



**Royal
HaskoningDHV**
Enhancing Society Together



Tinley Manor Southbanks Coastal Development

Amended Environmental Management Programme

March 2017

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 **Tongaat Hulett**
DEVELOPMENTS

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Note: All changes from the EMPr (February 2016) to the Amended EMPr (March 2017, i.e. document at hand) are underlined for ease of reference.

Accident	A road vehicle accident.
Activity (Development)	An action either planned or existing that may result in environmental impacts through pollution or resource use. For the purpose of this report, the terms ‘activity’ and ‘development’ are freely interchanged.
Alien Species	A species that is not an indigenous species; or an indigenous species translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention.
Alternatives	Different means of meeting the general purpose and requirements of the activity, which may include site or location alternatives; alternatives to the type of activity being undertaken; the design or layout of the activity; the technology to be used in the activity and the operational aspects of the activity.
Applicant	The project proponent or Developer responsible for submitting an environmental application to the relevant environmental authority for environmental authorisation.
Biodiversity	The diversity of animals, plants and other organisms found within and between ecosystems, habitats, and the ecological complexes.
Buffer	A buffer is seen as an area that protects adjacent communities from unfavourable conditions. A buffer zone is usually an artificially imposed zone included in a management plan.
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 which include (a) discarded concrete, bricks, tiles and ceramics; (b) discarded wood, glass and plastic; (c) discarded metals; (d) discarded soil, stones and dredging spoil; (e) other discarded building and demolition waste.
Construction	The building, erection or establishment of a facility, structure or infrastructure that is necessary for the undertaking of a listed or specified activity but excludes any modification, alteration or expansion of such a facility, structure or infrastructure and excluding the reconstruction of the same facility in the same location, with the same capacity and footprint.
Contractor	Companies appointed on behalf of the Client to undertake activities, as well as their sub-contractors and suppliers.
Cumulative Impact	The impact of an activity that in itself may not be significant but may become significant when added to the existing and potential impacts eventuating from similar or diverse activities or undertakings in the area.
Decommissioning	The demolition of a building, facility, structure or infrastructure.
Degradation	The lowering of the quality of the environment through human activities e.g. river degradation, soil degradation.
Demolition	Demolition is the tearing-down of buildings and other structures, the opposite of construction. Demolition contrasts with deconstruction, which involves taking a building apart while carefully preserving valuable elements for re-use.
Direct Impact	Impacts that are caused directly by the activity and generally occur at the same time and at the same place of the activity. These impacts are usually associated with the construction, operation or maintenance of an activity and are generally quantifiable.

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, which include (a) garden and park waste; (b) municipal waste and (c) food waste.
Ecological Reserve	The water that is necessary to protect the water ecosystems of the water resource. It must be safeguarded and not used for other purposes. The Ecological Reserve specifies both the quantity and quality of water that must be left in the national water resource. The Ecological Reserve is determined for all major water resources in the different water management areas to enforce sustainable development.
Ecosystem	A dynamic system of plant, animal (including humans) and micro-organism communities and their non-living physical environment interacting as a functional unit. The basic structural unit of the biosphere, ecosystems are characterised by interdependent interaction between the component species and their physical surroundings. Each ecosystem occupies a space in which macro-scale conditions and interactions are relatively homogenous.
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 Client to be present on site to act on behalf of the Client 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 Assessment	The generic term for all forms of environmental assessment for projects, plans, programmes or policies and includes methodologies or tools such as environmental impact assessments, strategic environmental assessments and risk assessments.
Environmental Authorisation	An authorisation issued by the competent authority in respect of a listed activity, or an activity which takes place within a sensitive environment.
Environmental Assessment Practitioner (EAP)	The individual responsible for planning, management and coordination of environmental impact assessments, strategic environmental assessments, environmental management programmes or any other appropriate environmental instrument introduced through the EIA Regulations.
Environmental Impact	Change to the environment (biophysical, social and/ or economic), whether adverse or beneficial, wholly or partially, resulting from an organisation’s activities, products or services.
Environmental Impact Assessment (EIA)	In relation to an application to which scoping must be applied, means the process of collecting, organising, analysing, interpreting and communicating information that is relevant to the consideration of that application as defined in NEMA.
Environmental Issue	A concern raised by a stakeholder, interested or affected parties about an existing or perceived environmental impact of an activity.

Environmental Management	Ensuring that environmental concerns are included in all stages of development, so that development is sustainable and does not exceed the carrying capacity of the environment.
Environmental Management Programme (EMPr)	A detailed plan of action prepared to enforce that recommendations for enhancing or ensuring positive impacts and limiting or preventing negative environmental impacts are implemented during the life cycle of a project. This EMPr focuses on the construction phase, operation (maintenance) phase and decommissioning phase of the proposed project.
Estuary	A body of water formed where freshwater from rivers flows into the ocean, mixing with the seawater. Estuaries and the lands surrounding them are places of transition from land to sea, and from freshwater to saltwater. Although influenced by the tides, estuaries are protected from the full force of ocean waves, winds, and storms by the reefs, barrier islands, or fingers of land, mud, or sand that surround them.
Fatal Flaw	An event or condition that could cause an unanticipated problem and/or conflict which will could result in a development being rejected or stopped.
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.
Groundwater	Water in the ground that is in the zone of saturation from which wells, springs, and groundwater run-off are supplied.
Hazardous Waste	Hazardous waste means any waste that contains organic or inorganic elements or compounds that may, owing to the inherent physical, chemical or toxicological characteristics of that waste, have a detrimental impact on health and the environment.
Hazardous Waste Landfill Site	A waste disposal site that is designed, managed and permitted to allow for the disposal of hazardous waste.
Human Waste	Excrement, faeces or other waste material discharged from the human body.
Hydrology	The science encompassing the behaviour of water as it occurs in the atmosphere, on the surface of the ground, and underground.
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.
Indigenous Species	A species that occurs, or has historically occurred, naturally in a free state in nature within the borders of the Republic, but excludes a species that has been introduced in the Republic as a result of human activity.
Indirect Impacts	Indirect or induced changes that may occur as a result of the activity. These types if impacts include all of the potential impacts that do not manifest immediately when the activity is undertaken or which occur at a different place as a result of the activity.

Integrated Environmental Management	A philosophy that prescribes a code of practice for ensuring that environmental considerations are fully integrated into all stages of the development and decision-making process. The IEM philosophy (and principles) is interpreted as applying to the planning, assessment, implementation and management of any proposal (project, plan, programme or policy) or activity – at local, national and international level – that has a potentially significant effect on the environment. Implementation of this philosophy relies on the selection and application of appropriate tools for a particular proposal or activity. These may include environmental assessment tools (such as strategic environmental assessment and risk assessment), environmental management tools (such as monitoring, auditing and reporting) and decision-making tools (such as multi-criteria decision support systems or advisory councils).
Interested and Affected Party (I&AP)	Any person, group of persons or organisation interested in or affected by an activity; and any organ of state that may have jurisdiction over any aspect of the activity.
Invasive Species	Any species whose establishment and spread outside of its natural distribution range.
Method Statement	A method statement is a written submission by the Contractor to the Engineer in response to the specification or a request by the Engineer, setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity, identified by the relevant specification or the Engineer when requesting a Method Statement. It contains sufficient detail to enable the Engineer to assess whether the Contractor's proposal is in accordance with the Specifications and/or will produce results in accordance with the Specifications.
Mitigate	The implementation of practical measures designed to avoid, reduce or remedy adverse impacts or enhance beneficial impacts of an action.
No-Go Option	In this instance the proposed activity would not take place, and the resulting environmental effects from taking no action are compared with the effects of permitting the proposed activity to go forward.
Pollution	The National Environmental Management Act, No. 107 of 1998 defined pollution to mean any change in the environment caused by – substances; radioactive or other waves; or noise, odours, dust or heat emitted from any activity, including the storage or treatment of waste or substances, construction and the provision of services, whether engaged in by any person or an organ of state, where that change has an adverse effect on human health or well-being or on the composition, resilience and productivity of natural or managed ecosystems, or on materials useful to people, or will have such an effect in the future.
Public Participation Process	A process in which potential interested and affected parties are given an opportunity to comment on, or raise issues relevant to, specific matters.
Recovery	The controlled extraction of or the retrieval of any substance, material or object from waste.
Re-use	To utilise the whole, a portion of or a specific part of any substance, material or object from the waste stream for a similar or a different purpose without changing the form of properties of such substance, material or object.
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.
Rehabilitation	Rehabilitation is defined as the return of a disturbed area to a state which approximates the state (wherever possible) which it was before disruption. Rehabilitation for the purposes of this Environmental Management Programme is aimed at post-reinstatement re-vegetation of disturbed areas and the stability of the land surface. In attempt to achieve this purpose, disturbed areas must be rehabilitated with the establishment of permissible indigenous vegetation. Re-vegetation must aim to accelerate the natural succession processes so that the

plant community develops in the desired way, i.e. promote rapid vegetation establishment.

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 must be responsible for the day-to-day monitoring of the EMP and Health and Safety Plan.
Site Manager	The person, representing the Contractor, responsible for all the Contractor's activities on the site including supervision of the construction staff and activities associated with the construction Phase. The Site Manager will liaise with the Project Manager in order to enforce that the project is conducted in accordance with the Environmental Management Programme.
Sensitive Environments	Any environment identified as being sensitive to the impacts of the development.
Setback Line	Coastal setback lines are used as a means to control and prevent insensitive, inappropriate and non-sustainable development in sensitive coastal environments. These are also used to enforce public safety and public interests and to reduce the risk posed by climate change and/or the dynamic coastal processes on urban, rural or agricultural land.
SHEQ Manager	The SHEQ Manager is a Client representative, responsible for the safety, health, environmental and quality aspects on the construction site. The SHEQ Manager will liaise with the Site Manager and Professional Team, in order to enforce that the project is conducted in strict accordance with the Environmental Management Programme. The SHEQ Manager at his discretion will issue fines to the contractor for any serious non-conformances to the Environmental Management Programme.
Surplus Fill Material	Layers of topsoil and subsoil obtained through earth-works which is in excess and cannot be accommodated as engineering fill due to the excess and/or geological content.
Sustainable Development	Development which meets the needs of current generations without hindering future generations from meeting their own needs.
Topsoil	The A-horizon of the soil profile. Topsoil is the upper layer of soil from which plants obtain their nutrients for growth. It is often darker in colour, due to the organic (humus) fraction. Where topsoil is referred to, it is deemed to be the soil and grass / ground cover fraction. For the purposes of this management programme, where: topsoil is deemed as the layer of soil from the surface (approximately 300 mm) to the specified depth required for excavation.
Waste	Waste means any substance, whether or not that substance can be reduced, re-used, recycled and recovered – <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— v. a by-product is not considered waste; and vi. 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.
Watercourse	Defined as: <ul style="list-style-type: none"> i. a river or spring; ii. a natural channel or depression in which water flows regularly or intermittently; iii. a wetland, lake or dam into which, or from which, water flows; and

- iv. any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse as defined in the National Water Act, 1998 (Act No. 36 of 1998) and a reference to a watercourse includes, where relevant, its bed and banks.

Water Pollution

The National Water Act, 36 of 1998 defined water pollution to be the direct or indirect alteration of the physical, chemical or biological properties of a water resource so as to make it – less fit for any beneficial purpose for which it may reasonably be expected to be used; or harmful or potentially harmful (aa) to the welfare, health or safety of human beings; (bb) to any aquatic or non-aquatic organisms; (cc) to the resource quality; or (dd) to property”.

Wetland

Land which is transitional between terrestrial and aquatic systems where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted to life in saturated soil.

Workforce

The entire project team including people employed by the Developers 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.

Acronyms

AST	Above-ground Storage Tank
DAFF	Department of Agriculture, Fisheries & Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EDTEA	Economic Development, Tourism and Environmental Affairs (Department of)
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
EMS	Environmental Management System
EO	Environmental Officer
HGM	Hydro-geomorphic
HSRA	Health and Safety Risk Assessment
I&AP	Interested and Affected Party
ISO	International Organisation for Standardisation
MSDS	Material Safety Data Sheet
NCR	Non-Conformance Report
NEMA	National Environmental Management Act (Act No. 107 of 1998) (as amended)
OHS	Occupational Health and Safety
PM	Project Manager
PPE	Personal Protective Equipment
QMS	Quality Management System
ROSE	Recycling Oil Saves the Environment Foundation
ROW	Right-of-way
SABS	South Africa Bureau of Standards
SANS	South African National Standard
SCP	Stormwater Control Plan
SDC	Safe Disposal Certificate
SEMA	Suite of Environmental Management Acts
SFMS	Surplus Fill Material Site
SHE	Safety, Health & Environment
SMP	Stormwater Management Plan
SOP	Standard Operating Procedure
STD	Sexually Transmitted Disease
TBA	To Be Announced
THD	Tongaat Hulett Developments
WUL	Water Use Licence
WWTW	Wastewater Treatment Works

1 INTRODUCTION

1.1 Project Background

Tongaat Hulett Developments (THD) propose to develop the **Tinley Manor Southbanks Coastal Development**, hereafter referred to as the **Tinley Manor Southbanks**, into a mixed-use coastal development including a large residential component. Tinley Manor Southbanks is an approximately 485 ha site, located between the coastal towns of Tinley Manor and Sheffield Beach within the KwaDukuza Municipality, KwaZulu-Natal (**Figure 1-1**).

