designed, managed, and permitted to allow for the disposal of general waste.
Hazardous Waste Landfill Site	A waste disposal site that is designed, managed, and permitted to allow for the disposal of hazardous waste.
Impact	A description of the potential effect or consequence of an aspect of the development on a specified component of the biophysical, social or economic environment within a defined time and space
Incident	An undesired event which may result in a significant environmental impact but can be managed through internal response.
Mitigation	Measures designed to avoid, reduce or remedy adverse impacts.
Principal Agent	The principal agent is appointed by the Developer to oversee the overall project management and the management of the professional project team.
Recovery	The controlled extraction of a material or the retrieval of energy from waste to produce a product.
Re-Use	To utilise articles from the waste stream again for a similar or a different purpose without changing the form of properties of the articles.
Recycle	A process where waste is reclaimed for further use, this involves the separation of waste from a waste stream for further use and the processing of that separated material as a product or raw material.
Safety, Health And Environmental Officer	The SHE officer is a Contractor representative, responsible for the safety, health and environmental aspects on the construction-site. The SHE officer will be responsible for the day-to-day monitoring of the EMPr and Health and Safety Plan.
Waste	<p>Waste means any substance, whether or not that substance can be reduced, re-used, recycled and recovered -</p> <ul style="list-style-type: none"> [i] that is surplus, unwanted, rejected, discarded, abandoned or disposed of; [ii] which the generator has no further use of for the purposes of production; [iii] that must be treated or disposed of; or [iv] that is identified as a waste by the Minister by notice in the Gazette, and includes waste generated by the mining, medical or other sector, but— <ul style="list-style-type: none"> o a by-product is not considered waste; and o any portion of waste, once re-used, recycled and recovered, ceases to be waste
Waste Disposal Facility	Waste disposal facility means any site or premise used for the accumulation of waste with the purpose of disposing of that waste at that site or on that premises.
Workforce	The entire project team including people employed by the Principal Agent or the Contractor, persons involved in activities related to the project, or person present at or visiting the construction area, including permanent contactors and casual labour.

1 Introduction

1.1 Project Background

Canelands Extension, also referred to as Canelands East is located to the south-west of the Dube TradePort and King Shaka International Airport precinct. The development is situated in the north eastern quadrant of Canelands industrial area, adjacent to the north coast railway line. The development covers an area of 7.23 gross hectares. Access to the development is taken off Vincent Dickenson Road via road D499, a divisional road. The proposed development site is bounded by industrial sites and to the south, the Umdloti River. The location of the development is indicated in **Error! Reference source not found.**

Figure 1: Study area contextualisation

The site is to be developed for industrial purposes. The site lies adjacent to the existing Canelands Industrial estate. Potential land uses may include General / light industrial, logistics, warehousing and distribution. These land uses will complement those of the existing Canelands Industrial Estate, and will ensure that this land parcel reads as an extension to the existing development.

It is proposed, due to the proximity of the floodplain and numerous other constraints located on site, that a single platform covering an area of approximately 1.56 hectares is created. Both a servicing and traffic report has been completed, which details how this development will be accommodated by the existing bulk infrastructure within the region.

For further details of this project, please refer to the companion document: “*The Basic Assessment Report for the Canelands Extension*” [BAR - Royal HaskoningDHV, 2016].

It is noted that a broad conceptual EMPr for the receiving areas identified in the Climate Resilience Plan is required (refer to the *Canelands Extension Basic Assessment Report, Royal HaskoningDHV, February 2016* for an explanation on the Climate Resilience Plan and its role in this project) . However, we wish to clarify that this concept EMPr is not required to accompany this project, because the wetland specialist is not recommending offsite rehabilitation due to minimal impact on wetlands. The wetland functional equivalents assessment found that the gain of 0.17 ha equivalents for HGM Unit 1 and the loss of 0.03 ha equivalents for HGM Unit 2 equates to an overall gain of 0.14 ha equivalents for the entire site. Therefore

the assessment indicates and overall net gain in wetland functional units. The framework recognises that the overall loss of wetland habitat in the region is below sustainability thresholds, and as such, mitigation measures should be based on achieving a 'net gain' rather than 'no net loss'. Wetland habitat in the reasonably attainable rehabilitated state will equate to approximately 0.36 functional equivalents. Based on the development impact on 0.24 ha, the wetland habitat is considered to decrease in functioning by approximately 0.12 functional equivalents to 0.24 functional equivalents. This loss would be addressed through the functional and ecosystem conservation offset targets of 0.09 functional equivalents and 0.09 habitat hectare equivalents, respectively. Therefore, due to the minute 0.09 functional equivalent required, no offsite rehabilitation is required in any of the identified receiving areas.

2 The Environment

2.1 Vegetation

The site and broader study area occurs within the KwaZulu-Natal Coastal Belt [see Appendix 5], an Endangered vegetation type [Mucina *et al.*, 2006]. The KwaZulu-Natal Coastal Belt occupies a long, and in places broad, coastal strip along the KwaZulu-Natal coast extending roughly from Mtunzini in the north to Port Edward in the south [Mucina *et al.*, 2006]. In natural situations, this vegetation type is defined by various types of subtropical coastal forest interspersed with *Themeda triandra* grassland.

Over the years, the natural vegetation of this unit has been highly transformed and fragmented, primarily from extensive sugarcane cultivation, timber plantations and urban sprawl. Due to the extensive transformation, the natural vegetation has been replaced by a mosaic of secondary grasslands [dominated by *Aristida sp.*], seral thickets and bushveld most of which is severely threatened by alien plant invasion. Currently only a very small area [i.e. less than 1% of original area] is protected in Ngoye, Mbumbazi and Vernon Crookes Nature Reserves.

Lower order vegetation units [e.g. grassland, forest, wetland, etc.] are also nested in the part of the KwaZulu-Natal Coastal Belt. However, due to the degraded nature of the vegetation, little can be referred back to these units in their original state.

No vegetation that occurs within the site requires protection and/or specific management. However, it is important that the aquatic ecosystems associated with the site [i.e. riparian and wetland habitats] are protected under the auspices of the NWA. The functionality of these systems should be maintained, and where possible improved, to ensure the continued supply of ecological and hydrological services in the landscape [e.g. improving water quality, streamflow regulation, groundwater recharge, erosion control, and maintenance of wetland-dependant biodiversity].

The vegetation report concluded that with exception to loss of wetland habitat, the proposed development will not have a significant impact on the ecological state of the vegetation that is directly affected. Furthermore, opportunities exist to rehabilitate non-developed areas of the site to allow establishment of natural vegetation. Not only will this improve the integrity and functionality of terrestrial and aquatic ecosystems on site, but will also enhance ecological connectivity within the broader landscape setting. The specialist who conducted the study validates the seasonality and age of the study, stating that the transformation of the site indicated it is unlikely that a re-assessment in the rainy season will yield different results. Refer to Appendix D2 for the complete report and declaration.

2.2 Freshwater

The study area falls within the U30B quaternary catchment [Midgley *et al.*, 1994], and drains directly into the Umdloti River and a tributary system. The mean annual precipitation [MAP] for the U30B catchment is 983.2mm and Potential Evapo-transpiration [PET] is 247.3 mm [Schulze, 2007], which suggests that the

wetlands within the catchment would have Low sensitivity to hydrological impacts within the catchment [Macfarlane *et al.*, 2007].

According to GroundTruth [2012], two of the six HGM unit types are present within the study site namely channelled [HGM Unit 1] and un-channelled valley-bottom [HGM Unit 2]. The results of the study indicate that the wetland habitat within the study area covers approximately 2.87 ha of the site, including the wetland habitat within the Chem Spec / Dow AgroSciences site. The systems are considered to be fed by surface and sub-surface water inputs, depending on the nature of the wetland within the landscape [GroundTruth, 2012]. The study undertaken by GroundTruth [2012] further revealed that the site has undergone extensive modifications through agricultural practices, the railway line, Chem Spec / Dow AgroSciences and Duiker road.

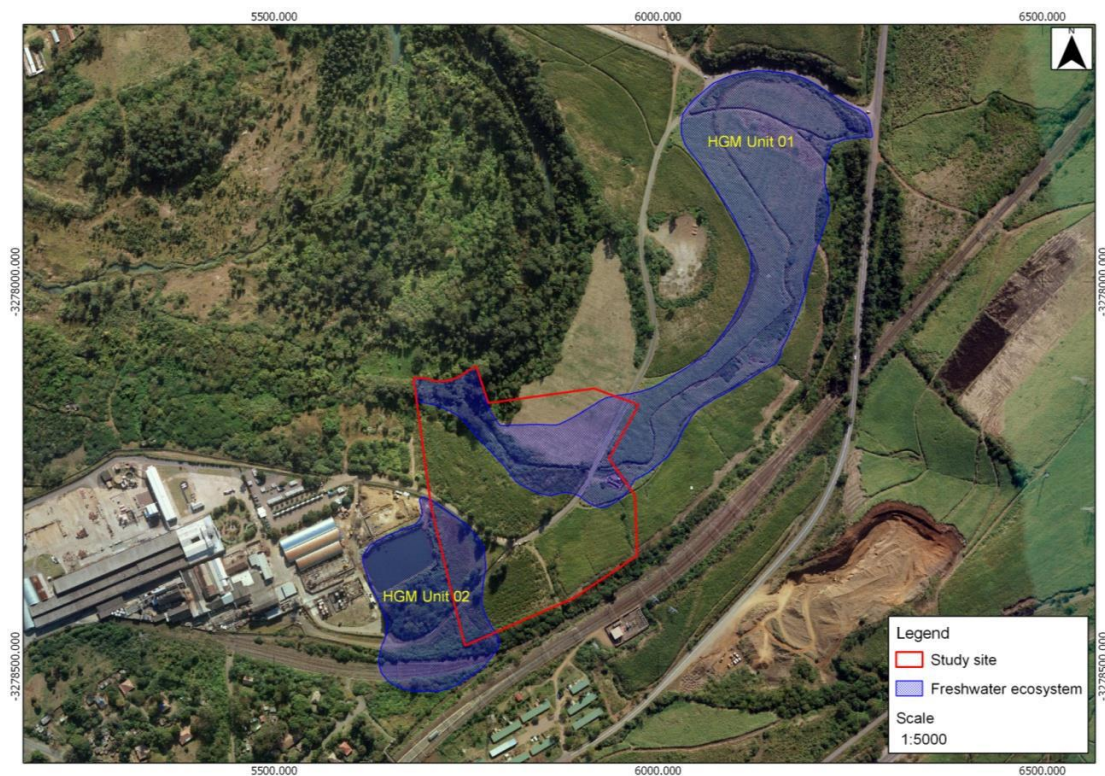


Figure 2: HGM Units on site

The assessment of the wetland habitat under current conditions identified extensive modification, associated with agricultural activities within the wetland systems and the surrounding landscape. These activities have resulted in modifications to the systems' current ecological integrity. In the post-development landscape, the integrity of the systems' are anticipated to marginally improve as a result of the proposed rehabilitation recommendations, but limited recommendations have been specified for the site due to constraints within the wetlands.

2.2.1 Wetland Functionality

Under natural conditions the surrounding landscape and study site would have been characterised by particular vegetation types. The historical dominant vegetation type present was the KwaZulu-Natal Coastal Belt [CB3] [Mucina and Rutherford, 2006], which falls under the Indian Ocean Coastal Belt Group 2 [CB] bioregion [Net *et al.*, 2011]. The KwaZulu-Natal Coastal Belt [CB3] has been classified as having an 'endangered' conservation status, due to the lack of protection it receives. Of the remaining 50% only a small percentage is statutorily protected in reserves including Ngoye, Mbumbazi and Vernon Crookes Nature Reserves. This vegetation type expands from Mtunzini along the north coasts of KwaZulu-Natal to

Port Edward in the south, and commonly occurs at altitudes of 20-450m above sea level. The greatest threat to this vegetation type has been agriculture, urbanization and the construction of roads [Mucina and Rutherford, 2006].

A single wetland within 500 m of the study site was identified but not assessed due to there being no hydrological link to the development site. The system has been transformed by extensive sugarcane cultivation.

The 'State of the Rivers' [SoR] survey by eThekweni Municipality [2007] showed that a number of the rivers, 17 of the 59 systems sampled, in the eThekweni Municipality are in poor condition i.e. habitat diversity and availability have declined; mostly only tolerant species are present; species present are often diseased; and population dynamics have been disrupted [Kleynhans and Louw, 2008]. The predominant impacts on the rivers include solid waste or litter, discharge from Waste Water Treatment Works, sewage infrastructure and road infrastructure. The Canelands East development site is located within the catchment of the Black Mhlashini River [Figure 3] which drains into the Mdloti River. The SoR identifies the Mdloti River as generally in a good condition for the stretch below Hazelmere Dam and above the town of Verulam, with high nutrient loads and industrialisation being major impacts on the system, and calls for the improved management of the system and its catchment to address the impacts on the river. It would be anticipated that the Black Mhlashini River would have a similar suite of impacts to that of the Mdloti River.

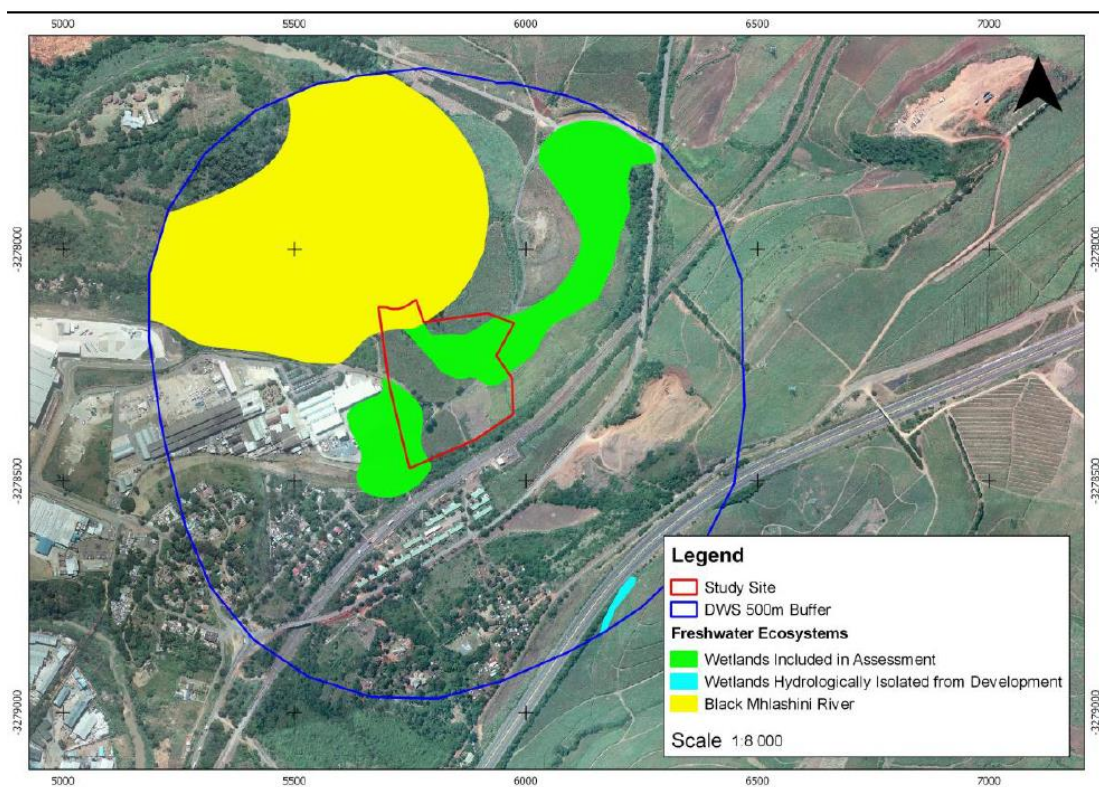


Figure 3: Overview of freshwater systems within the site proximity

2.2.2 Surface Water

The site was located downstream of Canelands East but upstream of the sand mining concession. The SASS5 assessment indicated the biological water quality was in a fair condition; however, habitat was limited at the site which in turn negatively impacted the SASS5 score. Diatoms which are not habitat dependent possibly provide a better indication of the condition of the site. The diatoms showed the site to

be in a good condition with the score improving compared to the upstream site: this would suggest a lack of additional impacts emanating from the Canelands East property. The in stream habitat integrity was near to natural with only minor impacts at the site. The riparian habitat was in a good condition, with alien plants being the main impact.

2.3 Topography

The southern part of the project area south of the road crossing through the project area is sloping gently with a concave slope conformation in a north to north-westerly direction. The northern part comprises a fairly level north-western portion with a wider north westerly trending valley line located to the north east. The entire valley line has been marked as wetland.

2.4 Geotechnical

The bedrock is generally moderately fractured very hard Dolerite at elevations of 751 m, 749 m and 744.5 m, correspondingly. The layer overlying the bedrock comprises of sub-rounded cobbles and boulders containing dolerite and occasional shale. Lastly, there is a top layer of slightly silty sandy clay containing fine roots.

It is recommended that the foundations of the river crossing structure be designed to act in end-bearing. Alternative foundations to be used include caisson and/ or pile foundations. However, pile foundations are highly recommended for the following reasons:

- The depth to competent bedrock is significant as in some cases it is up to 6.5 m below the Energy Grade Line [EGL].
- Boulder bed is considerably thick and extends up to 6.5 m below EGL.
- Shallow groundwater conditions exist.

In using pile foundations, it is recommended that only oscillator and/ or rotapiles be used because they are able to penetrate alluvial boulder beds of significant thickness. In addition to this, a maximum net allowable bearing pressure of 2 000 kN/ m² is considered applicable, provided the piles are socketed into competent weathered bedrock.

2.4.1 Geology and Soils of the Site

The report on the geotechnical investigation [DRENNAN MAUD & PARTNERS, 2012] provides the following results from inspection pits [IP], auger excavations and Dynamic Cone Penetration [DCP] testing.

The majority of the project area is underlain by the diamictic bedrock of the Ordovician Dwyka Formation and the soils derived therefrom. Along the upper slope of the valley as well as at the northern end of the project area, quaternary alluvial terrace sediments comprising loose sands, gravel and boulder capping the Dwyka Formation occur at depth.

Fill materials were encountered along the western portion of the site. It is assumed, a north west - south east trending depression or shallow drainage line leading towards the Dow AgroSciences SA [Pty] Ltd [adjacent business] pond has been filled in order to level the area. In general the depth to completely to highly weathered, very soft rock, sedimentary bedrock exceeds 3 m depth with the exception of the south western most area where weathered bedrock was exposed at a depth of 2.40 m below existing ground level.