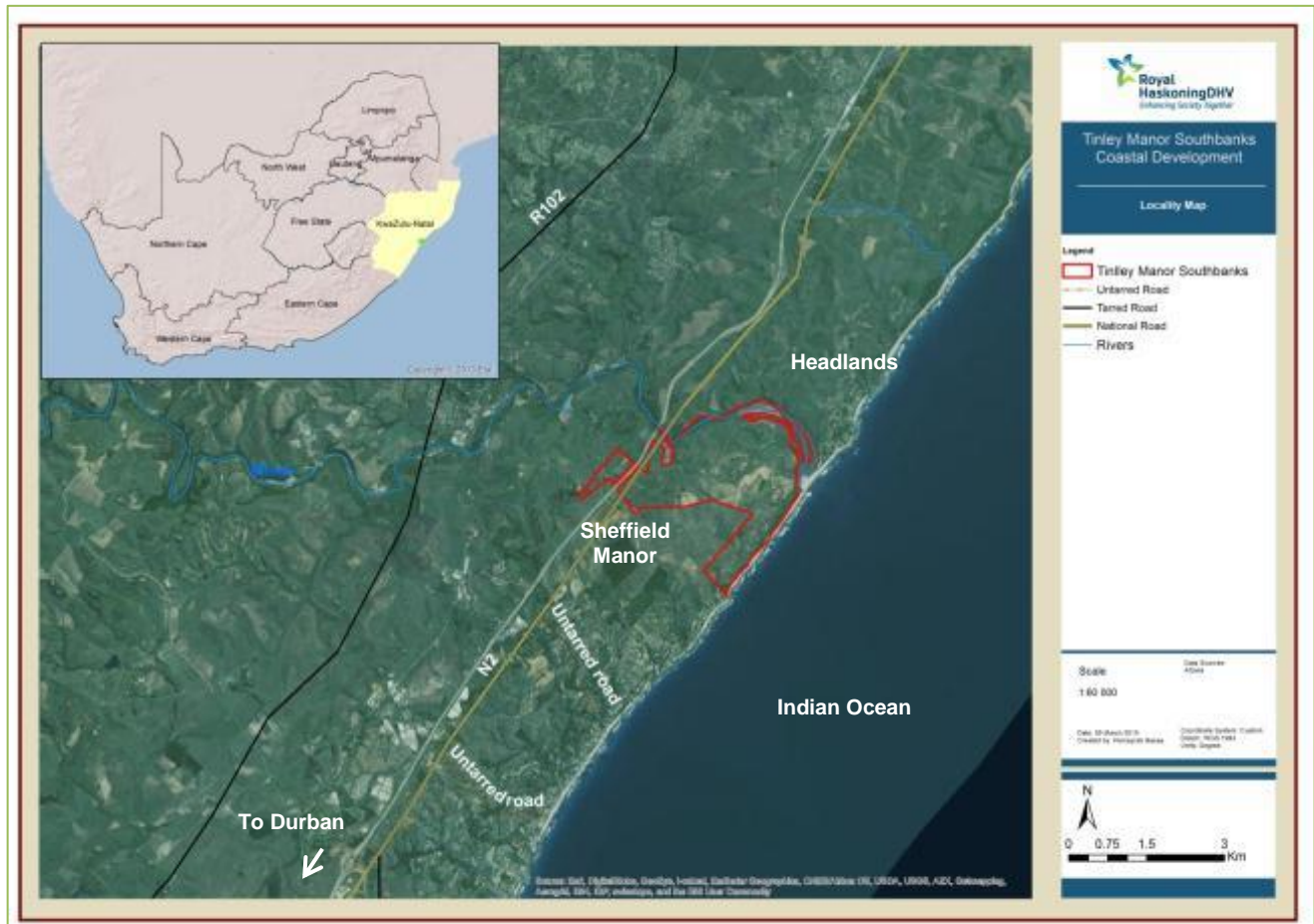


Figure 1-1: Location of the Tinley Manor Southbanks Coastal Development

Royal HaskoningDHV are appointed by THD to act as an independent Environmental Assessment Practitioner (EAP) for the Application for Environmental Authorisation (EA) for the proposed Tinley Manor Southbanks. The proposed Tinley Manor Southbanks is the first phase of the development of THD’s land holdings in Tinley Manor situated south and north of the Umhlali River. The subject of this **Environmental Management Programme (EMPr)** is THD’s Southbanks landholdings only (**Figure 1-2**).

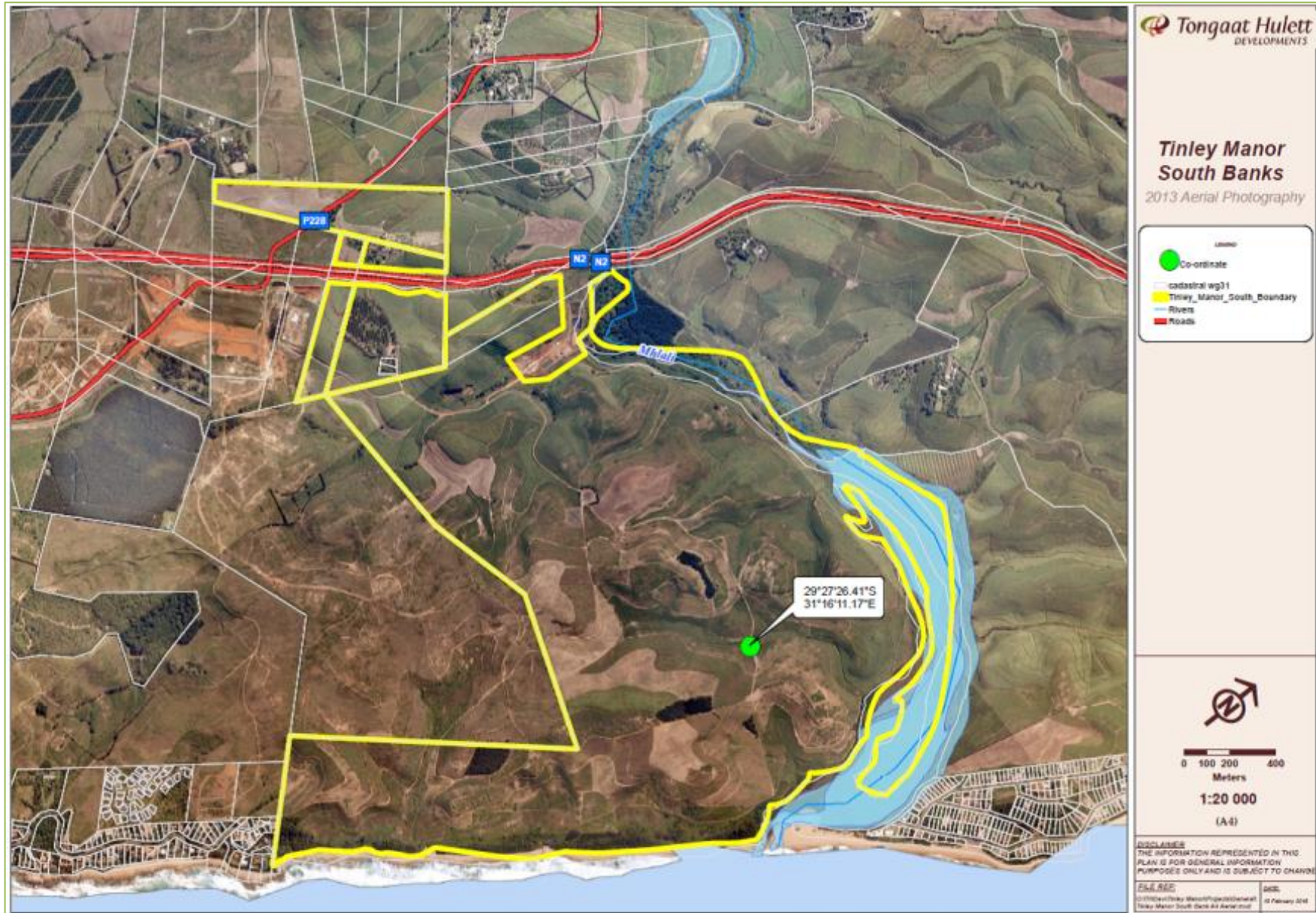


Figure 1-2: Site boundary

This EMPr is based broadly on the **Tinley Manor Southbanks Concept Plan (Figure 1-3)**.

The Tinley Manor Southbanks includes:

- ✦ Mixed densities and typologies of residential units;
- ✦ Social facilities and entertainment;
- ✦ A resort facility;
- ✦ Commercial and retail;
- ✦ Rehabilitated open space (conservation areas);
- ✦ The installation of general engineering services and infrastructure which include:
 - Earth-worked platforms and banks;
 - Water supply;
 - Irrigation storage dam and pipelines;
 - Sewer pipelines and pump stations;
 - Electricity supply;
 - Stormwater management facilities;
 - Boardwalks, pedestrian pathways and formalisation of emergency vehicular access;
 - Telecommunications; and
 - New road infrastructure.



Figure 1-3: Tinley Manor Southbanks Composite Block Layout of the Site

1.2 Purpose of the Environmental Management Programme

In terms of The Constitution of the Republic of South Africa (1996), everyone has the right to an environment that is not harmful to their health or well-being and to have the environment protected, for benefit of present and future generations, through reasonable legislation and other measures that prevent pollution and ecological degradation, promote conservation and secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development (Section 24). The needs of the environment as well as affected parties must thus be integrated into overall project management.

The Constitution is underpinned by the Suite of Specific Environmental Management Acts (SEMAs) – including the National Environmental Management Act (Act No. 107 of 1998, NEMA), National Environmental Management Waste Act (Act No. 59 of 2008, NEM:WA), National Environmental Management Air Quality Act (Act No. 39 of 2004, NEM:AQA), National Environmental Management Biodiversity Act (Act No. 10 of 2004, NEM:BA), National Environmental Management Integrated Coastal Management Act (Act No. 24 of 2008, NEM:ICMA), National Environmental Management Protected Area Act (Act No. 57 of 2003, NEM:PAA), and the National Water Act (Act No. 36 of 1998, NWA) – which combined serve to control all relevant facets of the environment so as to enforce that Section 24 of the Constitution is enforced.

The Environmental Management Programme (EMPr) is developed in terms of the SEMAs and enforces that construction activities meet the requirements of existing environmental legislation and good environmental practice in terms of national and international norms and standards. This is achieved by identifying those construction activities for the proposed development that will have a negative impact on the environment; outlining the mitigation measures that will need to be taken and the steps required for their implementation and describing the reporting system to be undertaken during construction.

1.3 Objectives of the Environmental Management Programme

The EMPr has the following objectives:

- ✦ To enforce compliance with regulatory authority stipulations and guidelines; which are local, provincial, national, and/or, international.
- ✦ To outline functions and responsibilities of responsible persons.
- ✦ To state standards and guidelines, which are required to be achieved / complied with in terms of environmental legislation.
- ✦ 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 prevent long-term or permanent environmental degradation.
- ✦ To establish a method of monitoring and auditing environmental management practices during all phases of development.
- ✦ Detail specific actions required to assist in mitigating the environmental impact of the project.
- ✦ Enforce 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 EMPr must be implemented.
- ✦ To provide an environmental awareness plan.
- ✦ Provide rational and practical environmental conditions / requirements to:
 - Minimise disturbance of the natural environment;
 - Enforce 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;

- Enforce 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; and
- Train the Developer, their employees and contractors (including all sub-contractors) with regard to their environmental obligations.

The EMPr is essentially, a written programme of how the environment is to be managed in practical and achievable terms.

An independent Environmental Control Officer (ECO) must be appointed by the Developer (i.e. THD), to enforce compliance with the EMPr.

The EMPr must be considered to be an extension of the Conditions of Approval as set forth by the KwaZulu-Natal Department of Economic Development, Tourism and Environmental Affairs (KZN EDTEA) and the Department of Water and Sanitation (DWS) as well as any other regulatory authority for relevant permits and/or licences. As such, non-compliance with the EMPr will constitute non-compliance with said Conditions.

1.4 Scope of the Environmental Management Programme

In accordance with the requirements of the National Environmental Management Act’s (Act No. 107 of 1998, NEMA) Environmental Impact Assessment (EIA) Regulations, 2010 (Government Notice Regulations 543 – 546), and the specific requirements of the KZN EDTEA, this EMPr is to be implemented by the Developer as well as any employee, contractor, agent, or sub-contractor appointed to act on behalf of the Developer in the execution of the project, in order to enforce environmental compliance on site.

The specifications outlined in this EMPr are thus applicable to all activities undertaken by the Developer as well as their appointed contractors and all persons involved in the execution of the works, including sub-contractors, the workforce, suppliers, and volunteers, for the duration of construction, operation and future maintenance.

Included within the EMPr is guidance for on-going training with respect to the implementation of the conditions included therein, including induction by all new people coming onto site to carry out work, and ‘top-up’ activities such as weekly ‘toolbox talks’ on specific key issues.

An **Environmental Code of Conduct** has also been developed that provides a simplified set of rules that must be adhered to by all persons involved with the project at all times. This is to be displayed at strategic points to enforce constant environmental awareness.

The effectiveness of the EMPr is limited by the level of adherence to the conditions set forth in the EMPr by the Developer, the Contractor and Sub-contractors. It is further assumed that compliance with the EMPr must be monitored and audited as set out in this EMPr and contractual clauses.

1.5 Structure of the Environmental Management Programme

The EMPr provides proposed mitigation and management measures for the following phases of the project (**Table 1-1**).

Table 1-1: Different Phases of the Project Life-cycle

PHASE	DESCRIPTION
Pre-Construction	This section will provide guidelines on pre-construction activities including site establishment and clearance; environmental induction and training and awareness; site access and health and safety.
Construction	This section will provide guidelines on construction methods and considerations.
Post-Construction	This section of the EMPr provides management principles for the rehabilitation, maintenance and operational phases of Tinley Manor Southbanks. This will include best practice, procedures and responsibilities as required for various associated activities.

1.6 The EMPr as a “live” document

The approach adopted for this EMPr is derived from the Deming Cycle (**Figure 1-4**), a cycle of continuous improvement that entails the reiterative actions of plan, do, check, act, and critically to then return to the planning phase.

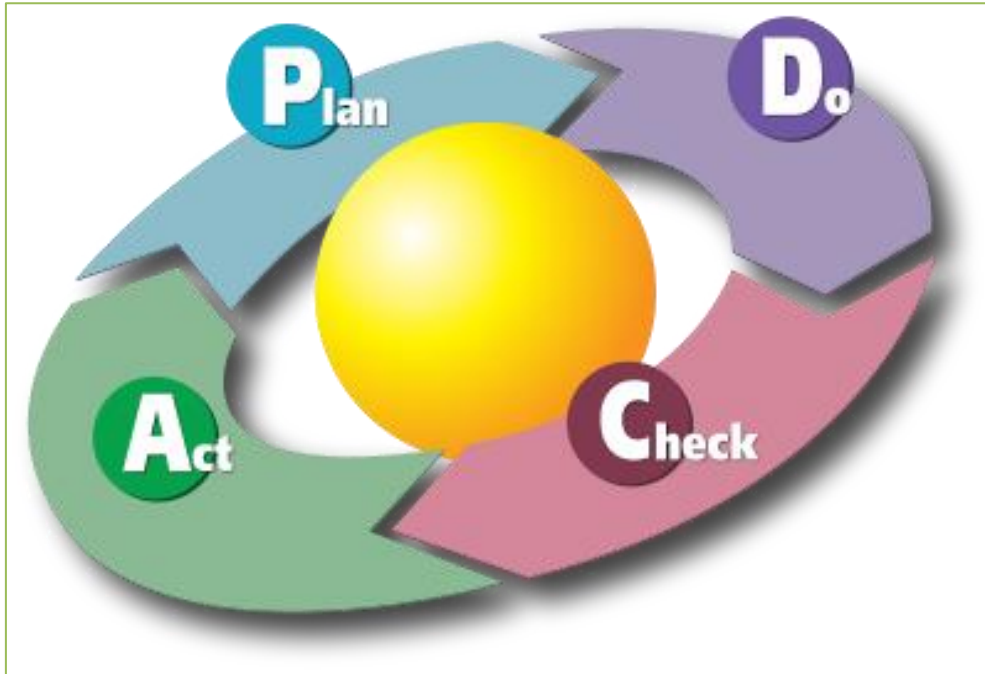


Figure 1-4: Deming Cycle of Continuous Improvement

1.6.1 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.

1.6.2 Do

Throughout the development’s life-span, the Developer must be required to develop and maintain a Quality Management System (QMS) – designed to enforce that best management practices are implemented in day-to-day management.

Such a QMS must at least include the following information:

- ✦ Location and extent of associated infrastructure;
- ✦ Associated activities, such as the transportation of people and equipment;
- ✦ Resources and experience required (staffing);
- ✦ Materials and equipment to be used;
- ✦ Management actions;
- ✦ Human resources used;
- ✦ Construction-monitoring activities;
- ✦ Emergency / disaster incident and reaction procedures; and
- ✦ Rehabilitation procedures for the impacted environment.

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

1.6.3 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. Monthly auditing of environmental performance is prescribed to prove and preserve accountability.

1.6.4 Act

The assessments and monitoring of the results and findings of the monthly audits must be documented within a reporting system. Precautionary mitigation measures and corrective actions must be prescribed and instructions must 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 as required by the ECO or KZN EDTEA to address the changing circumstances of the scheme.

It must be noted that this EMPr is a dynamic document that must be continually updated, as and when required. Any amendments made must be submitted to the KZN EDTEA Control Environmental Officer: EIA Component for approval prior to implementation.

1.7 Phasing of Tinley Manor Southbanks

It is noted that due to the large extent of the Tinley Manor Southbanks site, construction of Tinley Manor Southbanks is phased. The Tinley Manor Southbanks consists of ten (10) sub-phases in total as illustrated in **Figure 1-3**. Construction is expected to commence with sub-phase one and conclude with sub-phase ten.

Detailed sub-phasing layouts, including the service infrastructure requirements for each sub-phase are provided in **Appendix F**. It is noted that the issue of 'phasing' as relevant in terms of the EIA regulations has been considered and is addressed in the aEIAR. In short though, Tinley Manor Southbanks has been considered in entirety in the EIA process, thus including all 'construction phases' under the one authorisation process.

It is noted that all sub-phases form part of this EMPr and therefore, the EA and EMPr for the Tinley Manor Southbanks is at a high-level and assesses land use pockets at large. The EA must allow for flexibility with regard to specific infrastructure within the approved pockets.

The release of phases of land for development in Tinley Manor Southbanks is in accordance with an infrastructure programme and feasibility model. Each phase or phases will involve more detailed planning, design, specialist input as well as statutory approval through the relevant departments within the iLembe District and KwaDukuza Local Municipalities.

As construction is undertaken in a phased manner, each phase must be subject to all requirements of this EMPr and aspects must be repeated per phase, as required by the ECO.

1.8 Applicable Documentation

The following environmental documentation is applicable for the project, and must be read in conjunction with this EMPr:

- ✦ Environmental Authorisation for Tinley Manor Southbanks – *once issued*;
- ✦ Final Amended Environmental Impact Assessment Report for the Proposed Tinley Manor Southbanks;
- ✦ Water Use Licence for Tinley Manor Southbanks – *once issued*;
- ✦ DAFF Licence for the removal/ relocation of protected trees – *once issued*;

- ✦ Ezemvelo KZN Wildlife Permits for the removal / relocation of indigenous plants – *if required / to be confirmed*;
- ✦ Stormwater Management Plan for Tinley Manor Southbanks – *dated March 2017*;
- ✦ Wetland and Open space Rehabilitation Plan for Tinley Manor Southbanks – *once approved by DWS*; and
- ✦ Soil Management Framework Strategy for Tinley Manor Southbanks – *dated March 2017*.

1.9 Details of the Project Developer

The Developer is THD and the details of the responsible person are listed below.

Table 1-2: Details of the Project Developer

DEVELOPER	TONGAAT HULETT DEVELOPMENTS
Contact Person	Bheki Shongwe
Postal Address	P.O. Box 22319 Glenashley 4022
Telephone	+27 31 560 1937
Fax	+27 86 679 9243
E-mail	Bheki.Shongwe@tongaat.com

1.10 Details of the Environmental Assessment Practitioner

Royal HaskoningDHV have been appointed by the Developer as the Independent Environmental Assessment Practitioner (EAP) to prepare the EMPr. The team responsible for the preparation of the EMPr has been identified below:

Table 1-3: Details of the EAP

NAME	ORGANISATION	QUALIFICATION	TELEPHONE	EMAIL
Humayrah Bassa	Royal HaskoningDHV	MSc Environmental Science	<u>087 350 6760</u>	humayrah.bassa@rhdhv.com
Bronwen Griffiths	Royal HaskoningDHV	MSc Conservation Biology	021 936 7714	bronwen.griffiths@rhdhv.com
Malcolm Roods	Royal HaskoningDHV	BA (Hons) Geography and Environmental Management	011 798 6442	malcolm.roods@rhdhv.com

2 SITE DESCRIPTION

2.1 Location and Ownership

The proposed Tinley Manor Southbanks site is located on the eastern seaboard of KwaZulu-Natal, in the KwaDukuza Municipality, approximately 10 km north of the greater Ballito area (also referred to as the Dolphin Coast), 25 km from the King Shaka International Airport (KSIA) and 50 km north of Durban.

Current access to the site is via the N2 which forms the backbone of the eThekweni-uMhlathuze Provincial development corridor that connects the ports of Durban and Richards Bay.

The site is bounded by two significant natural features of the Umhlali River Estuary to the north and Christmas Bay and the Indian Ocean to the east. The regional N2 freeway traverses a small part of the western portion of the site with the partly developed low density residential estate of Seaton Delaval forming the southern boundary.

The site, prior to development, is zoned as agriculture and is currently under sugarcane cultivation.

Table 2-1 provides a list of properties affected by the Tinley Manor Southbanks. Tongaat Hulett own all four (4) properties.

Table 2-1: List of Properties and Landowners

PROPERTY DESCRIPTION	OWNERSHIP	SG 21 DIGIT CODE
Rem of the Farm Greywater No. 18435	Tongaat Hulett	N0FU0333018435000000
Rem of Sub 44 of Lot 69 No. 917	Tongaat Hulett	N0FU03330009170000044
Sub 11 of Lot 69 No. 917	Tongaat Hulett	N0FU03330009170000011
Rem of Portion 83 of the Farm Lot 69 No. 913	Tongaat Hulett	N0FU03330009130000083

2.2 Sensitive Environments

2.2.1 Geology and Soils

The site is predominantly underlain by likely sandstone, shale and siltstone of the Vryheid Formation and the residual and colluvial soils derived therefrom. These rocks have been intruded by dolerite dykes and sills of the Karoo Sequence. Furthermore the coastal portions of the site are underlain by Berea Formation sediment and Recent Aeolian Dune sand that typically overlies this material.

In general, the clayey colluvial and residual soils overlying the weathered bedrock, and to a lesser extent the sandy clayey Berea Formation where present, are likely to be moderately to highly active. As such these materials will undergo volume changes with fluctuations in moisture content. Furthermore, the sandy Berea Formation and Recent Aeolian Dune sand are likely to have a moderate to high collapse potential.

2.2.2 Vegetation and Fauna

The vegetation on the site is relatively transformed for the most part, with the sugarcane activities and the plantations having removed the traditional land cover and replaced it with high intensity agriculture. There are pockets of vegetation that are still representative of what one would expect to find in a less transformed area. The isolated pockets of vegetation that are still of a high quality and provide a valuable functional role has been considered in the proposed layout.

The vegetation in general terms, apart from the "Primary Dune" areas and portions of the vegetation closest to the mouth of the Umhlali River, are relatively disturbed and transformed. The vegetation could not be considered pristine, due to the impacts of agricultural practices taking place on their periphery and the effects of alien invasive vegetation being prevalent within the species assemblage.

In order to simplify and identify the various vegetation communities on site, the various communities have been separated into homogenous units. The following communities have been identified on site:

- ✦ Incised Wetland Areas;
- ✦ Open Valley Bottom Wetlands;
- ✦ Umhlali River and Associated riparian vegetation;
- ✦ Fallow Lands re-colonised by indigenous and alien vegetation; and
- ✦ “Primary Dune” Areas.

2.2.2.1 Incised Wetland Areas

The incised wetland areas are restricted to the steepest portions of the site. These areas are represented in **Figure 2-1**.

The plant species contained within these areas are predominantly woody in nature and well established. The typical structure of this vegetation type is comprised of numerous large woody species which create a closed canopy over the incised drainage lines, with limited indigenous plant species comprising the under-storey. The limited indigenous species result from the presence and high abundance of alien invasive species which are able to out-compete the indigenous under-storey species.