Loose alluvial terrace sediments associated with the nearby meandering Umdloti River cap the underlying Dwyka Formation both along the embankment of the valley line as well as at the north western boundary.

Laboratory tests show results of Colluvium and Residual Tillite. Colluvium has a low [7.4%] clay content and provides excellent to good sub-grade material. Colluvium classifies as a Grade Seven [G7] material and is considered suitable for re-use as subgrade and in selected layer works for road and pavement works. The Residual Tillite material encountered classifies as clayey sand with a clay content of 14.2% which is considered an excellent to good subgrade material. This material also classifies as a G7 material and is considered suitable for re-use as subgrade and in selected layer works for road and pavement works.

In addition, further residual material was encountered. This Residual Tillite classifies as a gravelly, sandy, silty clay with a clay content of 34.6%. This material is considered a fair to poor subgrade material and is not considered suitable in road and pavement layer works. Refer to Figure 4 for the map of the site geological characteristics.

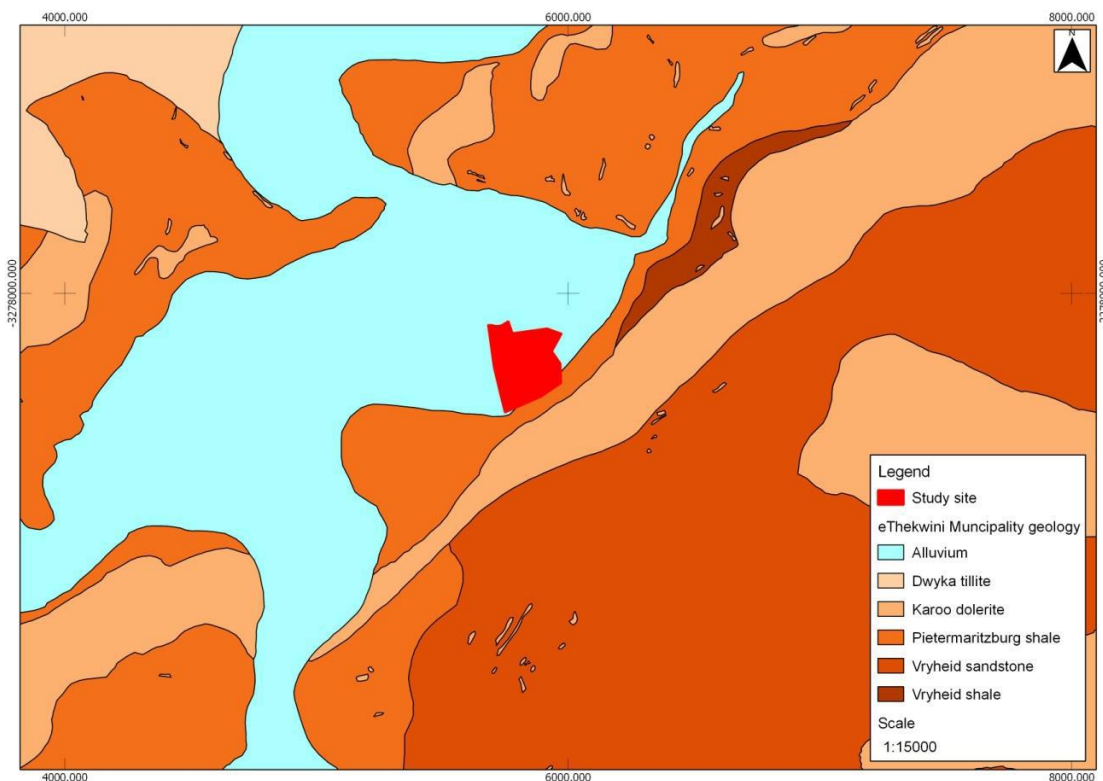


Figure 4: Geology of the Study Site [GroundTruth, 2014]

In terms of the results of this assessment, the geotechnical investigation concludes that the investigated 2.54 ha portion of the 7.3 ha site as stable in its existing condition, and capable of the proposed development.

2.5 Major Hazardous Installation Risk Assessment [MHI RA]

A SASOL Gas Pipeline transports SASOL gas which is a mixture of methane [88.6% by volume] at pressure [59 Bar] through the project site. The gas pipeline was originally laid in 1969 for transport of oil. In 1995 the pipeline was converted to a gas pipeline. The gas is supplied by SASOL from Secunda.

SASOL has a number of preventative actions and/or measures to reduce potential incidents which are discussed herein. A release could result in:

- toxic gas release. This could cause asphyxiation due to reduction of Oxygen in atmosphere.
- gas fire – jet fire

- explosion – vapour cloud explosion [VCE]

Methane gas can present a serious health risk, environmental and/or fire if unprotected exposure occurs. The primary hazard is the release of a toxic gas cloud into the outside atmosphere. Methane acts a simple asphyxiant when inhaled. Its presence in air displaces the air, which lowers the partial pressure of Oxygen and cause hypoxia in those who breathe it in.

3 Objectives of the EMPr

The EMPr has the following objectives:

- Ensure compliance with regulatory authority stipulations and guidelines which may be local, provincial, national and/or international.
- To outline mitigation measures and environmental specifications which are required to be implemented for all phases of the project in order to minimise the extent of environmental impacts, and to manage environmental impacts associated with the proposed project.
- To identify measures that could optimise beneficial impacts.
- To establish a method of monitoring and auditing environmental management practices during all phases of development.
- Detail specific actions deemed necessary to assist in mitigating the environmental impact of the project.
- Ensure that the safety recommendations are complied with.
- Propose mechanisms for monitoring compliance with the EMPr and reporting thereon.
- Specify time periods within which the measures contemplated in the draft environmental management plan must be implemented, where appropriate.
- Provide rational and practical environmental conditions / requirements to:
 - Minimise disturbance of the natural environment;
 - Ensure water resource protection;
 - Prevent or minimise all forms of pollution;
 - Protect indigenous flora and fauna;
 - Prevent soil and sand erosion and facilitate the re-vegetation of affected areas;
 - Maintenance of newly re-vegetated areas;
 - Restrict noise disturbance; and
 - Ensure compliance with all applicable laws, regulations, standards and guidelines for the protection of the environment.
- Adopt the best practical means available to prevent or minimise adverse environmental impacts.
- Develop waste management practices based on prevention, minimisation, recycling, treatment or disposal of waste.
- Train the Developer, its employees and contractors with regard to their environmental obligations

4 Structure of the EMPr

The EMPr addresses aspects of the project life-cycle from the point at which work on the ground begins, whereas the Basic Assessment Report [BAR] addresses impacts and mitigation thereof prior to the project commencing. This EMPr therefore covers the phases as per Figure 5 below:



Figure 5: Phases of the EMPr

The implementable EMPr complies with the EIA Regulations 2010 [*Regulations for the contents of EMPrs*] and comprises the aspects as per below:

Table 1: Tabular format of the EMPr

Aspect	Environmental Specification	Responsibility	Monitoring frequency
Meaning:	This section indicates the actions required to either prevent and/or minimise the potential impacts on the environment that is associated with the project.	This section indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr.	This section indicates when the actions for that specific aspect must be implemented and/or monitored.

4.1 The Dynamic Nature of the EMPr

The nature of environmental management is such that it deals with numerous disciplines and is applied to a myriad of study areas, each with its unique ecosystem functioning and requirements. Therefore, certain study areas may be considered to be pristine, whereas others may need to be more carefully observed as they are already significantly developed. This requires environmental management to develop tailor made solutions and responses to each and every project, through project specific tools within the Integrated Environmental Management [IEM] field, such as those of the BA, EIA and EMPr.

Part and parcel of ensuring these tailor made solutions, is flexibility and accommodation of what the natural environment can sustain. Hence, as the BA is predictive in nature, in assessing likely impacts, once the project is implemented for construction, certain aspects may come to light, and there must be provision to allow for the EMPr to guide activities around these. Therefore, the EMPr is a “living” or dynamic document which must be duly updated and complied with. To ensure this, the **Deming Cycle** or continuous development cycle is adopted, as demonstrated below:

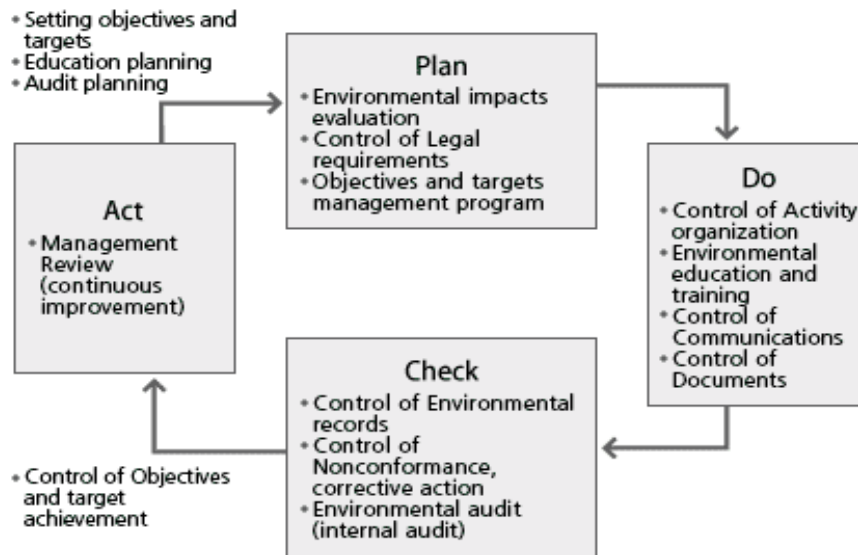


Figure 6: The continuous development cycle within the Green Management System

With reference to **Figure 5** above, the following interpretations are provided:

Plan: Project-specific planning for the proposed project involves consideration of the legal triggers, the specifics of the proposed development, and the nature of the receiving environment. This provides a starting point for targeted environmental management objectives. Environmental performance indicators are then determined with measurable targets prescribed to monitor the environmental performance of the project. Achieving the targets depends on compliance with this EMPr and the legislative requirements that underpin it.

Do: Throughout the development's life-span, the developer will be required to develop and maintain a Quality Management System [QMS] – designed to ensure that best management practices are implemented in day-to-day management. Such a QMS must at least include the following information: [a] Location and extent of associated infrastructure; [b] Associated activities, such as the transportation of people and equipment; [c] Resources and experience required [staffing]; [d] Materials and equipment to be used; [e] Management actions; [f] Human resources used; [g] Construction-monitoring activities; [h] Emergency / disaster incident and reaction procedures; and [i] Rehabilitation procedures for the impacted environment.



These topics will be cross-linked into the contracts related to the development of the project.

Check: A system of assessing monitoring results has been developed to check the environmental management performance. Continuous assessment facilitates proactive management of the environmental issues. Mitigation measures can then be successfully implemented on an on-going basis to keep environmental indicators within their target thresholds. Moreover, the assessment system also enables the assessment of the efficacy of the EMPr. Regular auditing of environmental performance is prescribed to prove and preserve accountability.

Act: The assessments and monitoring of the results and findings of the regular audits must be documented within a reporting system. Precautionary mitigation measures and corrective actions will be prescribed and instructions will be given in order to implement these in the field. The findings of monitoring

and auditing programmes can also be used to update the EMPr. Although the EMPr is a project-specific document, it is dynamic and must be updated regularly to address the changing circumstances of the scheme.

5 Purpose of the EMPr

The primary objective of the EMPr is to bring into effect and action the measures of mitigation for the environmental impacts which emerge from the environmental assessment undertaken and provide an actionable and auditable tool which can be used to ensure the project is undertaken in an environmentally responsible manner.

Therefore, the EMPr includes the following:

- Roles and responsibilities of the various responsible parties involved with the various phases of the project;
- Standards, guidelines and legal requirements [including any possible environmental permits required and the processes to be followed in obtaining these permits];
- Environmental specifications for construction;
- Environmental specifications for operation;
- Environmental specifications for rehabilitation; and
- Environmental awareness plan.

The EMPr specifies the minimum requirements to be implemented by the Developer, as per the scope of works and scope of the environmental authorisation [EA], in order to minimise and manage the potential environmental impacts and ensure sound environmental management practices. The EMPr also provides the framework for environmental monitoring throughout the construction, operational and rehabilitation phases. The provisions of this EMPr are binding on the Developer during the life of the project. The EMPr must be binding on the Developer or any authority to which responsibility for all buildings and associated infrastructure has been delegated to.

It is noted that protection of the environment is enshrined in the Duty of Care requirement of the National Environmental Management Act [Act No. 107 of 1998] [as amended], which thus means that it is the duty of all land-owners and users to ensure that the activities they carry out on a site do not cause detriment to the environmental facets thereof. The EMPr thus functions as a tool which can be monitored and audited that will allow the Developer the ability to ensure that all that operate on the site do so in an environmental safe manner. It is also structured in such a way that the conditions may be linked to a standard construction contract. The EMPr is a **live document** which must be continuously updated, with the approval of the Competent Authority. It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all time. Each action within the EMPr is supported by the priority of when the specific action will need to be implemented

Core to the purpose of the EMPr is to implement the 'mitigation hierarchy' [DEA *et al.*, 2013], which is demonstrated in Figure 7 below:

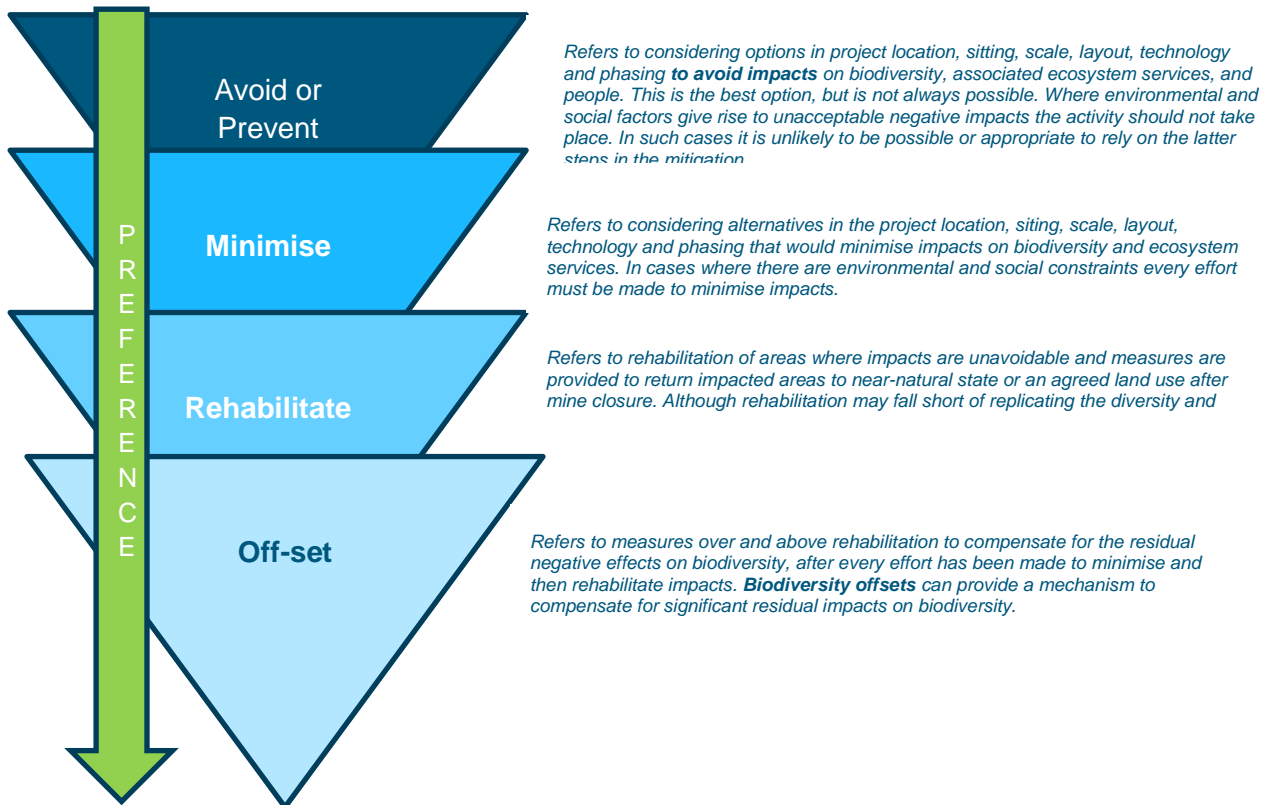


Figure 7: The mitigation hierarchy [DEA et al, 2013]

6 Details of the Developer

Table 2: Details of the Developer

Applicant name:	Tongaat Hulett Developments		
Responsible person name:	Greg Veerasamy		
Physical address:	305 Umhlanga Rocks Drive, La Lucia, 4051		
Postal address:	P. O. Box 22319 Glenashley		
Postal code:	4022	Cell:	-
Telephone:	[031] 560 1900	Fax:	086 678 7028
E-mail:	Greg.Veerasamy @tongaat.com		

7 Details of the Environmental Consultant Team:

The following provides details of the practitioners involved in the environmental assessment and must be made available on-site.

Table 3: Details of the Environmental Team

Name	Organisation	Responsibility	Telephone	Email
Novashni Sharleen Moodley	Royal HaskoningDHV	Environmental Assessment Practitioner	031 719 5500	Novashni.moodley@rhdhv.com
Bronwen Griffiths	Royal HaskoningDHV	Environmental Assessment	021 936 7714	Bronwen.griffiths@rhdhv.com

Name	Organisation	Responsibility	Telephone	Email
		Practitioner		
Expertise of EAP				
Novashni Sharleen Moodley	Novashni [Sharleen] Moodley is an Environmental Assessment Practitioner [EAP]. She holds a BSc in Environmental Science; a BSc [Honours] in Environmental Management [<i>cum laude</i>] and an MSc in Environmental Science. Novashni is a professionally registered scientist in the field of environmental science [Pr.Sci.Nat 4000305/15] with six years of experience in the field. Novashni has credible experience in environmental planning and consulting, as well as in project management and Geographical Information Systems [GIS]. She specialises in the suite of Integrated Environmental Management [IEM] tools, viz. Environmental Impact Assessments [EIA], Basic Assessments [BA], Strategic Environmental Assessment [SEA], Screening Assessments, Public Participation, and Environmental Compliance Officer [ECO] audits. Novashni has experience in a range of projects, with a range of clients, such as mixed use developments, water treatment, energy production, strategic [regional] planning and linear developments. She completed her vacation work at SAPREF and was thereafter based at the iLembe District Municipality as an Environmental Officer. Currently, Novashni functions as Senior Environmental Consultant within the Environmental Management and Compliance service line at Royal HaskoningDHV. She is scientifically, technically and socially competent and trained as an integrated thinker.			
Bronwen Griffiths	Bronwen has operated in a range of environmental sectors – since 2013 as Senior Environmental Consultant and Environmental representative for the region, Cape Town office. Previously, Bronwen was Chief Environmental Scientist at AECOM South Africa and for 12 years previously ran her own environmental consultancy, her main contract as a City of Johannesburg Environmental Manager. Her area of expertise is Environmental Impact Assessment (EIA) and related permitting, functioning as project manager and provision of environmental specialist knowledge. She deals with a range of environmental projects, including mixed land-use, industrial, petrochemical projects, waste-specific projects (e.g. Klinkerstene Regional landfill) – from feasibility and screening studies (e.g. Department of Water Affairs' uMkhomazi Water Transfer Project), EIA processes, to environmental management post-authorisation. Bronwen functions as environmental assessment practitioner, project manager, and, supervisor for the related project teams as required. Bronwen has been author / co-author of a number of environmental guideline documents for all three tiers of government			

8 Environmental Code of Conduct¹

One of the objectives of the EMPr is to ensure that all the workforce, contractors, sub-contractors and construction staff have an understanding of environmental issues and potential impacts on-site activities. This environmental code of conduct provides the basic rules that must be strictly adhered to.