The most prevalent species associated with these areas were: *Dracaena alectrifomis*, *Clerodendrum glabrum*, *Rhoicissus tomentosa*, *Isoglossa woodii*, *Trichilia emetica*, *Drypetes arguta*, *Dalbergia armata*, *Dalbergia obovata*, *Brachylaena discolor*, *Canthium inerme*, *Setaria megaphylla*, *Combretum kraussii*, *Drimiopsis maculata*, and *Bridelia micrantha*.

Other species which were identified, but less common include, *Scadoxus puniceus*, *Ekebergia capensis*, *Cryptocarya latifolia*, and *Commiphora harveyi*.

Common alien species growing within this area were *Anredera cordifolia*, and *Ipomoea purpurea*.

This incised system sits above the Sheffield Waste Water Treatment Works (WWTW) and can be described as relatively intact.

In addition, it must be noted that it includes three species of importance. *S. puniceus* and *D. maculata* are protected under the KwaZulu-Natal Nature Conservation Ordinance. The third species, *C. latifolia*, is Red-Listed and noted as declining in the wild as a result of bark harvesting for the *muthi* trade and also due to direct habitat destruction. Although deemed to be declining, this tree species is considered resilient and will persist within degraded drainage lines – but only if protected from bark harvesting and further habitat loss.

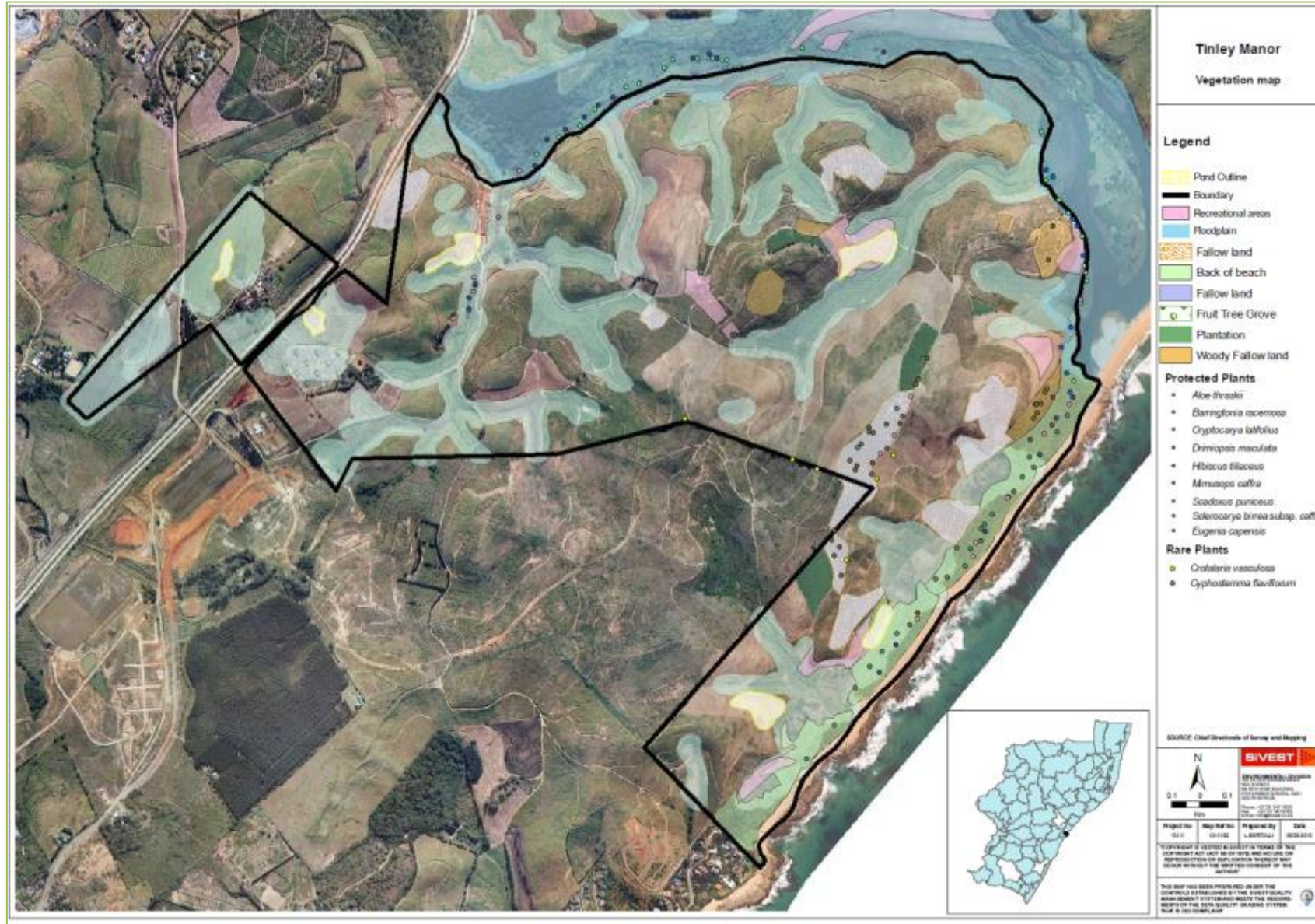


Figure 2-1: Tinley Manor Southbanks Vegetation Map

2.2.2.2 Open Valley Bottom Wetlands

The Open Channel Valley Bottom Wetlands are characterised by an “open channel”, i.e. they are not confined within the landscape by steep slopes adjacent thereto. The topography of the area determines their area, with the flows being typically confined to subsurface flows through the soil profile. The caveat being that in high rainfall events surface flow is registered, whilst in other areas the presence of topographical features where the water does daylight are found. In addition, numerous portions of the wetlands have been canalised (drainage of the wetlands to reduce soil moisture) to facilitate historic sugarcane planting within their rich and fertile soils.

In these open wetland systems the vegetation component is significantly different compared with the incised channel wetlands. The vegetation is dominated by *Cyperus* species and Graminoids (members of the Poaceae – grass family). The most common species encountered were *Typha capensis*, *Phragmites australis*, *Cyperus dives*, *Cyperus latifolius*, *Cyperus denudatus*, *Cyperus compressus*, *Pycnus polystachys*, *Mariscus macrocarpus*, and *Mariscus solidus*. Other species which were recorded, but not in high abundances and usually in restricted stands within the greater wetland, were; *Eleocharis limosa*, *Bulbostylis hispidula*, and *Isolepis prolifera*. In terms of the herbaceous species which were noted as being common within the wetland boundaries, *Ethulia conyzoides* was dominant. To a lesser extent and more isolated in their overall distribution across the wetland systems and their associated buffers, *Desmodium dregeanum*, *Priva cordifolia*, *Helichrysum ruderale*, and *Ludwigia octovalvis* occur.

Numerous alien invasive plant species are associated with the wetlands on site, as these areas were often historically deemed to be “waste” areas, as agricultural pursuits were not taking place within their boundaries. The most commonly occurring aliens therein are *Lantana camara*, *Solanum mauritianum*, *Chromolaena odorata*, *Eclipta prostrata*, *Ageratum conyzoides*, *Phragmites mauritiana*, *Ipomoea purpurea*, *Ambrosia artemisiifolia*, *Cyperus esculentus*, *Canna indica*, *Paspalum notatum*, *Eragrostis ciliaris*, *Cuscuta* sp., and *Verbena bonariensis*.

2.2.2.3 Umhlali River and Associated Riparian Vegetation on the Floodplain

The upper reaches of the Umhlali River, in close proximity to the N2, is heavily sedimented. This sedimentation has allowed for the establishment of preferential flow paths which remain open for water flow, with sediment islands forming and being maintained by the establishment of vegetation thereon. A large proportion of the vegetation growing on these islands is dominated by *Phragmites australis*. Within the channels *Ischaemum afra*, *Setaria sagittifolia*, and *Leersia hexandra* are dominant.

The river banks are dominated for the most part by *Barringtonia racemosa*, *Bridelia micrantha*, and *Trichilia emetica*. It is assumed that the majority of these trees have been planted rather than merely naturally established. The reasoning is that the trees for the most part appear to be relatively young c.a. 20 years old, they are all of a similar size and appear to be planted / positioned on the lip of the channel, allowing for maximum utilisation of the adjoining floodplain for sugarcane cultivation. In amongst these planted indigenous species a range of exotic species have established, namely, *Schinus terebinthifolius*, *Montanoa hibiscifolia*, *Tithonia diversifolia*, *Melia azedarach*, and *Eucalyptus* sp. have established.

In the lower reaches and just behind the beach area, the vegetation along the estuary is dominated by *Hibiscus tiliaceus*, a protected tree species under the KwaZulu-Natal Nature Conservation Ordinance. In addition to this species other species present in the assemblage are *Barringtonia racemosa* (protected under the National Forests Act), *Derris trifoliata*, *Ipomoea cairica*, and *Rhoicissus rhomboidea*. The remainder of the vegetation occurring in this area is on the periphery of the wooded portions and is comprised on the following *Paspalum urvillei*, *Centella asiatica*, *Ipomoea purpurea*, *Ipomoea alba*, *Stenotaphrum secundatum*, *Setaria sagittifolia*, *Ethulia conyzoides*, *Ludwigia octovalvis*, and *Phragmites australis*.

The majority of the above mentioned species fall within the wetland areas that are associated with the riparian collar that runs the length of the estuary. Within the actual estuary, *Phragmites australis* is the dominant fringing species and where tall species, such as, *P. australis* are precluded by shading; the dominant submerged species is *Potamogeton pusillus*.

The consideration above has led to sensitive areas based on the presence of this riparian zone being designated. This area is denoted in **Figure 2-1** and will not be allowed to be developed as the vegetation in this area is deemed to be extremely sensitive and plays a significant role in protecting the banks of the Umhlali River and associated Estuary.

In addition, the floodplain area which sits adjacent to the riparian vegetation fringing the River (as indicated), is also not deemed permissible to receive development either.

2.2.2.4 Fallow Lands Non-Woody

Fallow lands are deemed to be agricultural lands that are no longer used for agricultural purposes – the time period varies. In this specific case these areas are those areas where sugarcane production has ceased. The fallow lands were split according to the colonising vegetation type.

The non-woody fallow lands area is characterised by vegetation dominated for the most part by herbaceous and woody herbaceous species. The most commonly occurring indigenous plant species are *Helichrysum kraussii*, *Triumfetta rhomboidea*, *Chamaecrista mimosoides*, *Crotalaria lanceolata*, *Commelina benghalensis*, *Melinis repens*, *Eragrostis ciliaris*, *Panicum maximum*, *Kyllinga* sp., *Hewittia malabarica*, *Wahlenbergia grandiflora*, *Alectra sessiliflora*, *Abutilon sonneratianum*, *Rhynchosia caribaea*, *Helichrysum ruderales*, and *Asystasia gangetica*.

Interspersed within this matrix of herbaceous and graminoid species were some woody shrubs and tree species. The following tree species were recorded: *Trema orientalis*, *Erythrina lysistemon*, *Clerodendrum glabrum*, and *Trichilia emetica* subsp. *emetica*. *Chrysanthemoides monilifera* was an abundant woody shrub within the grassland matrix.

There were also a relatively high proportion of alien invasive species present within the plant species assemblage. The most prevalent species were; *Melia azedarach*, *Schinus terebinthifolius*, *Chromolaena odorata*, *Lantana camara*, *Euphorbia* sp., *Spilanthes decumbens*, *Oenothera stricta*, *Gomphrena celosioides*, *Richardia brasiliensis*, *Plectranthus barbatus* var. *grandis*, *Bidens pilosa*, and *Taraxacum officinale*.

In an isolated section of the fallow lands, there are quite a number of different species to the ones mentioned above. It is assumed that as this area lies adjacent to an old cadastral boundary demarcated by woody vegetation, and the potential exists for the woody vegetation to act as a reservoir for plant species. The following species were recorded over and above the species mentioned previously; *Vigna vexillata*, *Blumea alata*, *Solanum panduriforme*, and *Crotalaria vasculosa*. The last species is a ruderal species (i.e. primary colonising alien invasive species), however, it is not a commonly recorded species south of Richards Bay and thus makes this an interesting record.

2.2.2.5 Fallow Lands Woody

The woody fallow lands area relates to those areas dominated by woody colonising species.

This designation of land cover for the most part was restricted to the Primary Dune areas and some isolated fragments in close proximity to the Umhlali River.

The most dominant species in these areas is *Chrysanthemoides monilifera* which is a woody herbaceous species. Its growth form is such that it forms dense stands which prevent, through shading out, smaller herbaceous and graminoid species from establishing. In addition, these species stabilise the loose soils that are associated with this site.

These stands of *C. monilifera* are punctuated by a number of woody species. The following species were commonly occurring: *Eugenia capensis*, *Brachylaena discolor*, *Mimusops caffra*, and *Allophylus natalensis*. Two of the species above are protected, namely, *M. caffra* is protected by the National Forests Act, and *E. capensis* by the KwaZulu-Natal Nature Conservation Ordinance. In the event that these areas be disturbed in anyway and the two protected species are required to be removed / destroyed or uplifted, a licence from DAFF and permit from Ezemvelo KZN Wildlife must be required, respectively. It must be clearly stated that the establishment of these species is opportunistic, and all of the individuals encountered were small and have

established themselves within the last 10 years. This factor may make relocation out of the development footprint possible and with an expected high level of success.

Other species were also associated with this vegetation community, were recorded in lower abundances. The following species were recorded: *Erythrina lysistemon*, *Scutia myrtina*, *Searsia chirindensis*, *Clerodendrum glabrum*, and *Deinbollia oblongifolia*.

Other plant species were also recorded within these zones, were relatively sparsely distributed and were not contributing at a significant level in terms of biomass or conservation significance and thus are not specified in this consideration.

2.2.2.6 Primary Dune and Coastal Dune Scrub / Forest

In terms of size and value the primary dune and coastal dune scrub / forest areas provide the most significant conservation and diversity maintenance option that currently exists on the site. In addition, these areas are perforated by wetlands, which feed from the secondary dune slope and crest down onto the back of dune environment, prior to flowing into the sea.

On the base of the secondary dune, agricultural practices for the most part have ceased and these are demarcated in **Figure 2-1**. The vegetation contained within this area is as described in **Section 2.2.2.5**.

2.2.2.7 Primary Dune

In the Primary Dune area, the vegetation is a combination of indigenous pioneer species and alien invasive species. The vegetation is thick and almost impenetrable and lacks an under-storey.

The most common woody shrubs are: *Chrysanthemoides monilifera* and *Lantana camara*. Within this are clumps of woody species usually centred on individuals of *Brachylaena discolor*.

Associated with these species were the following woody species: *Pavetta revoluta*, *Dracaena alectrifomis*, *Scutia myrtina*, *Ficus natalensis*, *Putterlickia verrucosa*, and *Tricalysia sonderiana*.

Numerous creeper species were also encountered, the majority of which were associated with the woody species however, one species, namely, *Tragia glabrata* var. *glabrata* was commonly occurring only on the woody shrubs.

The other species which was common clumps. was *Asystasia gangetica*. *Rhoicissus digitaria* and *R. rhomboidea* were only found in the woody vegetation

The primary dune vegetation can thus be classified as an early successional vegetation state that is dominated by pioneer species. With time and limited interventions this successional stage will alter the microhabitat and climate and, if left undisturbed, will lead to later successional species. The species composition at this stage will have shifted from woody shrubs to woody species and later forest which is composed of a clearly defined tree layer and an under-storey layer. It must be determined whether the intent is to manage to maintain at this early successional stage, or whether at least parts must be allowed to move onto natural higher succession stages.

2.2.2.8 Fore Dune

The fore dune area between the crest of the fore dune and leading down towards the beach the vegetation is markedly different to the primary dune area. As mentioned above the vegetation in this zone is representative of forest, with a clearly defined and stratified layering of vegetation.

The most commonly occurring woody species within the core of this area, where the vegetation has not been exposed to the elements are: *Mimusops caffra*, *Cussonia zuluensis*, *Gymnosporia arenicola*, *Ficus natalensis*, *Dovyalis rhamnoides*, *Putterlickia verrucosa*, *Brachylaena discolor*, *Allophylus natalensis*, *Canthium inerme*, and *Grewia occidentalis*.

In terms of non-woody vegetation the most common species were *Dracaena alectrifomis*, *Isoglossa woodii*, *Carissa bispinosa*, *Rhoicissus digitaria*, *Secamone alpini*, and *Cynanchum obtusifolium*.

This portion of the site plays an important role in dune stabilisation as well as preventing blowouts (i.e. collapse of the dune front in specific areas) from occurring. The proposed development will remain outside of these areas and thus the management of these areas must only see the intermittent clearing of alien vegetation.

2.2.2.9 Beach and Frontal Vegetation

The vegetation on this portion of the site is typical of vegetation that is exposed to the elements and salt spray. The vegetation stunted and for the most part is hardy vegetation.

The most common species that were seen on the beach and slightly beyond were: *Aloe thraskii*, *Ipomoea pes-caprae*, and *Chrysanthemoides monilifera*.

This vegetation will remain unaffected by the development layout and will continue to deliver valuable stabilisation and protection of the vegetation beyond. It will also remain as the characteristic vegetation associated with beaches in terms of the tourism aspect.

Any access to the beach (existing or new) will obviously have to consider this sensitive vegetation, especially in ways of minimising movement through the vegetation, as well as changes to Aeolian sand deposition and dune morphology.

2.2.2.10 Areas adjoining the Road to Beach and where Sugarcane is still planted

The vegetation along the ecotone (i.e. disturbed edge impacted upon by anthropogenic influences) between the beach and the sugarcane, as separated by the access roads to the beach, has a very different suite of plant and woody species occurring on it.

The most commonly occurring woody species are *Eugenia capensis*, *Gymnosporia arenicola*, *Maytenus procumbens*, *Ficus burtt-davyi*, *Allophylus natalensis*, *Clerodendrum glabrum*, and *Psychotria capensis*. The vegetation as a result of exposure due to the open area created by the road is relatively short and in some cases stunted. Many of the woody species are multi-stemmed species as a result of the climate in which they are living.

A relatively unusual record was *Sclerocarya birrea* subsp. *caffra* which was growing next to a roadway that bisects the Dune Scrub / Forest. It was in all likelihood a result of a monkey and/or human eating the fruit and throwing the seed into the vegetation at the side of the roadway.

Other species of herbaceous plant and creeper that were identified in these areas were: *Gloriosa superba*, *Cyphostemma flaviflorum*, *Cynanchum obtusifolium*, *Grewia occidentalis*, *Scadoxus puniceus*, *Deinbollia oblongifolia*, *Commelina benghalensis*, and *Desmodium incanum*.

2.2.3 Water Resources

2.2.3.1 Catchment and Drainage

The study area falls within the Mkomazi Primary catchment. More specifically, the study area is situated in quaternary catchment U30E. The study area / catchment is characterised by a series of undulating ridges and steep valleys. Drainage from the site is towards the Umhlali River.

Two broad geologies dominate the site. The western portion of the property is underlain by shale and this has led to the development of generally narrow, steeply incised drainage features across this portion. The eastern portion of the site by contrast is characterised by deep sands and the valleys tend to be broader and shallower. The secondary dunes on site are very high and slope steeply down towards the coast. Seepage from the base of these features has formed a band of wetlands between the dunes and the sea.

2.2.3.2 Wetlands

The following wetland hydrogeomorphic units were identified in the study area (**Figure 2-2**):

- ✦ Six (6) channelled valley bottom wetlands;
- ✦ Seven (7) unchannelled valley bottom wetlands;
- ✦ Fifteen (15) hillslope seep wetlands; and
- ✦ One (1) floodplain wetland.

A wetland catchment and area analysis was undertaken to delineate each wetlands catchment area as well as to determine the extent of the wetlands. The results are presented in **Table 2-2**.

Table 2-2: Wetland Areas and Wetland Catchment Areas

NAME	WETLAND AREA (ha)	WETLAND CATCHMENT AREA (ha)
Channelled Valley Bottom Wetland 1	5.15	117.45
Channelled Valley Bottom Wetland 2	8.42	177.54
Channelled Valley Bottom Wetland 3	1.32	24.40
Channelled Valley Bottom Wetland 4	2.39	22.11
Channelled Valley Bottom Wetland 5	5.06	28.86
Channelled Valley Bottom Wetland 6	9.40	85.73
Hillslope Seep Wetland 1	1.62	4.84
Hillslope Seep Wetland 2	2.85	25.50
Hillslope Seep Wetland 3	1.19	7.01
Hillslope Seep Wetland 4	4.83	23.94
Hillslope Seep Wetland 5	4.47	13.91
Hillslope Seep Wetland 6	1.14	10.67
Hillslope Seep Wetland 7	0.34	3.43
Hillslope Seep Wetland 8	0.11	1.60
Hillslope Seep Wetland 9	0.13	2.90
Hillslope Seep Wetland 10	0.83	3.59
Hillslope Seep Wetland 11	2.13	15.66
Hillslope Seep Wetland 12*	0.22	-
Hillslope Seep Wetland 13	4.59	13.64
Hillslope Seep Wetland 14	0.59	8.09
Hillslope Seep Wetland 15	0.53	4.28
Unchannelled Valley Bottom Wetland 1	0.46	5.88
Unchannelled Valley Bottom Wetland 2	6.33	81.85
Unchannelled Valley Bottom Wetland 4	4.07	52.87
Unchannelled Valley Bottom Wetland 5	3.13	16.36
Unchannelled Valley Bottom Wetland 6	1.72	21.16
Unchannelled Valley Bottom Wetland 7	5.12	11.55
Unchannelled Valley Bottom Wetland 8	1.17	99.16
Umdlali Floodplain Wetland	93.260	24,914.22

* Note – Wetland Catchment Area could not be calculated due to limited wetland extent and the level of contour detail available (5 m) limitations.

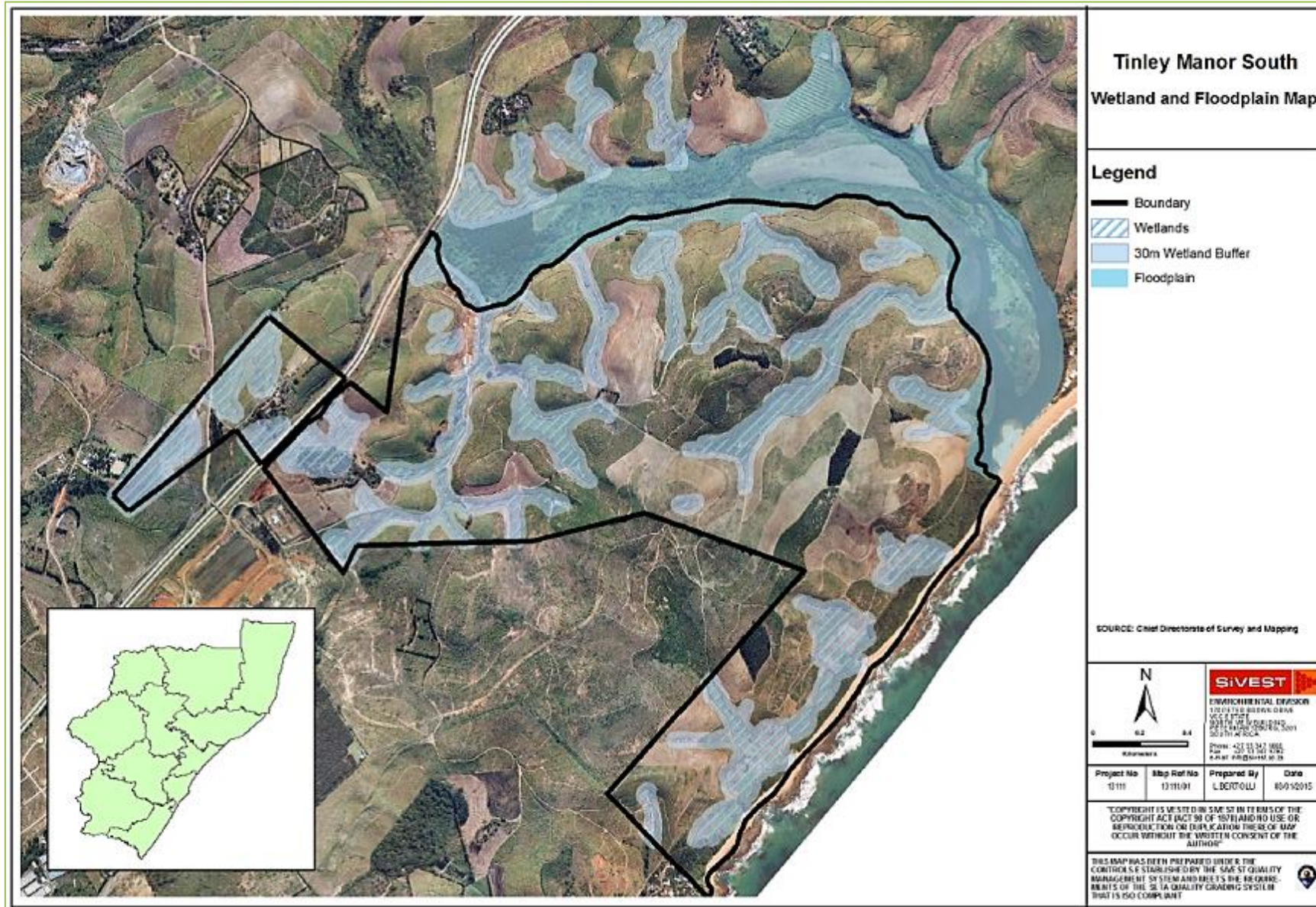


Figure 2-2: Wetlands within the Tinley Manor Southbanks Site

The area allocation per type is as follows:

- ✦ The channelled valley bottom wetlands range in size from 1.32 ha to 9.40 ha. Wetland catchment size for the channelled valley bottom wetlands vary greatly from a minimum of 22.11 ha to a maximum of 177.54 ha.
- ✦ The unchannelled valley bottom wetlands are more limited in extent ranging from a minimum of 0.46 ha to 6.33 ha. Wetland catchment size is similarly limited in extent and range from 5.88 ha to 99.16 ha.
- ✦ The hillslope seep wetlands are very limited in extent by comparison to the other two wetland types with the smallest hillslope seep wetland measuring 0.11 ha whilst the biggest hillslope seep wetland measures 4.83 ha.
- ✦ Corresponding wetland catchment areas are equally limited by comparison to the other wetland types ranging from a minimum of 1.60 ha to a maximum of 25.50 ha.
- ✦ The floodplain wetland however is relatively extensive by comparison to the other wetland types measuring 93.26 ha in extent. The wetland catchment is therefore likewise quite large by comparison encompassing an area of approximately 1,112.00 ha.