It is the responsibility of the Site Environmental Officer, the Environmental Officer and ECO [as appointed] to ensure that each contractor, sub-contractor and workforce understand and adhere to the Code of Conduct.

All persons are obliged to keep to the rules of this code of conduct

Ignorance, negligence, recklessness or a general lack of commitment resulting in environmental degradation or pollution must not be tolerated!

¹ The Environmental Code of Conduct must be printed as a poster to be erected on-site, as a constant reminder of environmental ethics.

Environmental Rules

- Do not waste electricity, water or consumables;
- Only use authorised accesses;
- Do not litter;
- Dispose solid waste to the correct waste containers provided;
- Prevent pollution;
- Use the toilet facilities provided;
- Do not dispose contaminated waste water to the storm water or the environment;
- Immediately report any spillage from containers, plant or vehicles;
- Do not burn or bury any waste in the sand;
- Do not trespass onto private properties;
- Strictly leave all animals alone. Never tease, catch or set devices to trap or kill any animal;
- Never damage or remove any trees, shrubs or branches unless it forms part of working instructions;
- Do not deface, draw or cut lettering or any other markings on trees, rocks or buildings in the area;
- Know the fire fighting procedure and locations of fire fighting equipment; and
- Know the environmental incident procedures.

9 Legal Requirements

The following is a summary of the environmental legislation applicable to the proposed project.

Table 4: Legislative Requirements²

Legislation	Sections	Relates To
The Constitution [No 108 of 1996]	Chapter 2	Bill of Rights.
	Section 24	Environmental rights.
National Environmental Management Act [Act No. 107 of 1998 [as amended]]	Section 2	Defines the strategic environmental management goals and objectives of the government. Applies through-out the Republic to the actions of all organs of state that may significantly affect the environment.
	Section 24	Provides for the prohibition, restriction and control of activities which are likely to have a detrimental effect on the environment.
	Section 28	The developer has a general duty to care for the environment and to institute such measures as may be needed to demonstrate such care.
EIA Regulations [2010] and [2014]	GNR 544 / 983	Activities requiring a Basic Assessment study to be undertaken.
	GNR 545 / 984	Activities requiring a Scoping and Impact Assessment study to be undertaken.
	GNR 546 / 985	Activities in special geographical areas requiring a Basic Assessment study to be undertaken.
National Waste Act [Act No. 59 of 2008] and List of Waste Activities [November		Provides for specific waste management measures and the remediation of contaminated land.

² It is noted that the legal framework provided in this document relates to the most recent legislation at the time of compiling this document. It is noted that legislation changes continuously and it is the Developers responsibility to ensure that they are compliant with the most relevant legislation at any given time.

Legislation	Sections	Relates To
2013]		
Norms and Standards for the Storage of Waste, 2013	GNR 926: Sections 7–20	Provides specific guidelines for the operational procedures for a facility for the storage of waste.
National Heritage Resources Act [Act No. 25 of 1999] and regulations	Section 34	No person may alter or demolish any structure or part of a structure which is older than 60 years without a permit issued by the relevant provincial heritage resources authority.
	Section 35	No person may, without a permit issued by the responsible heritage resources authority destroy, damage, excavate, alter, deface or otherwise disturb any archaeological or paleontological site.
	Section 36	No person may, without a permit issued by the South African Heritage Resource Agency [SAHRA] or a provincial heritage resources authority destroy, damage, alter, exhume, remove from its original position or otherwise disturb any grave or burial ground older than 60 years which is situated outside a formal cemetery administered by a local authority. "Grave" is widely defined in the Act to include the contents, headstone or other marker of such a place, and any other structure on or associated with such place.
National Environmental Management: Air Quality Act [Act No. 39 of 2004]	Section 34	Control of noise
	Section 35	Control of offensive odours
National Dust Control Regulations [GNR 827 of November 2013]		Control of dust.
Occupational Health and Safety Act [Act No. 85 of 1993]	Section 8	General duties of employers to their employees
	Section 9	General duties of employers and self-employed persons to persons other than their employees
National Water Act [Act No. 36 of 1998] and regulations	Section 19	Prevention and remedying the effects of pollution
	Section 20	Control of emergency incidents
	Section 21	Water uses
Minerals and Petroleum Resources Development Act [Act No. 28 of 2002]	Section 22	Application for a mining permit/right.
	Section 39	Environmental management programme and environmental management plan.

Legislation	Sections	Relates To
Hazardous Substances Act [Act No. 15 of 1973] and regulations		Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances
National Environmental Management: Biodiversity Act [No. 10 of 2004]		Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.
	Section 53	Protection of threatened or protected ecosystems
	Section 65	Control of alien species
	Section 71	Control of invasive species
National Forests Act [Act No. 84 of 1998] and Regulations	Section 7	No person may cut, disturb, damage or destroy any indigenous, living tree in a natural forest, except in terms of a licence issued under section 7[4] or section 23; or an exemption from the provisions of this subsection published by the Minister in the Gazette.
	Sections 12–16	These sections deal with protected trees, with the Minister having the power to declare a particular tree, a group of trees, a particular woodland, or trees belonging to a certain species, to be a protected tree, group of trees, woodland or species. In terms of section 15, no person may cut, disturb, damage, destroy or remove any protected tree; or collect, remove, transport, export, purchase, sell, donate or in any other manner acquire or dispose of any protected tree, except under a licence granted by the Minister.
National Road Traffic Act [Act No. 93 of 1996]		Road safety
By-laws		Promulgated by-laws: <ul style="list-style-type: none"> ▪ Waste Management ▪ Property Rates by laws ▪ Legal Services ▪ Municipal Cemeteries ▪ Discharge of Industrial Effluent ▪ Electricity Supply
SANS 10103 [Noise Regulations]		The measurement and rating of environmental noise with respect to annoyance and to speech communication
KZN Nature Conservation Ordinance [Ordinance 15 of 1974]		Sensitive species are protected under this Ordinance and must be considered.

10 Management and Monitoring Procedures

The following diagram outlines the roles and responsibilities and lines of communication which must be followed within them.

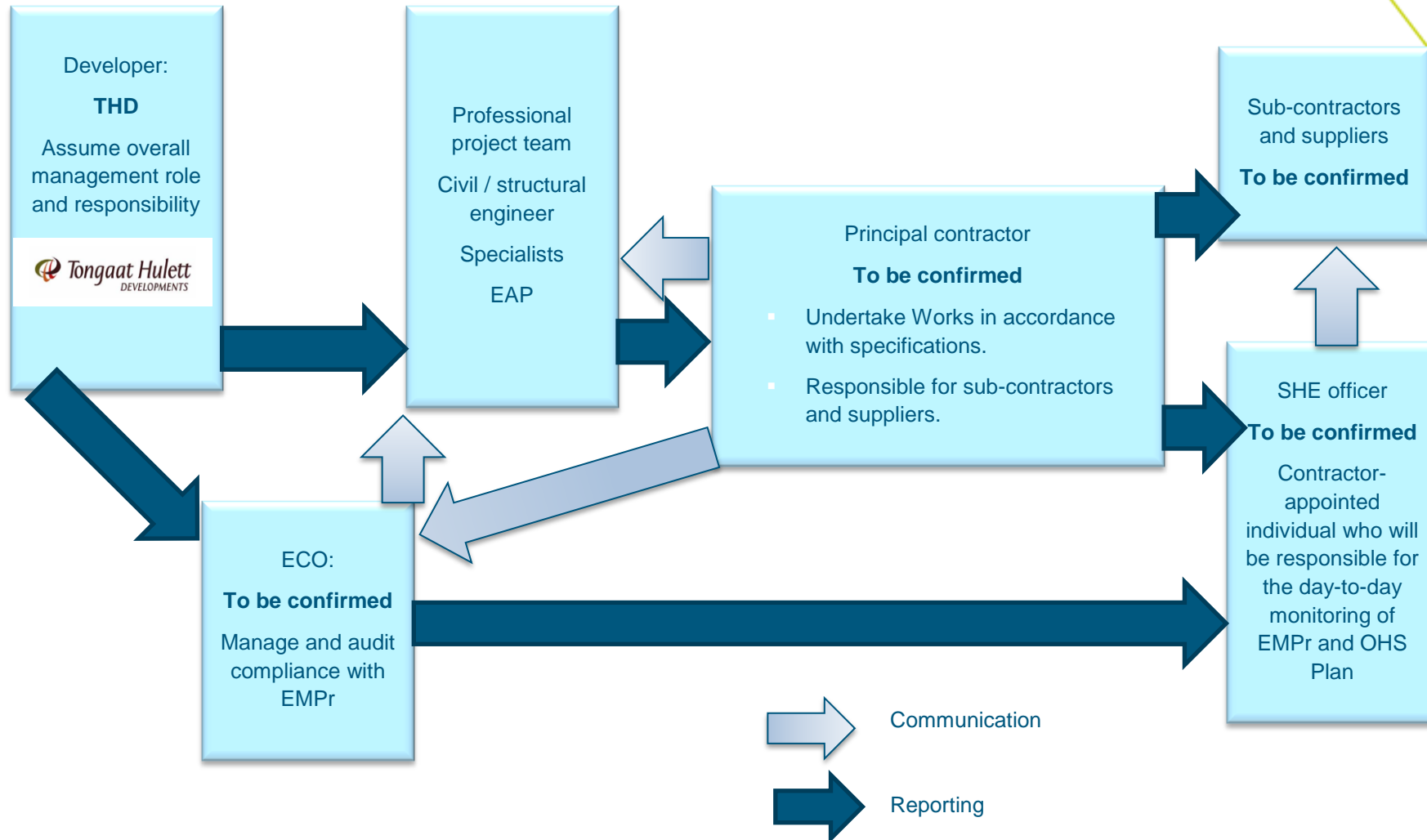


Figure 8: Team Organogram³

³ The organisational structure will need to be reviewed and finalised on inception, especially in terms of both reporting and responsibility of the parties involved.

The following outlines the defined and specific roles and responsibilities of each team member:

Table 5: Responsibilities per project team member

DEVELOPER / APPLICANT
<p>The Developer is ultimately responsible for ensuring compliance with the environmental specification and upholding THD's environmental commitment to 100% compliance with all National, Provincial and local legislation that relates to management of the environment.</p> <p><i>The Developer will:</i></p> <ul style="list-style-type: none"> ▪ Appoint a Project Manager [PM] to assume ultimate project responsibility; ▪ Be familiar with the contents of the EMPr; ▪ Ensure the EMPr is in the tender documentation issues to prospective contractors; ▪ Request for, review and approve the Method Statements prepared by the Contractor; ▪ Review and comment on environmental assessments and/ or reports produced by the Contractor and ECO; ▪ Undertake regular site visits and ensure environmental specifications are implemented; ▪ Discuss with the ECO the application of penalties for the infringement of the Environmental Specifications, another possible enforcement measures necessary; ▪ Issue penalties as and when necessary; ▪ Arrange information meetings for or consults with I&APs about the impending construction activities; ▪ May on the recommendation of the Engineer and / or Environmental Officer order the Contractor to suspend any or all works on-site if the Contractor or his Sub-Contractor / Supplier fails to comply with the said specifications; ▪ Maintain a register of complaints and queries by members of the public at the site office; and ▪ Ensure the EMPr is implemented as well as revised and updated as and when required.
ENGINEER
<p>The Engineer will:</p> <ul style="list-style-type: none"> ▪ Enforce the environmental specification on site; ▪ Be familiar with the contents of the EMPr; ▪ Ensure the EMPr is in the tender documentation issues to prospective contractors; ▪ Request for, review and approve the Method Statements prepared by the Contractor; ▪ Review and comment on environmental assessments and/ or reports produced by the Contractor and ECO; ▪ Undertake regular site visits and ensure environmental specifications are implemented; ▪ Monitor compliance with the requirements of the specification; ▪ Assess the Contractor's environmental performance in consultation with the Environmental Officer from which a brief monthly statement of environmental performance is drawn up for record purposes and to be reported to project meetings; and ▪ Ensure the documentation, in conjunction with the Contractor, the state of the site prior to construction activities commencing. This documentation will be in the form of photographs or video record.
CONTRACTOR [INCLUDING SUB-CONTRACTORS]
<p>The Contractor is required to:</p> <ul style="list-style-type: none"> ▪ Be fully conversant with the EMPr and all conditions of the EA, and any permits, licenses, etc.; ▪ Implement, manage and maintain the EMPr for the duration of the contract; ▪ Appoint a suitably qualified Environmental Officer [EO] whose responsibility includes ongoing monitoring and control of all construction activities concerning minimisation of environmental impact and adherence to the EMPr for the duration of the construction phase; ▪ Provide information on previous environmental management experience and company environmental policy in terms of the relevant forms contained in the Contract Document. ▪ Supply method statements timeously for all activities requiring special attention as specified and/or requested by

the Developer, Environmental Officer and/or Engineer during the duration of the Contract.

- Be conversant with the requirements of this environmental specification / EMPr. Brief all his / her staff about the requirements of the environmental specification;
- Comply with requirements of the EMPr and any subsequent revisions in terms of this specification and the project specification, as applicable, within the time period specified.
- Ensure any Sub-Contractors/Suppliers who are utilised within the context of the contract comply with the environmental requirements of the project, in terms of the specifications. The Contractor will be held responsible for non-compliance on their behalf;
- Provide appropriate resources - budgets, equipment, personnel and training - for the effective control and management of the environmental risks associated with the construction of the development;
- Bear the cost of any delays, with no extension of time granted, must he or his Sub-Contractors / Suppliers contravene the said specifications such that the Engineer orders a suspension of work. The suspension will be enforced until such time as the offending party[ies], procedure, or equipment is corrected;
- Bear the costs of any damages / compensation resulting from non-adherence to the said specifications or written site instructions;
- Review ECO reports and take cognisance of the information/ recommendations contained therein;
- Comply with all applicable legislation;
- Ensure that he informs the Engineer timeously of any foreseeable activities which will require input from the EO;
- Notify the ECO and PM, verbally and in writing at least 10 working days in advance of any activity he has reason to believe may have significant adverse environmental impacts, so that mitigatory measures may be implemented timeously;
- Ensure environmental awareness among his employees, sub-contractors and workforce so that they are fully aware of, and understand the Environmental Specifications and the need for them;
- Maintain a register of environmental training for site staff and sub-contractor's staff for the duration of the contract; and
- Communicate and liaise frequently and promptly with the ECO and the PM to ensure effective, proactive environmental management with the overall objective of preventing or reducing negative environmental impacts while enhancing positive environmental impacts.
- The Contractor will conduct all activities in a manner that minimises disturbance to the natural environment as well as directly affected residents and the public in general.
- The primary contractor assumes responsibility and accountability of all appointed sub-contractors and must ensure their compliance with this EMPr.

ENVIRONMENTAL CONTROL OFFICER

The ECO will:

- Be fully conversant with the EMPr;
- Be familiar with the recommendations and mitigation measures of the associated EMPr for the project;
- Monitor the implementation of the EMPr during the construction and rehabilitation phases;
- Ensure site protection measures are implemented on-site;
- Monitor that the Principal Contractor, sub-contractors, construction teams and the Developer are in compliance with the EMPr at all times during the construction and rehabilitation phases of the project;
- Monitor all site activities monthly for compliance;
- Conduct monthly audits of the site according to the EMPr, and report findings to the Developer/Contractor;
- Attend monthly site meetings;
- Recommend corrective action for any environmental non-compliance at the site;
- Compile a monthly report highlighting any non-compliance issues as well as progress and compliance with the

EMPr prescriptions. These monthly reports are to be submitted to the Developer and the EDTEA; and

- Conduct once-off training with the Contractor on the EMPr and general environmental awareness.
- It must be noted that the responsibility of the ECO is to monitor compliance and give advice on the implementation of the EMPr and not to enforce compliance. Ensuring compliance is the responsibility of the Developer and the SHE Officer.

SAFETY, HEALTH AND ENVIRONMENTAL [SHE] OFFICER

The Safety, Health and Environmental Officer will:

- Be fully conversant with the EMPr;
- Be fully conversant with all relevant environmental legislation applicable to the project, and ensure compliance with them;
- Compilation of Method Statements together with the Principal Contractor that will specify how potential environmental impacts in line with the requirements of the EMPr will be managed, and, where relevant environmental best practice and how they will practically ensure that the objectives of the EMPr are achieved;
- Convey the contents of this EMPr to the construction-site staff and discuss the contents in detail with the Contractor;
- Undertake regular and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr;
- Take appropriate action if the specifications contained in the EMPr are not followed;
- Monitor and verify that environmental impacts are kept to a minimum, as far as possible;
- Order the removal from the construction-site of any person[s] and/or equipment in contravention of the specifications of the EMPr;
- Report any non-compliance or remedial measures that need to be applied to the appropriate environmental authorities, in line with the requirements of the EMPr;
- Submitting a report at each site meeting which will document all incidents that have occurred during the period before the site meeting;
- Ensuring that the list of transgressions issued by the ECO is available on request; and
- Maintain an environmental register which keeps a record of all incidents which occur on the site during construction. These incidents include:
 - Public involvement / complaints.
 - Health and safety incidents.
 - Incidents involving hazardous materials stored on-site.
 - Non-compliance incidents.

11 Compliance with the Environmental Specification

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 operation required to complete the works. It is thus required that the Contractor must comply with the environmental specifications on an on-going basis.