Overall, it can be stated that the wetlands falling within the study area are generally not extensive systems with the exception of the Umhlali floodplain wetland. Most are quite small (< 10 ha) in size, and have localised and limited catchment areas that are contained within the study area.

The topography is a strong factor dictating the wetland type and characteristics in the study area. Relatively steep hills and sandy / loamy substrate provide a permissible template for the development of seasonal hillslope seep wetlands on the mid slopes. This wetland type was also the most commonly occurring wetland.

Drainage into the valley bottom areas gives rise to the occurrence of the channelled and unchannelled valley bottom wetlands. The valley bottom wetlands are generally narrow and constrained by hilly topography. The wetlands are seasonal to permanently inundated.

The Umhlali River is the primary water input to the Umhlali floodplain wetland. Progressive development of the floodplain wetland as a result of yearly inland flows and flood events has resulted in scouring out of a wide valley bottom area, susceptible to the deposition of sediments in the valley bottom. The substrate of the floodplain wetland contains mainly unconsolidated sandy sediments along with fine grained clay particles giving rise to permanent, seasonal and temporarily inundated areas.

2.2.4 Umhlali River and Estuary

The Umhlali Estuary (29°27'36"S; 31°16'41"E) (**Figure 2-3**) is situated approximately 68 km north-east of Durban and is classified as a subtropical, temporarily open/closed estuarine system. Estimations of the length of the Umhlali River range between 38 km and 55 km, draining a catchment area ranging between 256 km² and 331 km², and with a mean annual run-off between 49.85 and 59.76 x 106 m³.

Historically, the catchment area, and most of the land surrounding the estuary, was under sugarcane cultivation, which persists today.

The boundaries of the Umhlali Estuary are defined by the estuarine functional zone (**Figure 2-3**), that is, the area extending from the estuary mouth upstream to where the 5 m amsl contour crosses the river course, which is approximately 750 m upstream of the N2 bridge and laterally up to the 5 m topographical contour. This area is 129 ha in extent and is 5 km long, The estuarine functional zone encompasses the natural features of an estuary, including the water body, the flood plain, estuarine habitats and vegetation, as well as the dynamic processes, such as backflooding and tidal fluctuations, which characterise an estuarine environment.

The estuary comprises two channels, namely a northern and southern arm, separated by a large central island, a part of which is still planted with sugarcane. Saline intrusion in the main northern arm channel is however, restricted by a weir, reducing the extent of the estuary to some 2.6 km upstream of the mouth. A maximum depth of 1.3 m in the northern channel was recorded in the literature, presumably during open mouth conditions, while other literary sources recorded a maximum depth of ca. 2.3 m during closed conditions in the northern channel.

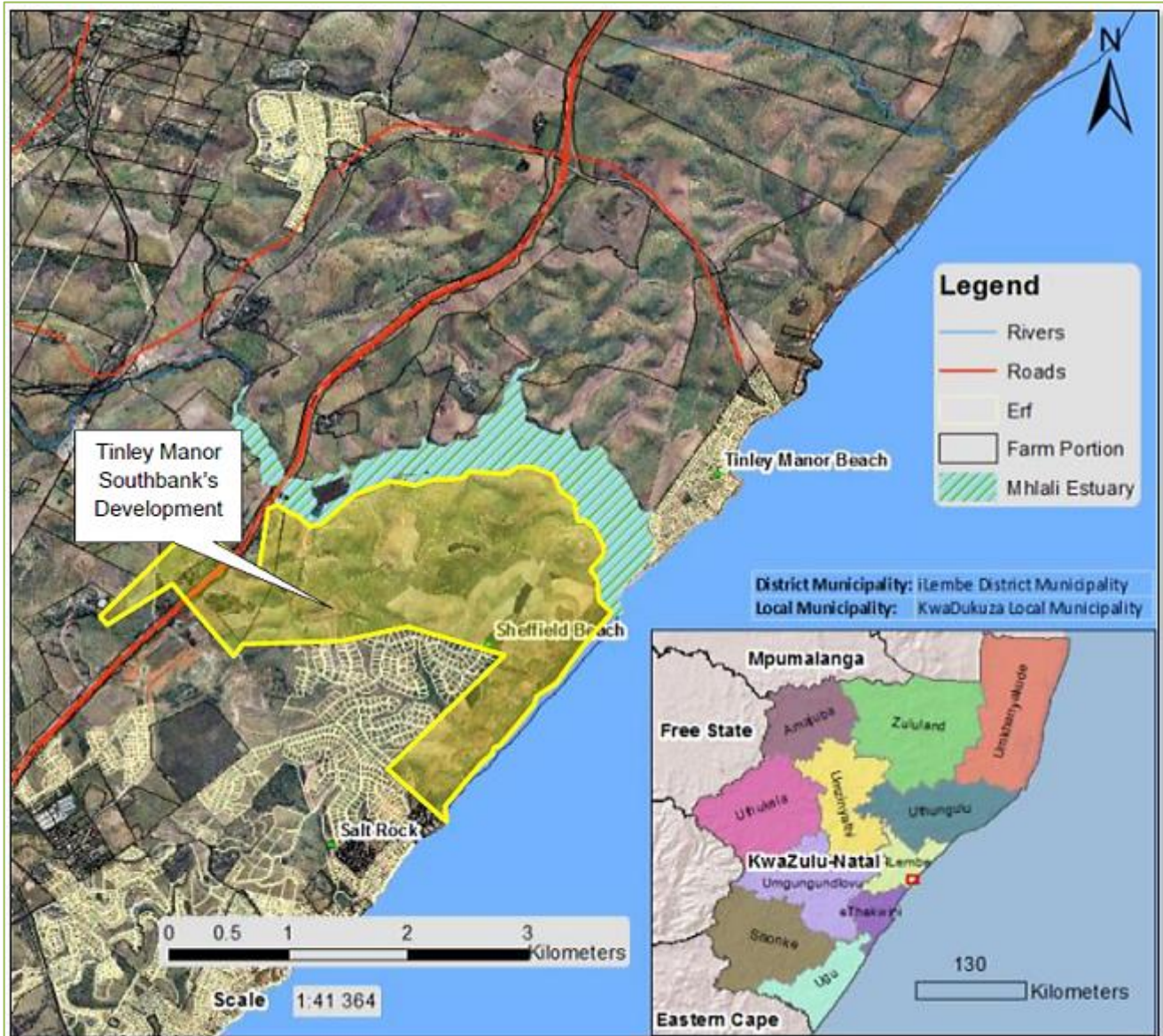


Figure 2-3: Location of the Umhlali Estuary

2.2.5 Coastal Zone

The proposed coastal setback line and limited development line¹ impose development constraints on the northern and eastern boundary of the site.

The proposed coastal setback line demarcates an area within which development must be prohibited or controlled in order to achieve coastal management objectives, specifically protecting development from coastal processes.

The limited development line is required to maintain biodiversity of the coastal region, allow for heritage issues or in some cases to address other issues such as shading by buildings and public access or amenity.

The development proposal must enforce that only unavoidable infrastructure is placed within these constraint lines and this must include, but limited investment and easily replaceable access and service infrastructure that would not impact on the objectives of the setback lines.

¹ The designation of the now 'Coastal Management Line', formally 'Coastal Setback Line' will be undertaken by the KZN EDTEA. The proposed lines indicated above were determined using the then approved KZN methodology and apply the precautionary principle.

2.2.6 Heritage

Two occurrences of unmarked ancestral graves are recorded on the Tongaat Hulett Estates' database and are located within non-development zones of the current proposal due to steepness of slope and the underlying lithography.

The first occurrence of unmarked graves is approximately 100 x 50 m in size. The GPS co-ordinates of this occurrence are as follows: 29°27.334'S 31°15.061'E (**Figure 2-4**).

The second occurrence of unmarked graves is a line of graves on the boundary line of S&P Farm between the following two co-ordinates: 29°27.544'S 31°15.013'E to 29°27.453'S 31°14.814'E (**Figure 2-4**).



Figure 2-4: Grave Locations

2.2.7 Summary of Sensitive Areas

The graves presented in **Figure 2-4** as well as a 20 m buffer around the grave sites are to be considered a strict 'No-Go' area. The key environmental systems which make up the 'No-Go' areas unless specifically authorised for construction workers to access in a controlled manner are presented in **Figure 2-5**.

These include:

- ✦ Umhlali River and Estuary (including the floodplain and setback);
- ✦ Coastal Dune Zone / Forest including setback;
- ✦ Pockets of indigenous vegetation;
- ✦ Protected Plant species;
- ✦ Indigenous Plant species; and
- ✦ Wetlands areas (including 30 m buffer and wetland areas to be 'lost').

The specific 'no-go' areas are illustrated in **Figure 7-1**.

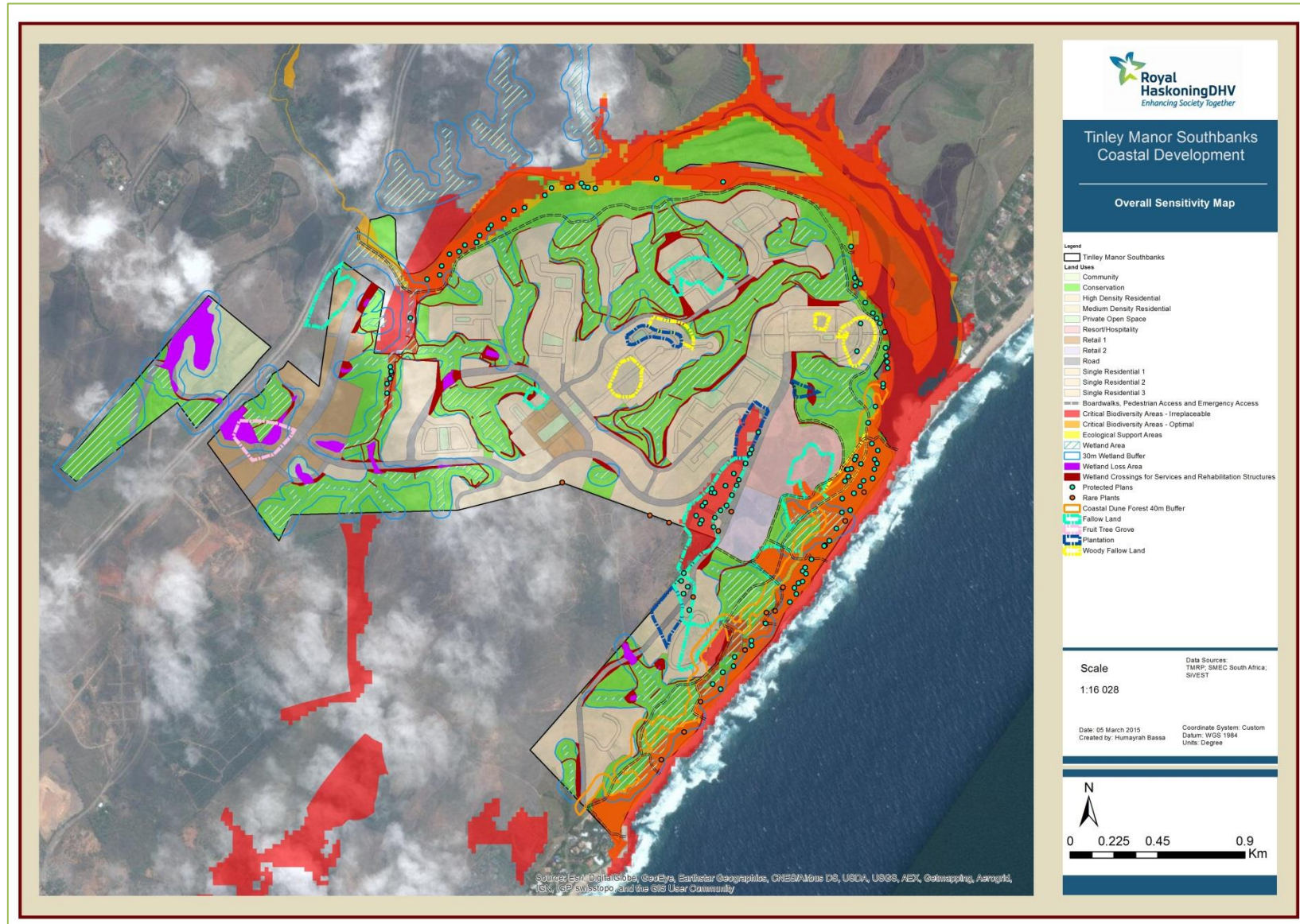


Figure 2-5: Key Sensitive Environments which are 'No-Go' Areas

3 LEGAL FRAMEWORK

Construction must be according to the industry best practice, as identified in the project documents.

This EMPr, which forms an integral part of the contract documents, informs the contractor as to his/her duties in the fulfilment of the project objectives, with particular reference to the prevention and mitigation of environmental impacts caused by construction activities associated with the project. The contractor must note that obligations imposed by the EMPr are legally binding in terms of environmental statutory legislation and in terms of the additional conditions to the general conditions of contract that pertain to this project.

In the event that any rights and obligations contained in this document contradict those specified in the standard or project specifications then the latter will prevail.

It is expected that the contractor is conversant with all legislation pertaining to the environment, including provincial and local government ordinances, which must be applicable to the contract. Some of the environmental legislation applicable to the construction and operation of Tinley Manor Southbanks include, but are not limited to, the following environmental legislation:

Table 3-1: Legal Framework²

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)	GNR 543 – Sections 28, 31, 32, 33, 54	Content of scoping reports (Section 28), Environmental Impact Assessment reports (Section 31), specialist report and reports on specialised processes (Section 32), content of draft environmental management programmes (Section 33) and the public participation process (Section 54).
	GNR 544 – Listing Notice 1	Activities requiring a Basic Assessment study to be undertaken.
	GNR 545 – Listing Notice 2	Activities requiring a Scoping and Impact Assessment study to be undertaken.
	GNR 546 – Listing Notice 3	Activities in special geographical areas requiring a Basic Assessment study to be undertaken.
EIA Regulations (2014)	GNR 983 – Listing Notice 1	Activities requiring a Basic Assessment study to be undertaken.
	GNR 984 – Listing Notice 2	Activities requiring a Scoping and Impact Assessment study to be undertaken.
	GNR 985 – Listing Notice 3	Activities in special geographical areas requiring a Basic Assessment study to be undertaken.
National Environmental Management: Waste Act (Act No. 59 of 2008)		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
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.
Environment Conservation Act (Act No. 73 of 1989) and regulations	Sections 19 and 19A	Prevention of littering by employees and sub-contractors during construction and the maintenance phases of the proposed project.
National Environmental Management: Integrated Coastal Management Act (Act No. 24 of 2008)		<p>The NEM:ICMA aims to facilitate the implementation of the principles and guidelines presented by the White Paper and has a number of objectives including:</p> <ul style="list-style-type: none"> - The provision of a legal and administrative framework to promote cooperative, coordinated and integrated coastal management; - The protection of the natural coastal environment as a national heritage; - The management of coastal resources in the interests of the whole community; - The promotion of equitable access to the resources and benefits provided by the coast; and - The fulfilment of South Africa’s obligations under international law. <p>The NEM:ICMA requires that activities that are potentially harmful to the coastal zone are considered.</p>
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.
	Section 38	This section provides for Heritage Impact Assessments (HIAs), which are not already covered under the ECA. Where they are covered under the ECA the provincial heritage resources authorities must be notified of a proposed project and must be consulted during the HIA process. The Heritage Impact Assessment (HIA) must be approved by the authorising body of the provincial directorate of environmental affairs, which is required to take the provincial heritage resources authorities' comments into account prior to making a decision on the HIA.
National Environmental Management: Air Quality Act (Act No. 39 of 2004)	Section 32	Control of dust.
	Section 34	Control of noise.
	Section 35	Control of offensive odours.
National Dust Control Regulations (2013)	GNR 827 of 1 November 2013	The purpose of the Regulations is to prescribe general measures for the control of dust in all areas. A standard for the acceptable dust fall rate is prescribed for residential and non-residential areas. Failure to comply with the standard for dust fall may result in an air quality officer directing the person in question to undertake a dust fall monitoring programme, submission of dust fall monitoring reports and dust fall management plans as well as the undertaking of continuous

LEGISLATION	SECTIONS	RELATES TO
		ambient air quality monitoring.
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 (a)	Abstraction of water.
	Section 21 (b)	Storage of water.
	Section 21 (c)	Impeding or diverting of flow of water in a watercourse.
	Section 21 (i)	Altering the bed, bank, course or characteristics of water in a watercourse.
	Section 21 (g)	Irrigation of water that could potentially be harmful.
Minerals and Petroleum Resources Development Act (Act No. 28 of 2002)	Section 22	Application for a mining right.
	Section 39	Environmental management programme and environmental management plan.
National Environmental Management Biodiversity Act (Act No. 10 of 2004) and regulations: <ul style="list-style-type: none"> ▪ Threatened or protected species (GNR 388) ▪ Lists of species that are threatened or protected (GNR 389) ▪ Alien and invasive species regulations (GNR 506) ▪ Publication of exempted alien species (GNR 509) ▪ Publication of National list of invasive species (GNR 507) ▪ Publication of prohibited alien species (GNR 508) 		Provide for the protection of species and ecosystems that warrant national protection and the sustainable use of indigenous biological resources.
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.
Hazardous Substances Act (Act No. 15 of 1973) and regulations		Provides for the definition, classification, use, operation, modification, disposal or dumping of hazardous substances.

LEGISLATION	SECTIONS	RELATES TO
Asbestos Regulations (2001)	Section 19	Labelling, packaging, transportation and storage of asbestos.
	Section 20	Disposal of asbestos.
National Road Traffic Act (Act No. 93 of 1996)		Road safety.
Town Planning and Townships Ordinance (No. 15 of 1986)		SPLUMA.
SANS 10103 (Noise Regulations)		The measurement and rating of environmental noise with respect to annoyance and to speech communication.
KZN Nature Conservation Ordinance (No. 15 of 1974)		Sensitive species are protected under this Ordinance and must be considered.
Planning and Development Act (Act No. 30 of 2000)		To provide for the adoption, replacement and amendment of schemes; to provide for consent in terms of schemes; to provide for the subdivision and consolidation of land; to provide for the development of land outside schemes; to provide for the phasing or cancellation of approved layout plans for the subdivision or development of land; to provide for the alteration, suspension and deletion of restrictions relating to land; to provide for the permanent closure of municipal roads or public places; to provide for enforcement measures; to provide for compensation in respect of matters regulated by the Act; to establish the KwaZulu-Natal Planning and Development Appeal Tribunal; to provide for provincial planning and development norms and standards; and to provide for matters connected therewith
Construction Regulations 2014		Contractors must comply with the Construction Regulations which lay out the framework for construction related activities.

4 MANAGEMENT AND MONITORING PROCEDURES

4.1 Organisational Structure and Responsibilities

Figure 4-1 below gives an indication of the organisational and team structure for the project.

THD is the Primary Developer for Tinley Manor Southbanks. It is noted that THD and their respective professional project teams, are responsible for the earth-works and installation of service infrastructure.

Once the earth-worked platforms have been prepared, individual sites must be purchased by individual End-use Developers who will then assume ultimate responsibility for his/her property as per the EA and confirmed in the sales agreement for each property. The individual End-use Developers must be required to engage in monthly communication with the Primary Developer as well as any Management Association established as detailed in the Environmental Stewardship Programme (**Section 11**). The individual Site Developers must appoint their own ECO (or Environmental Manager) to monitor compliance of the EA, EMPr and all other relevant permits/licences. This ECO must communicate with the Primary Developer's ECO and submit monthly audit reports to the Primary ECO for inclusion in his/her report to the KZN EDTEA or submit directly to the KZN EDTEA.

The organisational structure between the Developer's Project Team is illustrated in **Figure 4-1**.

Each of the team roles are elaborated on in terms of their specific duties in the Text Boxes hereafter.

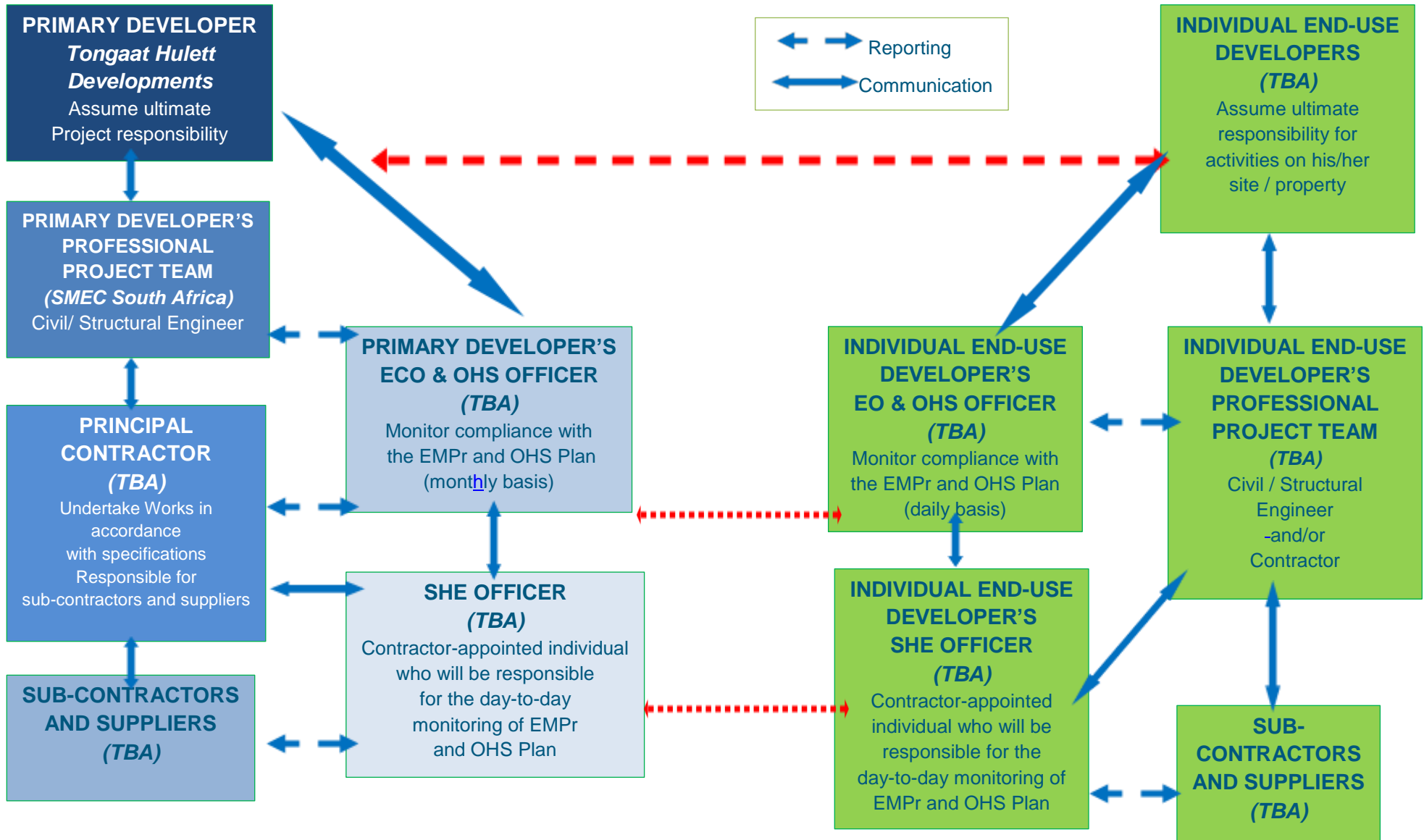


Figure 4-1: Project Team Organisational Structure

Text box 4-1: Primary Developers' Role

PRIMARY DEVELOPER

The Primary 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 this environment.