The EMPr forms part of the Contract Documentation and is thus a legally binding document. It is also necessary for the Contractor to make provisions as part of their budgets for the implementation of the EMPr. In terms of NEMA, an individual responsible for environmental damage must pay costs both to the environment and human health and the preventative measures to reduce or prevent additional pollution and/or environmental damage from occurring. This is referred to as the Polluter Pays Principle. Section 28 of the NEMA specifically embodies the polluter pays principle. Therefore, any failure on the Contractor's

part to comply with the EMPr will entitle the Developer to certify the imposition of a penalty subject to the details set out.

The Contractor is deemed not to have complied with the Environmental Specification / EMPr if:

- There is evidence of contravention of clauses within the boundaries of the site, site extensions / access roads;
- Environmental damage ensues due to negligence;
- The Contractor ignores or fails to comply with corrective or other instructions issued by the Developer, ECO or Engineer within a specified time; and
- The Contractor fails to respond adequately to complaints from the public.

Failure to conform to the conditions set out in the following section [Section 12], the EMPr will result in the issuing of fines to the Contractor / Site Manager by the Site Engineer following notification by the ECO. These fines will be paid by the Contractor and will be used in the rehabilitation or landscaping of the site.

The final amount, however, will be quantified by the Site Manager and the appointed ECO prior to going on-site. The values below are thus deemed to be a useful point of departure from which site and task appropriate values can be quantified.

Note that the escalation factor in terms of repeat offences also needs to be determined [e.g. doubling to a maximum combined value for a set of activities], and the point at which on repeat offence the contractor / sub-contractor is required to move off site.

Table 6: Fine system to be implemented

Offence	Amount
Failure to demarcate working areas	R10,000
Working outside of demarcated areas	R30,000
Failure to strip topsoil with intact vegetation	R50,000
Failure to stockpile topsoil correctly	R30,000
Failure to stockpile materials in designated areas	R10,000
Failure to take measures to prevent soil contamination	R10,000
Failure to take measures to control dust dispersion on-site	R10,000
Washing of vehicles on-site	R10,000
Pollution of water bodies and/or groundwater	R20,000
Failure to implement stormwater management provisions during construction	R20,000
Failure to control stormwater run-off	R30,000
Downstream erosion	R30,000
Failure to provide adequate sanitation	R10,000
Failure to erect temporary fences around trenches	R10,000
Failure to provide adequate waste disposal facilities and services	R50,000
Failure to reinstate disturbed areas within the specified time-frame	R30,000
Any other contravention of the project specific specification	R10,000

12 The Canelands Extension EMPr

The EMPr specifies the minimum requirements to be implemented by the Developer as per the scope of works and scope of the environmental authorisation, in order to minimise and manage the potential environmental impacts and ensure sound environmental management practices. It also provides the framework for environmental monitoring throughout the construction phases.

The provisions of this EMPr are binding on the Developer during the life of the project. The EMPr must be binding to THD or any authority to which responsibility for the construction activities has been delegated

to, until such time that the EDTEA or applicable environmental authority has formally absolved the Developer from its responsibilities in terms of this EMPr.

It is essential that the EMPr requirements be carefully studied, understood, implemented, and adhered to at all time.

To simplify the EMPr requirements, each aspect related to the EMPr has been addressed in the table below. Each action within the EMPr is supported by the priority of when the specific action will need to be implemented.

The proceeding tables constitute the Canelands Extension EMPr, together the preceding sections, which are legally binding to the developer and associated appointed contractors / employees.

12.1 Pre-Construction Phase

Table 7: Pre-Construction Phase EMPr

Environmental Specification	Responsibility	Frequency
12.1.1 Authorisations, Permits and Licences		
All necessary authorisations [as specified but not limited to 12.1.4], permits and licences must be obtained by the Developer prior to the commencement of construction.	Developer	Once-off at inception and On-going
All activities must comply with the Environmental Authorisation, EMPr and all permits / licences.		
The activity which is authorised may only be carried out at the premises listed in the authorisation.		
Construction activities must comply with the Final Layout Drawings.		
12.1.2 Appointment of Contractor		
The Developer must ensure that this EMPr forms part of any contractual agreements with a Contractor[s] and sub-contractors for the execution of the proposed project. The Contractor must make adequate provision in their budgets for the implementation of the EMPr.	Developer	Once-off at inception
The Contractor must comply with THD's Industrial Development and Buildings Minimum Sustainability Guidelines [Appendix H] and THD's Standards Operating Procedures [Appendix I].		
The Principal Contractor [including sub-contractors and suppliers] must comply with the relevant provisions of the EMPr, applicable environmental legislation, by-laws and associated regulations promulgated in terms of these laws.		
Tender documents must include statements to include the use of local communities or local community organisation in supplying services and labour to the construction activities.		
12.1.3 Monitoring		
A monitoring programme must be in place not only to ensure compliance with the EMPr through the contract / work instruction specifications, but also to monitor any environmental issues and impacts which have not been accounted for in the EMPr that are, or could result in significant environmental impacts for which corrective action is required. A monitoring programme must be implemented for the duration of the construction phase of the project. This programme must include: <ul style="list-style-type: none"> ▪ Weekly audits will be conducted by the ECO for the duration of the construction phase. The ECO must undertake environmental monitoring on a weekly basis and the audits will consider compliance with the EMPr and licence conditions. ▪ External auditing may take place at unspecified times by the authorities and/or other relevant authorities. ▪ The ECO must undertake regular site inspections to ensure all legislative requirements are adhered to. ▪ The ECO must compile a monthly audit report with a quantitative rating of the compliance with the EMPr. ▪ The ECO must keep a photographic record of any damage to areas outside the demarcated site area. The date, time of damage, type of 	Developer	Once-off at inception and On-going



Environmental Specification	Responsibility	Frequency
<p>damage and reason for the damage must be recorded in full to ensure the responsible party is held liable.</p> <ul style="list-style-type: none"> ▪ The Contractor must be held liable for all unnecessary damage to the environment. <p>The monitoring by the ECO must be extensive and inclusive; this involves the monitoring of construction related impacts as identified. Regular monitoring of the construction activities is critical to ensure that any problems with are picked up in a timeous manner. In this regard, the following potential concerns must be taken into consideration:</p> <ul style="list-style-type: none"> ▪ Destruction of habitat outside the construction servitude including 'No-Go' areas; ▪ Erosion of the bed and banks of water resources; ▪ Signs of intense or excessive erosion [gullies, rills, scouring and headcuts] and/or sedimentation within, along the edge and/or immediately downstream of the construction zone; ▪ Erosion of disturbed soils and soil stockpiles by surface wash processes; ▪ Sedimentation of aquatic habitats downstream of work areas; ▪ Altering the hydrology and through flows to downstream habitat during construction across rivers/streams/wetlands; ▪ Pollution of water resources [with a particular focus on water turbidity and hazardous substances such as fuels, oils and cement products]; ▪ Poorly maintained and damaged erosion control measures e.g. sand bags, silt fences and silt curtains; and ▪ Evidence of unsafe working conditions [e.g. evidence of flow overtopping the bund wall/running tracks]. 		
12.1.4 Reporting Procedures		
<p>The following documentation must be kept on-site in order to record compliance with the EMPr:</p> <p>An Environmental File must be maintained by the Contractor which includes:</p> <ul style="list-style-type: none"> ▪ Environmental Authorisation once issued by the EDTEA; ▪ A copy of the Water Use Licence; ▪ The Final BAR; ▪ Copy of the approved EMPr; ▪ Copy of all other licences/permits; ▪ Copy of all rehabilitation plans; ▪ Copy of the Stormwater Management Plan; ▪ Copy of relevant legislation [refer to section 9]; ▪ Environmental Policy of the Main Contractor; ▪ Environmental Policy of the THD; ▪ Environmental Method statements compiled by the Contractor; ▪ Non-conformance Reports; <p>Environmental register, which must include:</p> <ul style="list-style-type: none"> ▪ Communications Register – including records of Complaints, and, minutes and attendance registers of all environmental meetings. ▪ Monitoring Results – including environmental monitoring reports, register of audits, non-conformance reports. ▪ Incident book – including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record. 	Developer	Once-off at inception and On-going



Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> ▪ Waste Documentation such as, but not necessarily limited to: Waste Manifest Documents, Safe Disposal Certificates [SDCs], and Sewerage Disposal Receipts; ▪ Material Safety Data Sheets [MSDSs] for all hazardous substances; ▪ Dust suppression register; ▪ Any required MHI registration certificates; ▪ Written Corrective Action Instructions; and ▪ Notification of Emergencies and Incidents. 		
<p>The Developer, together with the Contractor, must put in place an Environmental Register.</p> <p>The contractor must ensure that the following information is recorded for all complaints / incidents:</p> <ul style="list-style-type: none"> ▪ Nature of complaint / incident. ▪ Causes of complaint / incident. ▪ Party / parties responsible for causing complaint / incident. ▪ Immediate actions undertaken to stop / reduce / contain the causes of the complaint / incident. ▪ Additional corrective or remedial action taken and/or to be taken to address and to prevent reoccurrence of the complaint / incident. ▪ Timeframes and the parties responsible for the implementation of the corrective or remedial actions. ▪ Procedures to be undertaken and/or penalties to be applied if corrective or remedial actions are not implemented. ▪ Copies of all correspondence received regarding complaints / incidents. ▪ The above records will form an integral part of the Contractors' Records. ▪ These records will be kept with the EMPr on-site, and must be made available for scrutiny if so requested by the Developer and Competent Authority [CA]. 	Developer & Contractor	Once-off at inception and On-going
<p>A Non-Conformance Report [NCR] will be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This will be issued by the ECO to the Contractor in writing. Preceding the issuing of an NCR, the Contractor must be given an opportunity to rectify the issue.</p> <p>Must the ECO assess an incident or issue and find it to be significant [e.g. non-repairable damage to the environment], it will be reported to the relevant authorities and immediately escalated to the level of a NCR.</p> <p>The following information must be recorded in the NCR:</p> <ul style="list-style-type: none"> ▪ Details of non-conformance; ▪ Any plant or equipment involved; ▪ Any chemicals or hazardous substances involved; ▪ Work procedures not followed; ▪ Any other physical aspects. ▪ Nature of the risk. ▪ Actions agreed to by all parties following consultation to adequately address the non-conformance in terms of specific control measures and must take the hierarchy of controls into account. ▪ Agreed timeframe by which the actions documented in the NCR must be carried out. ▪ The ECO must verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO 	Contractor	Once-off at inception and On-going



Environmental Specification	Responsibility	Frequency
<p>and Contractor must sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.</p> <p>The Contractor's environmental emergency procedures must ensure appropriate responses to unexpected/ accidental actions / incidents that could cause environmental impacts.</p> <p>Such incidents may include:</p> <ul style="list-style-type: none"> ▪ Accidental discharges to water [i.e. into the watercourse] and land; ▪ Accidental spillage of hazardous substances [typically oil, petrol, and diesel]; ▪ Accidental toxic emissions into the air; and ▪ Specific environmental and ecosystem effects from accidental releases or incidents. <p>The Environmental Emergency Response Plan is separate to the Health and Safety Plan as it is aimed at responding specifically to environmental incidents and must ensure and include the following:</p> <ul style="list-style-type: none"> ▪ Construction employees must be adequately trained in terms of incidents and emergency situations; ▪ Details of the organisation [i.e. manpower] and responsibilities, accountability and liability of personnel; ▪ A list of key personnel and contact numbers; ▪ Details of emergency services [e.g. the fire department / on-site fire detail, spill clean-up services] must be listed; ▪ Internal and external communication plans, including prescribed reporting procedures; ▪ Actions to be taken in the event of different types of emergencies; ▪ Incident recording, progress reporting and remediation measures to be implemented; and ▪ Information on hazardous materials, including the potential impact associated with each, and measures to be taken in the event of accidental release. <p>The Contractor and their sub-contractor[s] must comply with the environmental emergency preparedness and incident and accident-reporting requirements as per the relevant legal requirements.</p>	Contractor	Once-off at inception and On-going
12.1.5 Preparation of Method Statements		
<p>It is a statutory requirement to ensure the well-being of employees and the environment. To allow the mitigation measures in this document to be implemented, task-specific method statements must be developed for each set of tasks.</p> <p>A Method Statement details how and when a process will be carried out, detailing possible dangers / risks, and the methods of control required and must typically cover:</p> <ul style="list-style-type: none"> ▪ Type of construction activity; ▪ Timing and location of the activity; ▪ Construction procedures; ▪ Materials and equipment to be used; ▪ Transportation of the equipment to/ from site; ▪ How equipment / material will be moved while on-site; ▪ Location and extent of construction-site office and storage areas; ▪ Identification of impacts that might result from the construction activity; ▪ Methodology and/ or specifications for impact prevention / containment; 	Contractor	Once-off at inception



Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> ▪ Methodology for environmental monitoring; ▪ Emergency / disaster incident and reaction procedures [required to be demonstrated]; and ▪ Rehabilitation procedures and continued maintenance of the impacted environment. <p>The Contractor will be accountable for all actions taken in non-compliance of the approved Method Statements. The Contractor must keep all the Method Statements and subsequent revisions on file, copies of which must be distributed to all relevant personnel for implementation. As a minimum the following Method Statements will be required to be generated:</p> <ul style="list-style-type: none"> ▪ Bunding; ▪ Construction-site and office/ yard establishment; ▪ Cement mixing/ concrete batching/ bentonite mixing; ▪ Contaminated water; ▪ Dust; ▪ Environmental awareness course[s]; ▪ Environmental monitoring; ▪ Erosion control; ▪ Fire, hazardous and/ or poisonous substances; ▪ Fuels and fuel spills [may form part of the item above]; ▪ Storage, handling and decanting of diesel [may form part of the item above]; ▪ Personnel, public and animal safety; ▪ Rehabilitation of modified environment[s]; ▪ Solid and liquid waste management [including Hazardous waste management]; ▪ Sources of materials [including MSDSs]; ▪ Top-soil management; ▪ Stormwater Management; and ▪ Wash areas. 		
<p>The ECO will monitor the implementation of the Statements. All copies of the statements and plans must be submitted to the appointed ECO. The ECO reserves the right to request a method statement which is not specified in this EMPr.</p>		
12.1.6 Appointment of ECO		
<p>THD must appoint an independent ECO to perform the function as set out in section 10, Table 5 of this EMPr.</p>	Developer	Once-off at inception
<p>The nomination of the ECO must be given, in writing, to the EDTEA at least fourteen (14) days before the start of any work.</p>		
<p>The ECO must undertake monthly site inspections and provide monthly audit reports for the duration of the construction and rehabilitation phases. Each audit report must contain the results of the full audit. These audit results report on whether the response to the audit item is favourable, un-favourable or not applicable. Not applicable answers are for those aspects of the construction that have not yet started or are not applicable to the contract being</p>	ECO	monthly



Environmental Specification	Responsibility	Frequency
<p>considered.</p> <p>Graphs must be produced for each stage of the EMPr; general requirements, requirements during construction and post construction activities. Each of the aspects within each stage is allocated a percentage score. The percentage score is the percentage of favourable items against the total number of <u>applicable</u> items. The higher the score, the better the compliance. Complete compliance will result in a 100% score.</p>		
<p>The content of the EMPr must be updated in accordance with the findings of the ECO during site visits, keeping this EMPr up to date and relevant.</p>		
12.1.7 Notice of Construction		
<p>A written notice must be given to the EDTEA prior to the commencement of construction. The notice must include site preparation activities as well as a date on which it is anticipated that the activity will commence.</p>	Developer & ECO	Once-off at inception
12.1.8 Public Communication		
<p>The Developer must ensure that the adjacent landowners are informed and updated throughout the construction phases. Sufficient signage must be erected around the site [including at the entrance], informing the public of the construction activities taking place. The signboards must include the following information:</p> <ul style="list-style-type: none"> ▪ The name of the Contractor. ▪ The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration. 	Contractor & ECO	Once-off at inception
12.1.9 Environmental Training and Awareness		
<p>Construction staff must be adequately educated by the ECO, and the Contractor's EO and/or SHE Officer, as to the provisions included in the EMPr and general environmentally friendly practice.</p>		
<p>The EA and EMPr forms part of the formal site induction for all contractors, sub-contractors and casual labourers, preferably in their native language. The induction training will, as a minimum, include the following:</p> <ul style="list-style-type: none"> ▪ What is meant by the environment; ▪ The importance of conformance with all environmental policies; ▪ The environmental impacts, actual or potential, of their work activities; ▪ The environmental benefits of improved personal performance; ▪ Their roles and responsibilities in achieving conformance with the environmental policy and procedures and with the requirement of the Consultant's environmental management systems, including emergency preparedness and response requirements; and ▪ The mitigation measures required to be implemented when carrying out their work activities. 	ECO & SHE Officer	Once-off at inception
<p>All contractors, sub-contractors and casual labourers must acknowledge their understanding of the EMPr and environmental responsibilities by signing an induction attendance record.</p>		
<p>The Contractor is expected to have "tool box" talks. These talks must be in accordance with the risks and trends associated with the project. All records of environmental induction and training [including toolbox talks] must be kept on-site within the Site Environmental File.</p>	SHE Officer	Weekly



Environmental Specification	Responsibility	Frequency
12.1.10 Site Set-Up		
The ECO, Engineer and the Contractor must visit the site prior to the establishment of any site camps and lay down areas. These areas must be determined and agreed to.	Contractor & ECO & Engineer	Once-off at inception
Prior to the establishment of the site area, the Contractor must produce a site layout plan showing the positions of all equipment storage, waste stockpiling, fuel storage areas and other infrastructure for approval of the ECO and Developer. Choice of location for construction item storage must take into account location of local residents and environmentally sensitive areas [no-go areas] where applicable.	Contractor	Once-off at inception
The construction area must be clearly demarcated on the layout plan, and all other areas must be considered no-go areas for the construction personnel. All sensitive areas such as the wetlands and all indigenous vegetation must be protected by appropriate temporary fencing and 'no-go' signage during construction, and vehicular access into these sensitive areas must be restricted.		
No-go areas must be agreed to in consultation between the ECO, EO, and, Developer prior to construction.		
Adequate signage must be placed in the area where construction will take place informing the public of the activities taking place.		
The site camp must be secured.		
The Contractor must take responsibility for the site to conform to all contractual aspects and environmental standards applicable.		
On-site accommodation [if required] and the construction camp must be comprised of: <ul style="list-style-type: none"> ▪ site office; ▪ residential accommodation which meets the basic needs of site workers and is compliant with the relevant standards; ▪ ablution facilities; ▪ designated first aid area; ▪ eating areas; ▪ staff lockers; ▪ storage areas; ▪ batching plant [if required]; ▪ refuelling areas [if required]; ▪ maintenance areas [if required]; and ▪ Crushers [if required]. 		
Vegetation removed for any additional construction camp establishment must be kept to a minimum. No trees are to be removed with the exception of alien weeds and invader plants identified and approved by the EO and ECO.		
No persons, other than a night-watchman / security guard, may stay overnight at the construction camp.		
The size of the construction camp must be minimised.		
Adequate yet not extensive parking must be provided for site staff and visitors at the Construction camp with the intention to disturb as little grassland as possible.		
The Contractor must provide adequate refuse bins that must be cleaned / emptied and the waste removed from site on a regular basis.		
The construction areas must be kept in an orderly state at all times.		
Vegetation removed for the site establishment is to be kept to a minimum.		



Environmental Specification	Responsibility	Frequency
Unauthorised entry, stockpiling, dumping or storage of equipment, material or waste must be strictly prohibited in identified no-go areas		
The Contractor must ensure that drainage on-site is such to prevent standing water and/or sheet erosion from taking place or that it is not altered even temporarily which adversely impacts on drainage.		
Unauthorised access onto/into private properties is strictly prohibited.		
12.1.11 Ablution / Sanitation		
Where waterborne sewerage is not available, temporary chemical toilets must be provided by a company that has been approved by the Developer. Such toilets must be available for all site staff, both at the construction camp, and on-site as agreed by the Developer. The ratio of toilets to labour must not exceed 1:10..	Contractor	Daily
The EO and ECO must be consulted on the location of any temporary chemical toilets.		
Temporary toilets must be located outside of the 1:100 year floodline and at a suitable buffer away from the Rivers, wetlands and any other tributaries.		
In cases where facilities are linked to existing sewage structures, all necessary regulatory requirements concerning construction and maintenance must be adhered to.		
12.1.12 Access		
Access to the site is permitted only <i>via</i> the Vincent Dickenson Road via road D499. Any new access roads must be approved by the ECO and/or the CA prior to establishment.	Contractor & Engineer & Developer	On-going
It is recommended that a layby facility be included on Vincent Dickenson Road just downstream of the D499 intersection for both directions of travel. This will ensure safety of all road users.		
Road user safety must be improved on the D499 and the following improvements are recommended:		
1. Improve road signage in the area, including road markings indicating priority and maximum speed limit.		
2. Include laybys for public transport close to intersection D499 and P100.		
3. Improve lighting at intersection D499 and P100.		
4. Include a 1.5 m pedestrian sidewalk on at least one side of the D499		
Illegal signage at the Vincent Dickenson Road and D499 must be removed, allowing road users clear view of statutory road signage.		
D499 from P100 to the industrial development will have to be structurally upgraded to carry industrial traffic.		
The temporary access routes must avoid all water resources not being crossed by the authorised alignment. In addition, the access routes must not be located within 32 m of unaffected watercourses [i.e. Wetland and river habitat not being crossed by the authorised alignment must be considered 'No Go' areas.].		
The temporary access roads must not be aligned perpendicular to the slopes for long stretches to avoid the road acting as a preferential flow path for run-off		
Stormwater run-off and erosion control measures must be installed as part of the temporary access road and must include the establishment of many small mustow chute type drains and/or berms / cut-off drains at regular intervals along slopes that direct surface run-off from the road into adjacent grassland to avoid rill erosion and gully formation. Many small interventions must be favoured over few large ones, and		



Environmental Specification	Responsibility	Frequency
these outlets must be armoured against erosion using dump rock / riprap		
Wherever possible, the temporary chutes/berms must not be aligned perpendicular to the slope.		
A safe sight distance must be maintained at all times by cutting of grass or other vegetation on either side of the access.		
Access routes must be agreed upon prior to construction commencing and must be approved by the ECO appointed.		
The Contractor is only permitted to make use of the existing road entrances to the site as well as those agreed to with by the relevant authorities prior to construction commencing.		
The location of all underground services and servitudes must be identified and confirmed.		
The construction-site must have strict access control to reduce the risks associated with vehicular transportation and pedestrian access on the site.		
Watercourses and steep gradients must be avoided as much as possible.		
No vehicles may drive onto the retained wetland or other sensitive sites and "no-go" areas.		
All no-go areas will be indicated as such with warning signs in all relevant languages.		
12.1.13 Equipment, Vehicles and Storage Areas		
Washing of vehicles on-site is prohibited.	Contractor	On-going
Note that vehicle maintenance is not permitted on-site. If emergency repairs are required to vehicles or construction plant then the conditions as specified below must be implemented.		
Fire prevention facilities must be present at all storage facilities.		
Material Safety Data Sheets [MSDSs] must be readily available on-site for all chemicals and hazardous substances to be used on-site. Where possible and available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or escapes.		
An oil balance must be implemented to demonstrate appropriate management of hydrocarbons.		
Plant and equipment must be adequately maintained to prevent spillage of oil, diesel, fuel or hydraulic fluid. The Contractor must repair or withdrawn equipment or machinery from use if they consider these to be polluting and irreparable.		
Suitably covered receptacles must be available at all times and conveniently placed for the disposal of waste oils and greases. All used oils, grease or hydraulic fluids must be placed therein and these receptacles must be removed from the construction camps on a regular basis for recycling.		
A procedure for the management of oils spills must be introduced. This must address the cleaning of spillage from hard surfaces, utilising environmentally friendly cleaning materials [biodegradable] as well as the removal and disposal of polluted sand.		
Fuel must be stored in tanks with lids, which will be kept firmly shut and under lock and key at all times, within a secondary containment facility.		
Fuel decanting and refuelling must take place within the construction camp. 50 kg of hydrocarbon absorbent to be placed at the construction camp.		



Environmental Specification	Responsibility	Frequency
12.1.14 Waste Disposal Facilities		
<p>General waste produced on-site includes:</p> <ul style="list-style-type: none"> ▪ Office waste [e.g. food, waste, paper, plastic]; ▪ Operational waste [clean steel, wood, glass]; and ▪ General domestic waste [food, cardboards, paper, bottles, tins]. <p>An adequate number of general waste receptacles, including bins must be arranged around the Construction area, on-site to collect all domestic refuse, and to minimise littering.</p>	Contractor	Daily
<p>Different waste bins, for different waste streams must be provided to ensure correct waste separation and subsequent recycling, where applicable.</p>		
<p>Bins must be clearly marked and lined for efficient control and safe disposal of waste.</p>		
<p>All waste generated must be disposed of in a suitable manner which does not cause surface water pollution or a health hazard</p>		
<p>All solid waste prior to being collected for safe disposal must be stored under cover in a designated storage / collection area.</p>		
<p>No secondary pollution is permitted to arise from the disposal of waste or refuse. The contractor must be clearly briefed on methods of disposal of waste and compliance must be monitored.</p>		
<p>A fenced area must be allocated for waste sorting and disposal on the site.</p>		
12.1.15 Security and Safety		
<p>A security guard must be appointed to guard the site at all times.</p>	Contractor	Ongoing / Daily
<p>Potentially hazardous areas such as trenches are to be demarcated and clearly marked.</p>		
<p>The additional traffic generated by the development will not influence the safety of the roads. The current safety conditions in the area are poor.</p>		
<p>To ensure safety of all road users, the following safety precautions must be included:</p>		
<ul style="list-style-type: none"> ▪ Addition of road signage at intersections, yield and stop signs, maximum speed and 		
<ul style="list-style-type: none"> ▪ improved road markings 		
<ul style="list-style-type: none"> ▪ Street lighting along the above sidewalk and at the Vincent Dickenson intersection. 		
<p>Lighting on-site is to be set out to provide maximum security and to enable easier policing of the site, without creating a visual nuisance to local residents or businesses.</p>		
<p>Material stockpiles or stacks, such as pipes, must be stable and well secured to avoid collapse and possible injury to site workers/ local residents.</p>		
<p>Flammable materials must be stored as far as possible from adjacent residents / businesses.</p>		
<p>Fire fighting equipment must be present on-site at all times.</p>		
<p>Obstruction to driver's line of sight due to stockpiles and stacked materials must be avoided, especially at intersections and sharp corners.</p>		
<p>No materials are to be stored in unstable or high-risk areas, such as on steep slopes.</p>		



Environmental Specification	Responsibility	Frequency
12.1.16 General and Hazardous Substances and Materials		
Storage areas must not be within any watercourses or within 100 m of any drainage lines.	Contractor & SHE Officer	Daily
Storage areas must be designated, demarcated and fenced. Storage areas must be secure, under lock and key, so as to minimise the risk of crime.		
Fire prevention facilities must be present at all storage facilities.		
Proper storage facilities for the storage of oils, paints, grease, fuels, chemicals and any hazardous materials to be used must be provided to prevent the migration of spillage into the ground and groundwater regime around the storage area[s]. These pollution prevention measures for storage must include a bund wall high enough to contain at least 110% of any stored volume. Such a facility must be on an impervious surface. The storage area must be securely fenced and all hazardous substances such as fuel, oils, chemicals, etc., must be stored therein. Drip trays, a thin concrete slab or a facility with PVC lining, must be installed in such storage areas with a view to prevent soil and water pollution.		
All fuel storage tanks and associated facilities must be designed and installed in accordance with the relevant oil industry standards, SANS codes and other relevant requirements.		
Symbolic safety signs depicting “No Smoking”, “No Naked Flames” and “Danger” are to be prominently displayed in and around the fuel storage area.		
The capacity of the tank must be clearly displayed and the product contained within the tank clearly identified.		
Only empty and externally clean tanks may be stored on the bare ground. All empty and externally dirty tanks must be sealed and stored in an area where the ground has been protected.		
If fuel is dispensed from 200 litre drums, the proper dispensing equipment must be used.		
The drum must not be tipped in order to dispense fuel. The dispensing mechanism of the fuel storage tank must be stored in a waterproof container when not in use.		
The storage of materials, chemicals, fuels etc. must not pose a risk to the surrounding environment. Suck storage areas must be located outside of the 1:100 year floodline of watercourses and unauthorised access to these areas must be controlled. Temporary bunds must be constructed around these storage areas to contain any spills.		
All spillages must be reported to the Department of Water and Sanitation and the Department of Environmental Affairs. In the event of a spillage, the following steps must occur: <ol style="list-style-type: none"> 1. Stop the source of the spill; 2. Contain the spill; 3. Report the spill to the authorities; 4. Remove the spilled product for treatment / proper disposal; 5. Remedial actions must be taken in consultation with the ECO and authorities; and 6. Document the incident. 		
All waste fuel and chemical contaminated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site.		

Project related



Environmental Specification	Responsibility	Frequency
Storage sites will be provided with bunds to contain any spilled liquids and materials. These storage facilities [including any tanks] must be on an impermeable surface that is protected from the ingress of stormwater from surrounding areas in order to ensure that accidental spillage does not pollute local soil or water resources.		
Material Safety Data Sheets [MSDSs] must be readily available on-site for all chemicals and hazardous substances to be used on-site. Where possible the available, MSDSs must additionally include information on ecological impacts and measures to minimise negative environmental impacts during accidental releases or spillages.		
Staff dealing with these materials / substances must be aware of their potential impacts and follow the appropriate safety measures.		
A suitable Waste Disposal Contractor must be employed to remove waste oil. These wastes must only be disposed of at licensed landfill sites designed to handle hazardous waste. Appropriate SDCs must be provided for all hazardous waste being disposed of and must be kept on-site within the Site Environmental File.		
The Contractor must ensure that his staff are made aware of the health risks associated with any hazardous substances used and has been provided with the appropriate protective clothing / equipment in case of spillages or accidents and have received the necessary training.		
Cement / concrete must not be mixed directly on the ground. Dagma boards, mixing trays and impermeable sumps must be used at all mixing and supply points. Unused cement bags are to be stored so as not to be effected by rain or run-off events.		
The washing of concrete trucks on-site is prohibited.		
Used cement bags must be stored in weatherproof containers to prevent windblown cement dust and water contamination. Used cement bags must be disposed of on a regular basis via the solid waste management system, and must not be used for any other purpose.		
The washing of concrete trucks on-site is prohibited.	Contractor & SHE Officer	Daily
Used cement bags must be stored in weatherproof containers to prevent windblown cement dust and water contamination. Used cement bags must be disposed of on a regular basis via the solid waste management system, and must not be used for any other purpose.		
All visible remains of excess concrete must be physically removed on completion of the plaster or concrete pour section and disposed of. Washing the remains into the ground is not acceptable as groundwater contamination could occur.		
No paint products may be disposed of on-site.		
Storage areas must not be within any watercourses or within 100 m of any drainage lines.		
The Contractor must maintain a record of the sourcing of all materials [including topsoil, sands, natural gravels, crushed stone, asphalt, clay liners, etc.] used during construction.		
The Mineral and Petroleum Resources Act must be complied with.		
12.1.17 MHI		
All employees must be trained in all aspects including emergency procedures as well as in first aid and some in fire fighting. An emergency plan must be developed and include a Crisis Management should the tanks and filling process be damaged severely.	Contractor	Once-off at inception & On-going
The client must liaise with Sasol and thereafter may implement mitigation measures such as enclosure of the pipeline, covering the pipeline with soil greater than 1.22 m will provide a reduction factor of between 0.2 to 0.7. The developer must ensure that all windows/glazing facing the pipeline will be provided with shatterproof / safety glass.	Developer & End-user per Erf	Once off



Environmental Specification	Responsibility	Frequency
The developer must ensure that all ventilation systems [air conditioners] will be located away from the pipeline.		Once-off at inception & On-going
The developer and user must ensure that escape routes from within the building will be away from the pipeline.		
The developer must ensure access control. To reduce this risk management must ensure that site access is controlled / maintained and that employees are trained understand potential consequences.		
The Developer must ensure the following: <ul style="list-style-type: none"> ▪ Liaise with Sasol Gas prior to any development. Determine the type of development and its suitability. ▪ Maintain existing measures [no building or work in pipeline servitude]. ▪ Ensure that fire prevention controls are implemented on this site and that these meet the Local Fire Bylaws. ▪ Provide a Control Centre for emergencies. ▪ Educate all employees, contractors and tenants of health risks of exposure to Methane gas, the emergency plan and their role, should an emergency occur. ▪ Develop an Emergency and Crisis Management plan for the facility. Once developed, this must be tested, practised regularly [at least once per year]. 		
Developers and their tenants must implement an Emergency Plan, where applicable. The purpose of this Emergency plan should be: <ul style="list-style-type: none"> ▪ Preventing accidental chemical releases which could be toxic, explosive or flammable. ▪ Reducing risk to community. ▪ Minimising the consequences of releases on the environment. ▪ Enable management to respond to an emergency efficiently and effectively and to reduce a risk. 		
12.1.18 Engineering Design		
Ensure best practicable solutions of design which is best suited to the study area and receiving environment which will then result in the provision of infrastructure for the use of people in the surrounding communities.	Developer & Engineer	Once-off
Ensure correct, peer and supervisor reviewed designs are developed.		
Any alteration natural flow regimes and habitat condition for sensitive / migratory aquatic biota is undesirable and significant in this context.		
All relevant plans for the area must be considered and adequate consultation with the relevant planning officials in the area.		
Ensure correct, peer and supervisor reviewed, designs are developed.		

12.2 Construction Phase

Table 8: Construction Phase EMP

Environmental Specification	Responsibility	Frequency
12.2.1 Health and Safety		
All Procedures and equipment must be in accordance with the Occupational Health and Safety Regulations [OHSA] of South Africa, Act No.	Contractor	Daily



Environmental Specification	Responsibility	Frequency
<p>85 of 1993. The Contractor must familiarise himself and his employees with the contents of the aforementioned legislation.</p> <p>Well stocked and correctly stocked First Aid Boxes must be on hand at all times.</p> <p>The Contractor must implement adequate and mandatory safety precautions relating to all aspects of the deconstruction. Such safety measures and work procedures / instructions must be communicated to construction workers.</p> <p>The wearing of Personal Protective Equipment [PPE] on-site is mandatory for all personnel and construction team members. Minimum requirements must include the wearing of an approved safety helmet, safety boots, safety eyewear, safety reflective jackets and dust masks, ear plugs, etc. where appropriate.</p> <p>PPE signs must be erected on-site at the areas where it is required and the integrity and availability of the signs must be maintained.</p> <p>No person is to be allowed on-site unless they are wearing approved safety equipment.</p> <p>Casual visitors must be required to sign a register at the security checkpoint and undergo a site induction by the SHE Officer. The responsible person must then be contacted before the visitor is allowed access to site. No unauthorised visitors are to be allowed on-site.</p> <p>Workers' right to refuse work in unsafe conditions must be respected.</p> <p>All personnel must be trained in basic site safety procedures.</p> <p>The Contractor must design, test / exercise appropriate emergency preparedness programmes [plans, schedules, procedures and methods] for addressing environmental accidents, incidents and events such as spills of fuel, oil or lubricants; fires, etc.</p> <p>The Developer and/or Developer's agent will carry out regular audits on the principal contractor at least once per month. Similarly, principal Contractors must be responsible for carrying out regular audits on their contractors at least once per month.</p> <p>The results of both audit types must be tabled for action and discussed at the Health and Safety Committee meetings or the site meetings, as appropriate.</p>	SHE Officer	
12.2.2 Geotechnical Aspects and Earthworks		
<p>Shoring of any excavation deeper than 1.20 m is advised and must be implemented at the discretion of the Engineer.</p> <p>Where the alluvial terraces are present along the southern embankment of the north easterly valley sidewalls are likely to be unstable and might have to be shored at depth less than 1.20 m.</p> <p>Building platforms should ideally be created entirely in cut.</p> <p>All permanent cut slopes into sandy materials should be restricted to a maximum of 1:2 [26E]. The maximum height of any cut slope should not exceed 3.00 m without being assessed by an Engineering Geologist.</p> <p>All permanent cut slope batters into clayey materials should be trimmed back to a maximum batter of 1:1.75 [30°]. Temporary cut banks during construction may be laid back to a slope batter of 1:1.5 [33°].</p> <p>All cut embankments must be protected against surface erosion by the planting of vegetation immediately after construction.</p> <p>In the hard to medium weathered bedrock, cut slopes may be steepened to 1:1 [45E] or steeper at the discretion of the Engineer.</p> <p>Should it not be possible to accommodate the above slope angles, the slopes will need to be supported by retaining structures. In addition, it may be necessary to shore excavations or cut faces during construction.</p> <p>Where fill platforms have to be created the following generalized recommendations apply:</p> <ul style="list-style-type: none"> ▪ Fill platforms should not be placed onto any unstable materials such as colluvium materials or alluvial terraces. ▪ Prior to the placement of any fill the in-situ subsoil materials containing vegetation should be removed. 	Contractor & Engineer	At event



Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> ▪ The fills should be constructed in layers not exceeding a maximum of 300mm loose thickness and be compacted to 93% of the materials maximum Mod AASHTO Density for clayey materials and 95% of the materials maximum Mod AASHTO Density for sandy materials prior to the placement of the next layer. ▪ The maximum particle size within the fill should be restricted to two thirds of the layers loose thickness. ▪ Permanent fill batters should be no steeper than 1:1,75 [30E] and should not exceed a maximum vertical height of about 3 m. ▪ For generally well-constructed engineered fills, internal settlements within the fill of up to 1% of the fill thickness should be anticipated. As such, settlements across the cut/fill line or from natural ground to maximum fill, depending on the thickness of fill, may vary across the platform. 		
<p>Seepage may occur along the contact between the capping colluvial sandy materials and the in-situ residual clays or weathered bedrock formations during periods of high rainfall. Control of seepage by the installation of subsoil drains may be necessary locally depending on the nature of the development.</p>		
<p>Due to the site being situated in-between two areas apparently classified as wetland, all effluent waters should ideally be collected and piped towards the nearest treatment system. Alternatively, systems such as conservancy tanks or package plant may be considered. Systems such as french drain systems are not considered ideal due to the amount of unsealed area required for evapotranspiration and environmental restrictions implemented by the nearby eco-sensitive wetlands.</p>		
12.2.3 Fires		
<p>No open fires or uncontrolled fires will be permitted on-site.</p>	Contractor	Daily
<p>Fire fighting measures such as fire extinguishers must be located on-site.</p>		
<p>The workforce must be made aware of fire prevention and fire fighting measures.</p>		
12.2.4 Worker Conduct on-site		
<p>A general regard for the social and ecological wellbeing of the site and adjacent areas is expected of the site staff. Workers need to be made aware of the following general rules:</p> <ul style="list-style-type: none"> ▪ No alcohol / drugs to be present on the site. ▪ No firearms allowed on-site or in vehicles transporting staff to and from site, unless used by security personnel. ▪ Prevent excessive noise. ▪ Prevent unsocial behaviour. ▪ Bringing pets onto the site is forbidden. ▪ No harvesting of firewood from the site or from the areas adjacent to it. ▪ Construction staff are to make use of the facilities provided for them, as opposed to adhoc alternatives [e.g. fires for cooking, the use of surrounding bush for toilet facilities]. ▪ Trespassing on private properties adjoining the site. ▪ Driving under the influence of alcohol is prohibited. 	Contractor & SHE Officer	Daily



Environmental Specification	Responsibility	Frequency
12.2.5 Clearing and Protection of Fauna and Flora		
<p>No natural vegetation is to be collected for use as firewood.</p>		
<p>Stripping of vegetation to allow commencement of construction of the earthworks platform shall only be undertaken immediately prior to that element of construction commencing. Construction of the embankment shall be done in segments up to full height, before moving on to the next area, clearing vegetation, and constructing embankment, etc.</p>		
<p>The construction of the stormwater piped system is to be programmed for construction immediately on completion of the bulk earthworks.</p>		
<p>Mature, indigenous trees occurring within the development footprint should be incorporated, as far as possible, into the landscaping plan. Indigenous trees should be clearly marked to avoid accidental removal/damage.</p>		
<p>Active planting of indigenous vegetation should consider the following:</p> <ul style="list-style-type: none"> ▪ Revegetation should commence as soon as possible to create vegetative cover on bare/exposed soils. ▪ Landscaping of the development area should include strategic planting of indigenous plants that are representative of the area. ▪ Open spaces should be re-vegetated using an indigenous grass-seed mix, with preference for important grasses of the KwaZulu-Natal Coastal Belt. Appropriate indigenous herbs may be inter-planted into the grassland to speed up the process of natural recruitment and succession. ▪ Suitable riparian trees and shrubs should be planted along the watercourse draining through the site. Planting efforts should ensure that a multi-layered, undisturbed vegetative community established within the riparian areas over time. A detailed list of appropriate species is provided in the rehabilitation plan. <p>The objective of the active planting and revegetation should be to improve biodiversity and ecosystem service delivery, buffer the aquatic ecosystems from impacts associated with the development and surrounding land use activities, and to limit establishment of alien/ruderal vegetation. To achieve this, it will be important that these areas are managed and maintained indefinitely, particularly in terms of control of invasive alien plants.</p>	Contractor	Daily
<p>Develop and implement a comprehensive alien weed control programme to remove problematic plant species and prevent further spread and establishment. Invasive alien plants should be removed from the wetland/riparian areas and planned open spaces prior to rehabilitation and revegetation taking place. Allowance should be made for routine follow-ups until the time that there is either no presence or a negligible presence of these plants. Alien plant control work needs to be carried out by competent contractors.</p>		
<p>No animals are to be disturbed unnecessarily and no animals are allowed to be shot, trapped or caught for any reason. Any wildlife that is injured or killed on the site by accidental means i.e. hit by a vehicle, are to be reported to the Developer, who must take appropriate action to facilitate the recovery of the animal where possible i.e. take the animal to the SPCA or the nearest local veterinary surgery.</p>		
<p>Indigenous vegetation and topsoil cleared for the construction servitude/working area must be rescued and stored at the designated vegetation and soil stockpile area outside of the wetland/aquatic zone for use later in rehabilitation. In this regard, vegetation will need to be cleared in-situ [with sods / topsoil].</p>		
<p>Any temporary access routes must avoid all water resources not authorised for crossing by the EA and WUL. In addition, the access routes must not be located within 32 m of unaffected watercourses [i.e. Wetland and river habitat not authorised as part of the construction work servitude must be considered 'No Go' areas.]. The temporary access roads must not be aligned perpendicular to the slopes for long</p>		



Environmental Specification	Responsibility	Frequency
stretches to avoid the road acting as a preferential flow path for run-off.		
All alien invasives found must be immediately removed and disposed of responsibly in accordance with the requirements of the ECO. No artificial plants are permitted to be brought to site.		
Cleared areas must be planted with the present, indigenous grass sods as soon as is possible. All alien invasive vegetation that has colonised the construction-site must be removed, preferably by uprooting. The contractor must consult the ECO regarding the method of removal.		
All bare surfaces across the construction-site must be checked for alien invasive plants at the end of every month and alien plants removed by hand pulling/uprooting and adequately disposed.		
Herbicides must be utilised where hand pulling / uprooting is not possible. ONLY herbicides which have been certified safe for use in wetlands by independent testing authority to be used. The ECO must be consulted in this regard.		
All staff involved in work within the freshwater habitats must receive specific inductions related to the detailed methods statements. All managers, contractors, labourers and personnel involved during the project are to be familiarised with the method statement. It is vital that all personnel are adequately trained to perform their designated tasks to the accepted standards. The ECO must monitor the compliance of the Contractors and instruct the Contractors where necessary. The ECO may request that the Project Manager suspend part or all the works if the Contractors repeatedly cause damage to the environment. The suspension must be enforced until such time as the offending actions, procedure or equipment is corrected and the environmental damage repaired.		
A permit must be obtained from the Department of Agriculture, Forestry and Fisheries [DAFF], for any trees / plants [if any] that fall within the development footprint that is protected as per the National Forestry Act [Act No. 84 of 1998] and need to be removed or relocated. It must be ensured that for every tree removed; at least five [5] replacement trees must be planted in suitable localities.		
Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas.		
Where alien plants have been introduced on to the site during clearing and infilling, they must be removed. The Contractor must develop an Action Plan for the removal of alien invasive species and submit it to the ECO for approval.		
Invader species and weeds must be removed and disposed of in accordance with existing legislation on a regular basis.		
The removal of indigenous/endemic shrubs and small trees must be kept to a minimum and only be removed if absolutely necessary and where authorisation has been received where applicable.		
12.2.6 Heritage		
If an artefact on-site is uncovered, work in the immediate vicinity must be stopped immediately.	Contractor	Daily
The contractor must take reasonable precautions to prevent any person from removing or damaging any such article and must immediately, upon discovery thereof, inform the Construction Engineer of such discovery which in turn must contact a registered archaeologist and AMAFA.		
No structures older than sixty years or parts thereof are allowed to be demolished altered or extended without a permit from Amafa and no activities are allowed within 50 m of a site, which contains rock art.		
Work may only resume once clearance is given in writing by the archaeologist and/or AMAFA.		



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12.2.7 Traffic and Safety		
Temporary loading and off-loading areas and holding of construction vehicles must be designed prior to construction activities to ensure that the most preferable access and haulage routes has been identified.	Contractor	Daily
Implement proper road signs to warn motorists of construction activities ahead.		
Ensure that there are flag men and signs in place at access points to the construction-site.		
Road signs for all lane closures to be done in accordance to the South African Road Traffic Signs Manual [SARTSM, 1999].		
Construction routes must be clearly defined.		
Disruption to the peak traffic periods 06h00–9h00 and 15h00–18h00 to be minimised or if possible avoided.		
All contractors must ensure that their employees and in particular, construction vehicle drivers / operators comply with the safe access and egress plans that are to be put in place during the construction process.		
Appropriate warning and reduced speed signage must be erected where necessary.		
12.2.8 Pedestrian Protection		
Pedestrians to be protected from construction activities at all times.	Contractor	Daily
Pedestrian conflict with site access and construction vehicles to be managed by traffic officer.		
The construction-site camp must remain fenced for the entire construction period.		
12.2.9 Construction Vehicles		
Access of all construction and material delivery vehicles must be strictly controlled.	Contractor	Daily
Holding of all construction vehicles is to be controlled to ensure that through traffic is not unnecessarily impeded.		
Vehicles and equipment must be serviced regularly to avoid the contamination of the area from oil and hydraulic fluid leaks, etc.		
Servicing of vehicles must be done off-site.		
All speed limits must be adhered to.		
Machinery or equipment used on-site must not constitute a pollution hazard in respect of the above substances.		
The Constructor must order such equipment to be repaired or withdrawn from use if they consider the equipment or machinery to be polluting and irreparable.		
Suitably covered receptacles must be available at all times and conveniently placed for the disposal of waste.		
All used oils, grease or hydraulic fluids must be placed therein and these receptacles will be removed from the site on a regular basis for disposal at a registered or licensed disposal facility.		
12.2.10 Road Maintenance		
Contractors must ensure that any damage to the pedestrian walkway or holding areas are maintained in good condition by attending to any damages [e.g. road signs or stormwater damage, etc.] as soon as these develop.	Contractor	Daily
If necessary, staff must be employed to clean surfaced roads adjacent to construction-sites where materials have spilt.		



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All temporary road signs to be removed and pavement reinstated at completion of works.		
All covered road signs to be reinstated.		
12.2.11 Topsoil		
The Contractor must strip and stockpile all topsoil within the work area for subsequent use at a later stage.	Contractor & Engineer	Daily
The removal of any topsoil from site is prohibited and this must be stockpiled and used solely in the rehabilitation of the works area.		
Any soil or topsoil stockpiles created during the construction phase are to be maintained as flat as possible, shall not exceed 3m in height. Materials from stockpiles are to be used as soon as is practically possible or spread and spoiled in designated areas.		
To minimize the time that an area is exposed, the stripping of vegetation is to be carried out progressively and immediately prior to commencement of construction activities in a particular area. Topsoiling and re-vegetation of exposed surfaces is to commence immediately after the completion of all construction activity. All embankments or cut slopes, unless otherwise directed by the Engineer, shall be protected by a cut off drain to prevent water from cascading down the face of the slope.		
Stockpiles must be located outside of the 32 m wetland and river buffers. Stockpiles must be protected from wind and rain with the use of tarpaulins where necessary. The Engineer is to use his discretion as to the mechanism to be used to ensure this protection.		
Topsoil must be kept separate from overburden and must not be used for infilling.		
Noxious weeds must be eradicated from topsoil stockpiles.		
The Contractor must exercise suitable precautions with the storage, handling and transport of all materials that could adversely affect the environment. If pollution of any surface or groundwater occurs, it must immediately be reported to the EDTEA and appropriate mitigation measures must be employed.		
The topsoil and spoil material must be used to create stormwater attenuation berms and contour the topography accordingly, were required, rather than be spoiled.		
12.2.12 Spoil		
Litter and general waste is to be removed from the topsoil and spoil material before stockpiling.	Contractor	Daily
Spoil sites will be shaped to fit the natural topography.		
Erosion/sediment control measures such as silt fences, low soil berms or wooden shutter boards must be placed around the stockpiles to limit sediment run-off from stockpiles.		
Subsoil and topsoil is to be stockpiled separately. Stockpiled soil must be replaced in the reverse order as to which it was removed [subsoil first followed by topsoil].		
Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils.		
All undeveloped surfaces hardened due to construction activities are to be ripped, top-soiled and vegetated as soon as possible.		
The stockpiles may only be placed within demarcated stockpile areas, which must fall within the demarcated construction area. The contractor must, where possible, avoid stockpiling materials in vegetated areas that will not be cleared.		



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Stockpiled soils are to be kept free of weeds and are not to be compacted. The stockpiled soil must be kept moist using some form of spray irrigation on a regular basis as appropriate and according to weather conditions.		
The slope and height of stockpiles must be limited to 2 m to avoid collapse.		
Spoil sites must receive a minimum of 75 mm topsoil and be grassed with a recommended seed mixture by a qualified horticulturist.		
Slopes must not exceed a vertical: horizontal ratio of 1:3.		
The topsoil and spoil material must be used to create stormwater attenuation berms and contour the topography accordingly, where required, rather than be spoiled.		
12.2.13 Soil Erosion and Sedimentation		
Stockpiles of soil must be limited in height to between 2 m and 4 m, and must either be dampened on a regular basis or vegetated depending on the length of time the stockpile will exist.	Contractor	Daily
Stormwater run-off and erosion control measures must be installed as part of the temporary access road and must include the establishment of many small mustow chute type drains and/or berms / cut-off drains at regular intervals along slopes that direct surface run-off from the road into adjacent grassland to avoid rill erosion and gully formation.		
Many small interventions must be favoured over few large ones, and these outlets must be armoured against erosion using dump rock/riprap. Wherever possible, the temporary chutes/berms must not be aligned perpendicular to the slope.		
The access roads must be one-way and adequate turning areas outside of the sensitive areas will need to be identified and demarcated in conjunction with the ECO.		
The natural flow of rivers or streams must not be permanently diverted or blocked.		
Maintain adequate through flows to downstream aquatic ecosystems to protect aquatic life, and prevent the interruption of existing downstream uses.		
Areas prone to erosion must have measures to prevent excessive soil erosion. These measures include the use of sand bags, hessian sheets, retention or replacement vegetation.		
Stockpiling of soil or other materials used during construction must not be allowed on or near steep slopes, near a watercourse or a water body. The Applicant must control and establish suitable mitigation measures to prevent the erosion of stockpiles.		
Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities must be put on hold. In this regard, the contractor must be aware of weather forecasts.		
Construction activities must be scheduled to minimise the duration of exposure to bare soils on-site, especially on steep slopes.		
Run-off generated from cleared and disturbed areas / slopes that drains into rivers, streams or wetlands must be controlled using erosion control and sediment trapping measures like silt fences, sandbags, earthen berms and synthetic logs, particularly where slopes are exposed. These control measures must be established at regular intervals perpendicular to the slope to break surface flow energy and reduce erosion as well as trap sediment. The frequency of these interventions needs to increase with increasing slope gradients.		
Sediment barriers [e.g. silt fences, sandbags, hay bales, earthen filter berms, retaining walls and check dams] must be established to protect water resources from erosion and sedimentation impacts from upslope.		
Sediment barriers must be regularly maintained and cleared so as to ensure effective drainage.		
The berms, sandbags and/or silt fences must be maintained and monitored for the duration of the construction phase and repaired		



Environmental Specification	Responsibility	Frequency
<p>immediately when damaged. The berms, sandbags and silt fences must only be removed once vegetation cover has successfully re-colonised the disturbed areas post-rehabilitation.</p>		
<p>During construction, the contractor must check the site for erosion damage after every rainfall event, and rehabilitate this damage immediately.</p>		
<p>Demarcations and No-go Areas must be done conspicuously. The outer edge of the construction servitude / working area must be clearly demarcated by the Contractor together with the ECO for the entire construction phase using plastic orange bonnox fencing. Once the temporary access route has been agreed to by the ECO, the outer edge of the access route must be staked out by the contractor using brightly coloured stakes prior to the access route being used by machinery. All demarcation work must be signed off by the ECO before any work commences</p>		
<p>Topsoil and grassland which are removed from the preferred option must be used to rehabilitate the gravel track and erosion donga.</p>		
<p>Any contractors found working inside the 'no-go' areas [areas outside the working servitude] must be fined as per fining schedule/system setup for the project.</p>		
<p>Off-site mitigation must be conducted to fill erosion donga which has developed along the gravel track. Eroded areas would first have to be filled with soil before grassland sods are transplanted. Removed topsoil and grassland sods must also be used to rehabilitate sections along the chosen alignment where construction activities have extended beyond the four metre wide construction width of the proposed gravel road resulting in damage to or destruction of the grassland. With this recommended on-site and off-site rehabilitation, top-soils, sub-soils and grassland sods would have to be conserved and protected in a nursery area where the grassland sods would have to be watered to keep the plants alive.</p>		
<p><i>Eragrostis curvula</i> which is one of the grasses that is present in the study area, is one of the best grasses to stabilise exposed soil as it establishes easily.</p>		
<p>Erosion / sediment control measures such as silt fences, low soil berms or wooden shutter boards must be placed around the stockpiles to limit sediment run-off from stockpiles.</p>		
<p>Subsoil and topsoil is to be stockpiled separately. Stockpiled soil must be replaced in the reverse order as to which it was removed [subsoil first followed by topsoil]</p>		
<p>The slope and height of stockpiles must be limited to 2 m to avoid collapse. If rehabilitation is undertaken effectively and is signed off after successful indigenous vegetation re-establishment, the risks of these impacts must be minimised</p>		
<p>Indigenous vegetation and topsoil cleared for the construction servitude/working area must be rescued and stored at the designated vegetation and soil stockpile area outside of the wetland/aquatic zone for use later in rehabilitation. In this regard, vegetation will need to be cleared in-situ [with sods/topsoil].</p>		
<p>The contractor must, where possible, avoid stockpiling materials in vegetated areas that will not be cleared. Stockpiled soils are to be kept free of weeds and are not to be compacted. The stockpiled soil must be kept moist using some form of spray irrigation on a regular basis as appropriate and according to weather conditions.</p>		
<p>Stockpiles of construction materials must be clearly separated from soil stockpiles in order to limit any contamination of soils.</p>		



Environmental Specification	Responsibility	Frequency
<p>The stockpiles may only be placed within demarcated stockpile areas, which must fall within the demarcated construction area</p> <p>Soil erosion on-site must be prevented at all times, i.e. pre, during and post construction activities. Suitable erosion control measures must be implemented in areas sensitive to erosion such as near water supply points and edges of slopes. These measures must include:</p> <ul style="list-style-type: none"> ▪ Phased construction activities must take place to ensure the removal of vegetation, only as it becomes necessary for work to proceed. This enables erosion and sedimentation to be minimised and centralised in relatively small areas easier to control and to stabilize. Topsoil storage must be as brief as possible and storage must occur in a bunded area away from watercourses as described above. ▪ Vegetative Cover – vegetation reinforces soil and holds it in place thereby reducing erosion. Temporary or permanent vegetation must be planted on all bare soil immediately after any ground disturbance. The prompt rehabilitation of exposed soil areas with indigenous vegetation will ensure that soil is protected from the elements. The unnecessary removal of vegetation especially on steep areas must be prevented. Taking necessary precautions in terms of design and construction and earthworks, cuts and fills must be taken. Soil stockpiles must be vegetated or covered to reduce soil loss as a result of wind or water to prevent erosion and sedimentation. Disturbed areas must be rehabilitated as soon as possible. ▪ Seeding, anchored mulch, wool binders or erosion control fabrics must be used to provide surface protection and stabilisation until vegetation is established. ▪ The use of sand bags or Hessian sheets must be used to stabilise bare soil. ▪ The use of geo-textiles, turf blankets or mats must be used as slope protection for exposed slopes. ▪ Proper drainage controls such as culverts and cut-off trenches must be used to ensure proper management of surface water run-off to prevent erosion and sedimentation. ▪ Construction vehicles must remain on designated demarcated areas. ▪ Work areas must be clearly defined and demarcated to avoid unnecessary disturbance of areas outside the maintenance area. <p>Constant cognisance of the inherent high erosion risk potential of all soils and sites on the property must be taken and appropriate control and preventative measure put in place.</p>		
12.2.14 General Waste Management		
<p>General waste produced on-site is to be collected in skips for disposal at a registered landfill site.</p>	Contractor & SHE Officer	Daily
<p>Hazardous waste is not to be mixed or combined with general waste earmarked for disposal at the municipal landfill site.</p>		
<p>Under no circumstances is waste to be burnt or buried on-site.</p>		
<p>The excavation and use of rubbish pits on-site is forbidden.</p>		
<p>Waste bins must be cleaned out on a regular basis to prevent any windblown waste and/or visual disturbance.</p>		
<p>All general waste must be removed from the construction areas on a daily basis and disposed of in suitable waste receptacles.</p>		
<p>No general waste is to be disposed of on-site.</p>		
<p>Any form of waste material and rubble generated during construction must be removed from the site and disposed of at a facility registered in terms of section 20[b] of the NEM:WA [Act No. 59 of 2008], if it cannot be responsibly reused or recycled on-site.</p>		
<p>No waste material may be buried [for the sole purpose of final disposal] or burnt.</p>		
<p>The contractor responsible for the removal of the rubble and waste must supply the applicant with a certificate indicating safe disposal.</p>		



Environmental Specification	Responsibility	Frequency
12.2.15 Hazardous and Industrial Waste Management		
<p>Hazardous waste produced on-site includes:</p> <ul style="list-style-type: none"> ▪ Oil and other lubricants, diesel, paints, solvent; ▪ Containers that contained chemicals, oils or greases; and ▪ Equipment, steel, other material [rags], soils, gravel and water contaminated by hazardous substances [oil, fuel, grease, chemicals or bitumen]. <p>Hazardous waste is to be disposed of at a Licensed Hazardous Waste Landfill Site. The ECO must approve a licensed waste disposal site at the inception of the project.</p>	Contractor	Daily
<p>Hazardous waste bins must be clearly marked, stored in a contained area [or have a drip tray] and covered [either stored under a roof or the top of the container must be covered with a lid].</p>		
<p>SDCs must be obtained from the waste removal company as evidence of correct disposal and kept on-site within the Site Environmental File.</p>		
<p>It may be feasible for the waste to be transported to a central point where it can be collected in bulk by the waste disposal company. It must however be noted that:</p> <ul style="list-style-type: none"> ▪ Transport of hazardous materials must be done in accordance with legislative control; and ▪ Relevant SABS Codes of Practice must be adhered to. 		
12.2.16 Wastewater		
<p>All wastewater generated at the proposed development must be disposed of in a suitable manner so as not to cause any surface or subsurface water pollution or health hazard. Wastewater, including cement-contaminated water, must not enter any watercourse and must be managed by the site manager to ensure that the existing water resources on and off site are not polluted by activities emanating from the above development.</p>	Contractor	Daily
<p>The use of mobile of chemical toilet facilities must not cause any pollution to watercourses and resources or pose a health hazard. Toilets must be outside of the 1:100 year floodline. A maintenance plan for the servicing of these toilets must be developed and strictly adhered to.</p>		
<p>All wastewater generated at the site must be disposed of in suitable manner which does not cause surface or sub-surface pollution or health hazards. Any pollution arising from the proposed project must be addressed immediately by the Applicant [or the Applicant's representative]</p>		
<p>Contaminated wastewater including cement-contaminated water must not enter any watercourse and must be managed by the Contractor to ensure that the existing water resources on and off site are not polluted by activities emanating from the above development.</p>		
<p>Used oil and wastewater must be disposed at a registered facility. A SDC is to be obtained by the Contractor and kept on-site within the Site Environmental File.</p>		
<p>Water containing waste must not under any condition be discharged into the natural environment. Measures to contain water containing waste and safe disposal of such must be implemented.</p>		



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12.2.17 Water Pollution Management [including groundwater and soil contamination]		
<p>The flow direction of any surface water run-off must be established prior to disturbing any area.</p> <p>The stockpiling of soil or any other material must not be allowed near a watercourse or water body in order to prevent pollution or impede surface run-off.</p> <p>Construction methods must comply with the stormwater management plan appended as Appendix D to this EMP.</p> <p>Every effort must be made to ensure that any chemicals or hazardous substances do not contaminate the soil or ground water on-site.</p> <p>Dirty water originating from maintenance activities is to be contained and disposed of correctly, to prevent the contamination of soil and/ or any watercourses.</p> <p>Bathing or washing of clothes, equipment or machinery within any watercourse is prohibited.</p> <p>Erosion and loss of soil must be prevented by minimising construction areas exposed to surface water run-off.</p> <p>Bare areas are to be rehabilitated as soon as the areas become available or after use.</p> <p>All water consumption on-site must be recorded on a daily basis.</p> <p>The abstraction of water from any water resource for construction purposes and/or dust suppression must not be permitted without a water use authorisation from the Department of Water and Sanitation [DWS].</p>	Contractor	Daily
12.2.18 Watercourse and Wetland Management		
<p>A 30 m buffer at the very least from the edge of the permanent zone must be maintained for the wetland on the north east. Under no circumstances may this wetland be encroached on or disturbed.</p> <p>No clearing or infilling of the wetland is permitted.</p> <p>Water for construction purposes can only be sourced from the location licenced as per the WUL and the daily amount of water abstracted must be recorded in a register by the Contractor and kept in the Site Environmental File</p> <p>Under no circumstances may any of the construction workers or staff access the wetland. All staff must be informed of this requirement.</p> <p>No stockpiling of construction materials or spoil material or any construction activities whatsoever are allowed to take place within this fenced off area.</p> <p>It is not permitted under any circumstances that stormwater from the site be allowed to drain toward the wetland.</p> <p>It is vitally important that any stormwater discharging in the direction of the wetland is dissipated and diverted to avoid gully erosion or any negative impact on the hydrological functioning of the wetland.</p> <p>The temporary access roads must be strictly one-way and be a maximum width of 3 m.</p> <p>No vehicle turning areas must be located within 32 m of any watercourse.</p> <p>No equipment laydown or storage areas must be located within 50 m of any watercourse and/or within the 1:100 year floodline.</p> <p>No soil stockpile areas must be located within 32 m of any watercourse.</p> <p>In-stream sediment control measures such as the following must instated:</p> <ul style="list-style-type: none"> ▪ Before any work commences in the river channel, sediment control/silt capture measures [e.g. bidim / silt curtains] must be installed downstream of the working areas within the river. Quantities of silt fences / curtains must be decided on-site with the engineer, 	Contractor	Daily



Environmental Specification	Responsibility	Frequency
<p>contractor and ECO.</p> <ul style="list-style-type: none"> ▪ During works within the channel, the downstream silt fences / curtains must be regularly checked and maintained [de-silted to ensure continued capacity to trap silt], and repaired where necessary. ▪ A copy of the method statement will need to be made available at the construction-site offices / site camp at all times. Run-off generated from cleared and disturbed areas / slopes that drains into rivers, streams or wetlands must be controlled using erosion control and sediment trapping measures like silt fences, sandbags, earthen berms and synthetic logs, particularly where slopes are exposed. ▪ These control measures must be established at regular intervals perpendicular to the slope to break surface flow energy and reduce erosion as well as trap sediment. ▪ Sediment barriers [e.g. silt fences, sandbags, hay bales, earthen filter berms, retaining walls and check dams] must be established to protect water resources from erosion and sedimentation impacts from upslope. ▪ Sediment barriers must be regularly maintained and cleared so as to ensure effective drainage. ▪ The berms, sandbags and/or silt fences must be maintained and monitored for the duration of the construction phase and repaired immediately when damaged. ▪ The berms, sandbags and silt fences must only be removed once vegetation cover has successfully re-colonised the disturbed areas post-rehabilitation. 		
<p>No batching or chemical / fuel storage areas to be located within 50 m of the area of residual hydromorphic soils or the stream and associated riparian corridor.</p>		
<p>Adequate measures must be put in place to protect the water resources, including the wetland which flow in close proximity to the site. Visible markings showing the buffers demarcated must be provided during the construction phase.</p>		
<p>Eating areas must not be located within 15 m of the wetland / riparian habitats. Provide adequate rubbish bins and waste disposal facilities on-site outside of the 32 m buffer area, and educate / encourage workers not to litter or dispose of solid waste in the natural environment but to use available facilities for waste disposal. Clear and completely remove from site all general waste, constructional plant, equipment, surplus rock and other foreign materials once construction has been completed. Recycling / re-use of waste is to be encouraged.</p>		
<p>The use of protective measures such gabions and revetments to protect the riverine habitats.</p>		
<p>It is recommended that construction take place in the winter / dry months to reduce erosion and sedimentation risks associated with high summer rainfall in this region. Stormwater and erosion control measures must be implemented during the construction phase to ensure that erosion and sedimentation impacts to the river including in-stream habitats are minimised and avoided. In this regard, the following measures must be implemented:</p> <ul style="list-style-type: none"> ▪ The natural flow of rivers or streams must not be permanently diverted or blocked. ▪ Maintain adequate through flows to downstream aquatic ecosystems to protect aquatic life, and prevent the interruption of existing downstream uses. ▪ Clearing activities must only be undertaken during agreed working times and permitted weather conditions. If heavy rains are expected, clearing activities must be put on hold. In this regard, the contractor must be aware of weather forecasts. ▪ Construction activities must be scheduled to minimise the duration of exposure to bare soils on-site, especially on steep slopes. 		



Environmental Specification	Responsibility	Frequency
12.2.19 Spills, Incidents and Pollution Control		
Any spill incident, which may occur, must be investigated and immediate action must be taken. This must also be reported to the ECO and SHE Officer.	Contractor SHE Officer	Daily
In the case of a spill of hydrocarbons, chemicals or bituminous material in the construction camp or on the construction-site / bunding area, the spill must be contained and cleaned up and the material together with any contaminated soil collected and disposed of as hazardous waste to minimize pollution risk and reduce bunding capacity.		
An Emergency Response Plan [ERP] must be developed by the Contractor for approval by the Developer and review by the ECO.		
Should a pollution incident occur on-site, the Contractor must: <ul style="list-style-type: none"> ▪ Implement reasonable measures immediately to contain and minimise the impacts of the incident; ▪ Contain the spill; ▪ Notify all persons whose health may be affected by the incident; ▪ Undertake clean up procedures immediately; ▪ Notify the Contractor of the incident immediately who will advise the employee as to the measures that must be implemented; ▪ Record the incident in the Environmental Incident Register; and ▪ Implement measures to prevent similar incidents from occurring in the future. 		
The following measures must be implemented in conjunction with the generic pollution prevention measures: <ul style="list-style-type: none"> ▪ Hazardous storage and refuelling areas must be bunded prior to their use on-site during the construction period following the appropriate SANS codes. ▪ The bund wall must be high enough to contain at least 110% of any stored volume. ▪ The surface of the bunded surface must be graded to the centre so that spillage may be collected and satisfactorily disposed of. ▪ The proper storage and handling of hazardous substances [e.g. Fuel, oil, cement, bitumen, paint, etc.] needs to be administered. ▪ Storage containers must be regularly inspected so as to prevent leaks. ▪ Mixing and/or decanting of all chemicals and hazardous substances must take place on a tray, shutter boards or on an impermeable surface and must be protected from the ingress and egress of stormwater. 		
Drip trays must be utilised at all dispensing areas.		
No refuelling, servicing or chemical storage must occur within 100 m of the delineated wetland / aquatic habitat, or, within the 100-year flood line, whichever is applicable.		
No vehicles transporting concrete, asphalt or any other bituminous product may be washed on-site.		
Vehicle maintenance must not take place on-site unless a specific bunded area is constructed for such a purpose.		
Ensure that transport, storage, handling and disposal of hazardous substances is adequately controlled and managed.		
Correct emergency procedures and cleaning up operations must be implemented in the event of accidental spillage		
All equipment to be used within the sensitive working areas [within the channel] must be checked daily for oil and diesel leaks before gaining access to these working areas.		
An emergency spill response procedure must be formulated and staff are to be trained in spill response		
All necessary equipment for dealing with spills of fuels / chemicals must be available at the site.		

Project related



Environmental Specification	Responsibility	Frequency
Spills must be cleaned up immediately and contaminated soil / material disposed of appropriately at a registered site, 44-gallon drums must be kept on-site to collect contaminated soil. These must be disposed of at a registered hazardous waste site.		
Fire prevention facilities must be present at all hazardous storage facilities.		
Concrete mixing must be confined to as few areas as possible and <i>ad hoc</i> mixing is to be avoided.		
Areas where concrete was mixed must be cleaned up after use.		
Concrete mixing is to be undertaken on an impervious surface.		
Subsoil and construction material stockpiles are to be bermed to prevent leachate and polluted run-off.		
In the event of a spill incident, the Emergency Response developed by the contractor must be followed.		
12.2.20 Noise		
Neighbouring landowners must be notified about construction activities.	Contractor	Daily
All construction vehicles and equipment are to be kept in good repair and must be fitted with Standard silencers prior to construction.		
Where possible, stationary noisy equipment [for example compressors, generators etc. must be encapsulated in acoustic covers, screens or sheds. Portable acoustic shields must be used in the case where noisy equipment is not stationary [e.g. drills, angle grinders, chipping hammers].		
Construction activities, and particularly the noisy ones, are to be contained to reasonable hours during the day and early evening.		
Machines in intermittent use must be shut down in the intervening periods between work or throttled down to a minimum.		
In general, operations must meet the noise standard requirements of the Occupational Health and Safety Act [Act No 85 of 1993].		
Construction staff working in areas where the 8-hour ambient noise levels exceed 75 dBA must wear ear protection equipment.		
Noise levels must be kept within acceptable limits.		
All noise and sounds generated must adhere to SANS 10103 specifications for maximum allowable noise levels for central business districts.		
No pure tone sirens or hooters may be utilised except where required in terms of SANS standards or in emergencies.		
Noisy operations must be combined so that they occur where possible at the same time.		
Noise from labourers must be controlled.		
Noise suppression measures must be applied to all construction equipment.		
Construction equipment must be kept in good working order and where appropriate fitted with silencers which are kept in good working order.		
Should the vehicles or equipment not be in good working order, the Contractor may be instructed to remove the offending vehicle or machinery from site.		
The Contractor must take measures to discourage labourers from loitering in the area and causing noise disturbance. Where possible labour must be transported to and from the site by the Contractor or his sub-contractors by the contractors own transport.		
Construction activities are to be contained to reasonable hours during normal working hours.		
Neighbours are to be given at least three [3] days warning prior to any blasting, piling or other 'noisy' activities.		



Environmental Specification	Responsibility	Frequency
12.2.21 Air Quality Pollution Management and Odour Control		
Any oil containing equipment or containers must be managed in a manner to avoid oil exposure to atmosphere to limit evaporation of volatiles to atmosphere.	Contractor	Daily
Portable toilets must be regularly emptied to avoid and minimise sanitary odour pollution.		Weekly
No fires are to be allowed on-site.		Daily
Vehicles must be maintained to avoid excessive emissions and smoke. Similarly, equipment must be serviced.		
12.2.22 Dust Control		
Dust track-on from disturbed areas to gravel road surfaces must be avoided by making use of one of the following measures to: <ul style="list-style-type: none"> ▪ Road sweeping. ▪ Chemical dust suppression of disturbed areas to reduce the amount of dust which can be lifted by the wheels of trucks. ▪ Wet suppression to the roads using a light spray. 	Contractor SHE Officer ECO	Daily
Dust liberated to atmosphere must not reduce the visibility for private vehicles making use of the road passing by the site.		
Wet suppression and wind speed reduction are common methods used to control open dust sources at construction-sites.		
Re-vegetation of exposed areas for long-term dust and water erosion control is commonly used and is the most cost-effective option. Plant roots bind the soil, and vegetation cover breaks the impact of falling raindrops, thus preventing wind and water erosion and promoting infiltration.		
Plants used for re-vegetation must be indigenous to the area, hardy, fast-growing, nitrogen-fixing, provide high plant cover, be adapted to growing on exposed and disturbed soil [pioneer plants] and must easily be propagated by seed or cuttings.		
All construction vehicles and equipment are to be kept in good repair.		
Speed limits of a maximum of 40 km/hr are to be implemented on-site and enforced by the Contractor.		
Dust liberated to atmosphere must not reduce the visibility for vehicles making use of the road passing by the site.		
Shade cloth fencing is to be used to reduce dust aggravation.		
Construction activities are to be contained to reasonable hours during the day avoiding periods of sunrise and sunset.		
In areas where there is a large potential for dust liberation [high wind days] wet suppression using a light spray must be applied to the areas in question.		
A dust suppression register as well as a complaints register needs to be kept.		
All complaints received need to be investigated with remedial action taken communicated to the affected party within 14 days.		
12.2.23 Stormwater Management		
The Stormwater Management Plan must be implemented to ensure proper management of stormwater on the site during and after construction to ensure that pollutants and sediment are not released into any water resources.	Contractor Engineer	Daily
Ensure that the stormwater management plan for the development minimises flow-related impacts to aquatic ecosystems located downstream. Interventions that can be considered, in addition to the stormwater runoff recommendations of the wetland report include:		



Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> ▪ On-site storage / attenuation structures incorporated into the overall design layout. ▪ Open swales, properly sized to accommodate excess stormwater, particularly from roofs and paved areas. ▪ Permeable pavers incorporated, where practical, into the design and construction of parking areas, walkways, etc. 		
<p>The future property owners will be required to develop and submit to eThekweni Municipality a site specific stormwater management system which may include a 'first-flush' stormwater attenuation system for the control of pollution.</p> <p>Stormwater run-off from the site will be piped under the existing access road and discharged onto the remainder of the overall site [5.64 ha]. This will be done via a field outlet headwall with spreader blocks to reduce velocities and thus prevent erosion.</p>		
<p>The stormwater system for the proposed development must take cognisance of the impacts of both the minor and major stormwater system in terms of runoff, potential flooding, the impact on the existing wetlands, stormwater attenuation, etc.].</p> <p>The minor stormwater system will consist of all measures to address runoff from individual sites and road reserves, buildings and car lots to the major stormwater system for minor storm events. This includes: kerbing, gutters, conduits, channels, infiltration systems etc. The minor system normally deals with low / medium rainfall events with high occurrence intervals [normally up to a one in 2 or 5-year interval] which are likely to cause a level of nuisance to users if not controlled. For this development it is proposed that the minor system on all individual sites be designed to handle a 1 in 5-year storm event.</p> <p>The major storm water system will consist of the natural streams and wetlands draining in a north westerly direction towards the Umdhloti River. The major system also controls runoff for high rainfall events with low occurrence intervals [usually 1 in 10 years or longer as in this case] with a high risk of flooding. For this development it is proposed that the major system be designed to handle a 1 in 50-year storm event. Cognisance is to be taken though of risks by storms of a higher magnitude [i.e. 1 in 100-year].</p>		
<p>Reduce stormwater flow variance of the pre-development flows by discharging stormwater via a headwall into the remainder of the site, Prevent the concentration of stormwater runoff at any point where erosion is a possibility.</p> <p>This will be prevalent near areas with high impermeability [roof structures, large surfaced areas] and embankments.</p> <ul style="list-style-type: none"> ▪ Avoid ponding on site, especially near building structures, ▪ Avoid destabilisation of existing and proposed embankments, ▪ Ensure compliance to local authority standards, ▪ Construction of pollution reducing systems, and ▪ Ensure that the construction of stormwater control systems is executed in a safe and acceptable manner. 		
<p>Measures to be applied to reduce pollutants include litter traps at all outlets and possibly swales at Green Open Spaces. These measures will be applied at the point source [individual sites and road reserves] as far as possible.</p> <p>First flush systems may be required on the individual sites to prevent oils and other pollutants entering the drainage system, this requirement will be dependent on the future land use.</p>		
<p>Where embankments are constructed on engineering fill, careful consideration will have to be applied to prevent erosion on unstable banks. In this regard it is recommended that kerbing upstream of embankment slopes be constructed to divert flow away to an underground conduit or stabilised channel to the existing major stormwater system.</p> <p>Energy dissipaters will be required where further erosion is a possibility, on the outlets from underground conduits or the run-off from the embankments.</p>		
<p>All existing drainage systems [streams, channels] are to be maintained by the main developer in accordance with normal agricultural soil</p>		



Environmental Specification	Responsibility	Frequency
conservation practices and local authority guidelines as far as possible [except where the town planning layout makes provision for the development of land over existing drainage systems].		
Access routes to the construction site must follow the existing access roads as far as possible. Should new access roads be required these must be constructed in a way to minimise concentrated flow runoff and pollution to the existing wetlands.		
Prior to moving onto site, the Engineer and Contractor shall inspect the existing stormwater drainage measures along these access routes and repair or construct new drainage measures to limit point source run-off, prevent erosion and allow for the natural flow of water. The drainage measures shall include: <ul style="list-style-type: none"> ▪ Side drains and mitre drains. ▪ Scour check walls of rocks, wooden pegs or bundled brush, constructed in long runs of side drains 		
No dumping of construction rubble or spoil is to occur in completed stormwater drains, pipes, channels or natural drainage lines [existing wetland, stream, and riparian zone]. Weekly checks are to be carried out on the site's drainage system to ensure that the water flow is unobstructed. These are to be repaired or cleared of silt if required.		
Following the completion of the works and the handover of the development, it will be the responsibility of the eThekweni Municipality to maintain the stormwater system in a safe and responsible manner.		
It is good practice to reserve certain months of the year before the onset of the summer rains to carry out routine maintenance work on the stormwater system. Serious problems should however receive immediate attention. Work which is of a critical nature should be done under the supervision of a professional engineer or according to his instructions.		
All kerb inlets need to be inspected and cleared of any build up of silt, litter, vegetation or rubble that may impede the clear flow of water into the inlet. It also needs to be inspected for structural damage and repaired if necessary.		
Piped systems need to be checked in a systematic way to ensure they are clear of any obstructions and are able to flow at their full capacity. Any build-up of silt or other obstruction is to be removed by hand or by jetting.		
Routine inspection should be carried out every three months by a competent person appointed by the responsible body or association. The required qualification for such a person is that they shall be well acquainted with the contents of this document, should be alert and be endowed with sound judgement so that he / she will know when to call for assistance, arrange for maintenance or immediate intervention.		
On-site stormwater control systems, such as swales, berms, soil fences and attenuation ponds are to be constructed before any construction commences on the site. As construction progresses, the stormwater control measures are to be monitored and adjusted to ensure complete erosion and pollution control at all times.		
Earthworks on-site are to be kept to a minimum. Where embankments have to be formed, stabilisation and erosion control measures must be implemented immediately.		
Stormwater must not be allowed to pond in close proximity to existing building foundations.		
No materials, fluids or substances are allowed to enter the stormwater system that could have a detrimental effect on the flora, fauna and aquatic life in the water courses and wetlands.		



Environmental Specification	Responsibility	Frequency
<p>Regular monitoring of the sites must be undertaken.</p> <p>Any site that is required to store any substances that could be regarded as hazardous in terms of water pollution must notify the uMuziwabantu Local Municipality and must take measures to ensure spillages of the substance[s] can be adequately contained to prevent contamination of the water resources within the development area.</p>		
12.2.24 Social Considerations		
<p>Working hours are restricted to 07:00–18:00 during weekdays and 08:00–17:00 over weekends if necessary. Should work be required after these hours, the ECO must be notified and any person who resides in close proximity to the site and who may be impacted upon by the disturbance must also be notified.</p> <p>All neighbouring landowners and those that are disturbed due to construction activities are to be notified of construction activities and provided with regular feedback on the status of construction.</p> <p>The Contractor is to arrange for a suitable candidate to assist with the appointment of local labour and assist with labour disputes.</p> <p>Due to the concentration of a workforce in the area over the construction period, the contractor must implement an HIV/AIDS Awareness Programme on-site.</p> <p>The contractor must appoint an HIV/AIDS Awareness Officer for the duration of the construction period. Activities for HIV/AIDS awareness and prevention will be broad based, targeting both individuals and groups. They may consist of:</p> <ul style="list-style-type: none"> ▪ Information posters in public places both on and off site [eating places, bars, guest houses, etc]; ▪ Peer educators [reference people] drawn from the local labour force and trained in HIV/AIDS issues for discussions with colleagues [estimate 1 per 30 employees]; ▪ Small focus group discussions and information covering key issues must be held; ▪ Inclusion of HIV/AIDS activities at site meetings and other discussions; and ▪ Voluntary Counselling and Testing. <p>Education must cover:</p> <ul style="list-style-type: none"> ▪ Stigma and discrimination issues; ▪ Preventative behaviours including partner reduction, condom use, and awareness and importance of treatment of STDs; ▪ Skills including negotiating safer sex, correct condom use, purchase without embarrassment; and ▪ Referral to local health centres and services available. 	Contractor & ECO	Daily
12.2.25 Visual Considerations		
<p>Storage facilities, elevated tanks and other temporary structures must be located such that they have as little visual impact on local residents as possible.</p> <p>Special attention must be given to the screening of highly reflective materials on-site.</p>	Contractor	Daily
12.2.26 Reporting & Record Keeping - Complaints Register		
Complaints received must be registered and recorded by the contractor and also brought to the attention of the contractor. Both parties will	Contractor	Daily



Environmental Specification	Responsibility	Frequency
respond accordingly. The following information must be recorded in the case of any complaint / incident: <ul style="list-style-type: none"> ▪ Time, date and nature of complaint; ▪ Response and investigation undertaken; and ▪ Corrective and preventative actions taken and by whom. 		
All complaints received will be investigated and a response is to be given to the complainant within 7 days.		
12.2.27 Reporting & Record Keeping - Environmental Incidents Register		
All environmental incidents occurring on the site will need to be recorded in an Environmental Incident Book and brought to the attention of the ECO. The following information must be provided: <ul style="list-style-type: none"> ▪ Time, date and nature of complaint; ▪ Response and investigation undertaken; and ▪ Corrective and preventative actions taken and by whom. 	Contractor	Daily

12.3 Post Construction / Rehabilitation / Operational and Maintenance Phase

Table 9: Post Construction Phase EMP

Environmental Specification	Responsibility	Frequency
12.3.1 Construction areas		
All structures comprising the construction affected areas are to be removed from the site and surrounding areas.	Contractor & Developer	Post-Construction
The area that previously housed the construction materials is to be checked for spills of substances such as oil, paint, diesel, etc. and these must be cleaned up.		
All hardened surfaces within the construction affected area must be ripped, all imported materials removed, and the area must be top soiled and re-grassed accordingly with indigenous species.		
The Contractor must arrange the cancellation of any temporary services.		
12.3.2 Vegetation and Erosion		
All areas that have been disturbed by construction activities [including the construction affected areas] must be cleared of alien vegetation.	Developer	Post-Construction
Suitable erosion control measures must be implemented at stormwater discharge points, exposed areas and high embankments. These measures may include the following options: <ul style="list-style-type: none"> ▪ • Sand bags on trenches [trench breakers]. ▪ • Bunds or grips adjacent to watercourses. ▪ • Technologies similar to Soil Saver on embankments. ▪ • Planting of indigenous vegetation on embankments. 		



Environmental Specification	Responsibility	Frequency
<ul style="list-style-type: none"> ▪ • Minimise clearing and grubbing to necessary sections within the road reserve. ▪ • Excavating borrow pit areas to ensure they are self-draining. ▪ • Over-wetting, saturation and unnecessary run-off during dust control, curing and irrigation activities will be avoided. <p>Sandbag berms will be placed at regular intervals on all steep slopes and on the trench line before and after backfilling in order to minimise erosion and the discharge of contaminated storm water run-off into water courses.</p> <p>The gravel wearing course of the existing road may be susceptible to the risk of scour or this can be managed by using suitable gravel to temporarily repair the scouring or potholes.</p> <p>All vegetation that has been cleared during construction is to be removed from site or used as mulch, [except for vegetation which may result in inadvertently seeding alien vegetation].</p>		
12.3.3 Materials and Infrastructure		
All residual stockpiles must be removed to spoil or spread on-site as directed by the Developer and/or Engineer.	Developer & Engineer & Contractor	Post-Construction
All leftover building materials must be returned to the depot or removed from the site.		
The Contractor must repair any damage that the construction works has caused to neighbouring properties.		
Fences, barriers and demarcations associated with the construction phase are to be removed from the site unless stipulated otherwise by the Developer.		
12.3.4 Rehabilitation		
The Developer is responsible for compliance with the provisions for Duty of Care and Remediation of Damage in accordance with Section 28 of National Environmental Management Act [NEMA], Act No. 107 of 1998.	Contractor & Engineer & Developer & ECO	Post-Construction
The wetland rehabilitation plan [GroundTruth, 2015] must be implemented [provided in Appendix C].		
<p>Pollution and or contamination of the surface water and stormwater must be well controlled. This can be achieved by managing activities such as:</p> <ul style="list-style-type: none"> ▪ • Mixing concrete on wooden boards in a plastic lined and leak-proof area. ▪ • Removing all surplus material from the watercourse. ▪ • Avoiding spills of hazardous substances [e.g. Fuel]. ▪ • Opening of frequent chutes on long steep grades with unlined drains. ▪ • Ensuring that banks are re-vegetated as soon as construction work is completed. ▪ • Avoid water contamination by construction as well as general traffic. ▪ • Containing the first-flush run-off, collectively or individually. <p>The stormwater system must be maintained to remove and reduce debris that may pose any pollution risk.</p> <p>A lack of maintenance will lower the transportation of the run-off to the existing watercourses and which may cause flooding.</p>		
The proposed upgrade will not increase the stormwater run-off significantly as it is partially an existing road and the cross section of the new portion is relatively narrow.		
The design of the stormwater system addresses the above issues and was designed as such that the post-development flood risks are not greater than the pre-development flood risks.		

Project related



Environmental Specification	Responsibility	Frequency
<p>The 'precautionary principle' must apply and cost-effective measures must be implemented to pro-actively prevent degradation of the region's water resource and the social systems that depend on it. Ultimately, the risk of water resource degradation must drive sustainability in development design.</p>		
<p>The protection of water resources [wetlands and rivers in this instance] begins with the avoidance of adverse impacts and where such avoidance is not feasible; to apply appropriate mitigation in the form of reactive practical actions that minimises or reduces impacts. Examples of mitigation can include changes to the scale, design, location, siting, process, sequencing, phasing, and management and/or monitoring of the proposed development activities, as well as the restoration or rehabilitation of disturbed sites.</p>		
<p>Where environmental impacts can be severe, the guiding principle must be "anticipate and prevent" rather than "assess and repair."</p>		
<p>All remaining maintenance materials, building rubble and waste are to be removed from the site to an approved disposal site. Burying rubble on the site is prohibited.</p>		
<p>All disturbed surfaces compacted by maintenance activities including the ablutions and loading areas must be ripped to a minimum depth of 30 cm to allow organic contaminants to breakdown and promote vegetation establishment.</p>		
<p>The Contractor is required to rehabilitate all impacted areas according to the approved Method Statement for the Rehabilitation of Modified Environments.</p>		
<p>Final rehabilitation must be completed within a period specified by the Engineer.</p>		
<p>The site and surrounding areas is to be cleared of all litter.</p>		
<p>Surfaces are to be checked for waste products from activities such as concreting or asphaltting.</p>		
<p>All embankments are to be trimmed, shaped and replanted to the satisfaction of the ECO.</p>		
<p>Immediately after construction disturbed areas must be re-vegetated using the rescued plant sods and supplemented with transplants from adjoining like habitats if required.</p>		
<p>Alternatively, reseeding via broadcasting using an indigenous seed mix reflecting the general species composition of the area must also be used where necessary.</p>		
<p>If such seed mixes are not available, seed will need to be harvested from the area and grown nearby for later re-vegetation using plugs / sprigs.</p>		
<p>A biodegradable geo-fabric mat [or vegetation blanket] must be utilized to protect the topsoil on steep slopes from water and wind erosion during re-vegetation.</p>		
<p>Alternatively, the plants can be secured using a coarse mesh [steel wire or plastic]. The mesh or mat is placed over the vegetation securing it until it can fully establish. The plants must be able to grow unhindered through the mesh or matting. Mats can be staked down.</p>		
<p>Alien and weedy vegetation that colonise the disturbed areas must be removed and eradicated.</p>		
<p>The soils must be adequately prepared prior to planting by a contractor with experience in re-vegetation and under no circumstances must fertiliser be applied.</p>		
<p>Once the initial transplants / plugs are planted, the contractor to conduct weekly site visits to monitor re-establishment and remove alien plants [in accordance with the latest revised NEM:BA requirements] and address any re-vegetation concerns until re-vegetation is considered successful [i.e. >90% indigenous cover]. Thereafter, the rehabilitation must be signed off by the ECO.</p>		
<p>Should wetland and riparian areas outside of the construction corridor that are disturbed during the construction phase must be rehabilitated immediately.</p>		



Environmental Specification	Responsibility	Frequency
<p>All disturbed areas must be prepared and then re-vegetated to the satisfaction of the ECO as per the relevant re-vegetation / replanting plan.</p> <p>Where stream channels have been disturbed, the channels must be re-graded, stabilised using erosion control measures and re-vegetated as per the relevant re-vegetation / re-planting plan.</p> <p>Rehabilitation guidelines pertain to wetland, river / riparian areas and their associated buffer zones.</p> <p>Rehabilitation refers to all disturbed areas affected by construction activities.</p> <p>The key objective of rehabilitation in this context is as follows:</p> <ul style="list-style-type: none"> ▪ Stabilise erodible soils / material. ▪ Ensure continued hydrological functioning. ▪ Ensure all disturbed areas are well vegetated. ▪ Ensure alien plant do not colonise disturbed areas. <p>The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.</p>		
12.3.5 End of Contractor services		
<p>A meeting is to be held on-site between the Developer and the ECO to approve all remediation activities and ensure that the site has been restored to a condition acceptable to the ECO and the Developer.</p>	ECO & Developer	Post-Construction
<p>A site close-out audit is to be undertaken by the ECO prior to handover of the site by the Contractor.</p>		
12.3.6 Waste Management		
<p>Waste management at the site should subscribe to the principles of sustainable waste management.</p> <p>This includes:</p> <ul style="list-style-type: none"> ▪ Waste prevention – the prevention and avoidance of the production of waste at source; ▪ Waste reduction – the reduction of the volume or hazardous nature of the waste during production; ▪ Resource recovery – recycling or re-use of the waste; ▪ Waste treatment – the treatment of waste to reduce volume or risk to human and environmental safety and health to reduce the degree of hazard when waste is disposed of in a landfill or discharged into a water source; and ▪ Waste disposal – the environmentally acceptable and safe disposal or discharge of waste, [e.g. encapsulation, incineration, landfill or discharge to a water source]. <p>These principles must be practiced to the greatest extent possible.</p>	ECO & Developer	Post-Construction
12.3.7 Social concerns		
<p>Job creation expectations will have to be well managed <i>via</i> management systems and communication mechanisms.</p>	Developer	Construction and operational phases – on-going

The above EMPr must be adopted and declarations of Understanding as provided in Appendix B must be signed by all relevant parties.



With its headquarters in Amersfoort, The Netherlands, Royal HaskoningDHV is an independent, international project management, engineering and consultancy service provider. Ranking globally in the top 10 of independently owned, non-listed companies and top 40 overall, the Company's 6,500 staff provide services across the world from more than 100 offices in over 35 countries.

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