The Primary Developer will:

- Appoint a Project Manager (PM) to assume ultimate project responsibility;
- Be familiar with the contents of the EMPr;
- Enforce the EMPr is in the tender documentation issued 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 (at least weekly) and enforce environmental specifications are implemented;
- Discuss with the ECO the application of penalties for the infringement of the Environmental Specifications, and other possible enforcement measures;
- Issue penalties / fines as and when required;
- Arrange information meetings for consultation with Interested and Affected Parties (I&APs) about the impending construction activities;
- Must on the recommendation of the Engineer and/or ECO 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
- Enforce the EMPr is implemented as well as revised and updated as and when required.

Text box 4-2: Individual Site Developers' Role

INDIVIDUAL SITE DEVELOPERS

The individual End-use Developer is responsible for ensuring compliance with the environmental specification for his/her site / property.

The individual End-use Developers will:

- Appoint a Project Manager (PM) to assume ultimate project responsibility;
- Be familiar with the contents of the EA, EMPr and all relevant permits / licences;
- Enforce the EMPr is in the tender documentation issued to prospective contractors;
- Be responsible for the appointment of their own project team (i.e. Contractor, ECO, OHS Officer, SHE Officer, etc.) and their activities on site;
- Appoint an ECO to monitor and report on compliance with the EMPr and Environmental Stewardship Programme;
- Enforce their project team are compliant with the environmental specification and understand their responsibilities as detailed in the subsequent tables;
- Undertake regular site visits (at least weekly) and enforce environmental specifications are implemented;
- 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;
- Enforce his/her ECO submits all audit reports to the KZN EDTEA and primary ECO;
- Pay penalties to the as per **Section 5.2** of the EMPr for any non-conformances on his/her site;
- Maintain a register of complaints and queries by members of the public at the site office; and
- Enforce the EMPr is implemented.

Text box 4-3: Engineer's Role**ENGINEER***The Engineer will:*

- Enforce the environmental specification on site;
- Be familiar with the contents of the EMPr;
- Enforce 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 (at least weekly) and enforce 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
- Enforce the documentation, in conjunction with the Contractor, the state of the site prior to construction activities commencing. This documentation must be in the form of photographs or video record.

Text box 4-4: Principal Contractor's (incl. sub-contractors) Role**PRINCIPAL CONTRACTOR (INCLUDING SUB-CONTRACTORS)***The Contractor is required to:*

- Be fully conversant with the EMPr and all conditions of the EA, Water Use Licence (WUL), etc.;
- 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, ECO and/or Engineer during the duration of the Contract;
- Appoint a dedicated Environmental Officer (EO) to be on site on a regular basis (at least twice a week) to enforce compliance with the EA, WUL, EMPr, and other applicable permits and/or licences;
- Be conversant with the requirements of this environmental specification / EMPr. Brief all his/her staff about the requirements of the environmental specification;
- Enforce 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 – that is, the Contractor must be held responsible for non-compliance on their behalf;
- Provide 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, in the event that he or his Sub-Contractors / Suppliers contravene the said specifications such that the Engineer orders a suspension of work – note that the suspension must 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;
- Enforce that he informs the Engineer timeously of any foreseeable activities which will require input from the Environmental Officer and/or ECO;
- 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 enforce effective, proactive environmental management with the overall objective of preventing or reducing negative environmental impacts while enhancing positive environmental impacts.

The Contractor will thus conduct all activities in a manner that minimises disturbance to the natural environment as well as directly affected residents and the public in general.

Text box 4-5: Environmental Control Officer's Role

ENVIRONMENTAL CONTROL OFFICER

The ECO will:

- Be fully conversant with the EMPr and perform all tasks assigned to him / her in the approved 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;
- Enforce 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 / Contractors;
- 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 KZN 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 their SHEQ Manager; as well as the Contractor and their EO.

Text box 4-6: Occupational Health and Safety Officer's Role

OCCUPATIONAL HEALTH AND SAFETY OFFICER

The OHS Officer must be responsible for undertaking of the following:

- Compilation of a comprehensive project health and safety risk assessment (HSRA);
- Compilation of health and safety specifications based on risks identified;
- Reviewing and approval of health and safety plan(s) submitted by appointed Principal Contractor(s);
- Conducting monthly health and safety inspections and compiling monthly OHS reports;
- Conducting monthly health and safety audits with audit reports;
- Assisting the Developer / Contractor in the investigation of major accident / incidents;
- Monitoring of site activities for compliance to the Occupational Health and Safety Act and Regulations;
- Establishment and monitoring of project health and safety file;
- Monitoring the Principal Contractors' health and safety performance; and
- Preparation of project close-out reports and submission of project health and safety files to the Client.

Text box 4-7: Environmental Officer's Role (Contractor)

ENVIRONMENTAL OFFICER

The Environmental Officer will:

- Be fully conversant with the EMPr;
- Be fully conversant with all relevant environmental legislation applicable to the project, and enforce 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 must be managed, and, where relevant environmental best practice and how they will practically enforce 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 (at least twice weekly) and comprehensive inspection of the site and surrounding areas in order to monitor compliance with the EMPr;
- Take 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

ENVIRONMENTAL OFFICER

specifications of the EMPr;

- Report any non-compliance or remedial measures that need to be applied to the 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.

Note that a SHE officer covering all functions of Safety, Health and Environment is not permissible unless this person has a dedicated qualification in Environmental Management and Compliance with relevant appropriate EO experience, as well as the required approvals to operate as a H&S Officer in terms of the OHSA. It is therefore required that a functional Environmental Officer is employed by the Contractor.

4.2 Training and Environmental Awareness

It is important to enforce that the Contractor has the level of environmental awareness and competence to enforce continued environmental due diligence and on-going minimisation of environmental harm. Training needs must be identified based on the available and existing capacity of site personnel (including the Contractors and Sub-contractors) to undertake the required EMPr management actions and monitoring activities. It is vital that all personnel are trained to perform their designated tasks to an acceptable standard.

The environmental training is aimed at:

- ✦ Promoting environmental awareness;
- ✦ Informing the Contractor of all environmental procedures, policies and programmes applicable;
- ✦ Providing generic training on the implementation of environmental management specifications; and
- ✦ Providing job-specific environmental training in order to understand the key environmental features of the construction site and the surrounding environment.

Training must be done in a verbal format. The training must be a once-off event. In addition to training, general environmental awareness must be fostered among the project's workforce to encourage the implementation of environmentally sound practices throughout its duration. This enforces that environmental accidents are minimised and environmental compliance maximised.

4.3 Monitoring

A monitoring programme must be in place not only to enforce 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 will include:

- ✦ Monthly audits must be conducted by the ECO(s) for the duration of the construction phase – the ECO shall undertake this environmental monitoring with the audits considering compliance with the EMPr, the EA conditions, as well as the conditions of any permits and/or licences.

- ✦ On-going monitoring is to be undertaken by the Contractors' Environmental Managers – this will include notification to the ECO in the event that an incident takes place.
- ✦ External auditing must take place at unspecified times by the authorities and/or other relevant authorities.
- ✦ An independent, qualified, auditor will need to be contracted to conduct bi-annual environmental audits during the construction phase of the project according to the provisions of the EMPr.
- ✦ The Contractor's Environmental Officer must undertake regular site inspections (at least twice weekly) to enforce all legislative requirements are adhered to.
- ✦ It is required that the bi-annual Air Quality monitoring is undertaken by an air quality specialist in order to monitor dust nuisances.
- ✦ It is required that quarterly water quality testing of the Umhlali Estuary is undertaken.

4.4 Reporting Procedures

4.4.1 Documentation

The following documentation must be kept on site in order to record compliance with the EMPr:

- ✦ An Environmental File which includes:
 - Copy of the EMPr;
 - Copy of the EA;
 - Copy of the WUL;
 - Copy of all other licences / permits;
 - Copy of all rehabilitation plans;
 - Copy of the Stormwater Management Plan;
 - Copy of the Soil Management Framework Strategy;
 - Copy of the Traffic Management Plan;
 - Copy of relevant legislation;
 - Environmental Policy of the Main Contractor;
 - Environmental Method Statements compiled by the Contractor;
 - Non-conformance Reports;
 - Environmental register, which shall include:
 - 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; and
 - Incident book – including copies of notification of Emergencies and Incidents, this must be accompanied by a photographic record.
- ✦ 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;
- ✦ Water Quality Monitoring reports;
- ✦ Written Corrective Action Instructions; and
- ✦ Notification of Emergencies and Incidents.

4.4.2 Environmental Register

The Developer will put in place an Environmental Register. The contractor will enforce that the following information is recorded for all complaints / incidents:

- ✦ 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 must be kept with the EMPr, and must be made available for scrutiny if so requested by the Developer.

4.4.3 Non-Conformance Report

A Non-Conformance Report (NCR) must be issued to the Contractor as a final step towards rectifying a failure in complying with a requirement of the EMPr. This must 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.

In the event that the ECO assesses an incident or issue and finds it to be significant (e.g. non-repairable damage to the environment), it must be reported to the relevant authorities and immediately escalated to the level of a NCR. The following information must be recorded in the NCR:

- ✦ 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 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; and
- ✦ ECO must verify that the agreed actions have taken place by the agreed completion date, when completed satisfactorily; the ECO and Contractor must sign the Close-Out portion of the Non-Conformance Form and file it with the contract documentation.

4.4.4 Environmental Emergency Response

The Contractor's environmental emergency procedures must enforce responses to unexpected / accidental actions / incidents that could cause environmental impacts. Such incidents must include:

- ✦ Accidental discharges to water (i.e. into the watercourse) and land;
- ✦ Accidental spillage of hazardous substances (typically: oil, petrol, and diesel);
- ✦ Accidental damage to existing utilities e.g. sewer and water pipelines;
- ✦ Accidental toxic emissions into the air; and
- ✦ Specific environmental and ecosystem effects from accidental releases or incidents.

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 enforce and include the following:

- ✦ Construction employees shall be 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) shall 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.

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.

4.4.5 Method Statements

It is a statutory requirement to enforce the wellbeing 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.

A Method Statement details how and when a process must be carried out, detailing possible dangers/risks, and the methods of control required.

- ✦ 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 must 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;
- ✦ Methodology for environmental monitoring;
- ✦ Emergency / disaster incident and reaction procedures (required to be demonstrated); and
- ✦ Rehabilitation procedures and continued maintenance of the impacted environment.

The Contractor must be accountable for all actions taken in non-compliance of the approved Method Statements. The Contractor shall 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 must be required to be generated:

- ✦ Boardwalk construction and maintenance;
- ✦ Formalisation of any access or emergency vehicular routes;
- ✦ 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 (must form part of the item above);
- ✦ Storage, handling and decanting of diesel (must form part of the item above);
- ✦ Personnel, public and animal safety;
- ✦ Rehabilitation of modified environment(s);
- ✦ Solid and liquid waste management;
- ✦ Sources of materials (including MSDSs);
- ✦ Top-soil management;
- ✦ Haulage, stockpiling and management of surplus fill material;
- ✦ Stormwater Management; and
- ✦ Wash areas.

4.4.6 *Public Communication and Liaison with I&APs*

The Developer must enforce 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:

- ✦ The name of the Contractor; and
- ✦ The name and contact details of the site representative to be contacted in the event of emergencies or complaint registration.

5 COMPLIANCE WITH THE ENVIRONMENTAL SPECIFICATIONS

The EMPr forms part of the Contract Documentation and is thus a legally binding document. It is also required for the Contractor to make provisions as part of their budgets for the implementation of the EMPr. In terms of *Polluter Pays Principle*. Section 28 of the NEMA, an individual responsible for environmental damage must pay the costs for both environmental and human health damage. As far as possible reasonable, feasible and implementable measures must be in place to reduce or prevent additional pollution and/or environmental damage from occurring.

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 and haul / 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; or
- ✦ The Contractor fails to respond to complaints from the public.

5.1 Environmental Authorisation

In terms of section 24F of the NEMA, failure to comply with the conditions of the EA constitutes an offence for which a convicted person must be liable to a fine not exceeding R5 million or imprisonment for a period not exceeding ten years or both such fine and such imprisonment. Note that for second offences the fine and/or penalties must double.

All conditions laid out in the EA (once obtained), EMPr and/or any permit / licence must be complied with at all times. The expectation is that the document at hand will become an extension / enabling mechanism of the EA once granted.

5.2 Penalties

Application of a penalty clause will apply for incidents of non-compliance. The contractor must be allowed one offence and a written warning must be issued to the Contractor's Environmental Officer. Failure to rectify the offence within one (1) working week of the issue of the warning or a repeat offence will result in a penalty.

The penalty must be issued by a representative of the Developer. The penalty imposed must be per incident at the discretion of the Developer's SHEQ Manager or any other duly authorised representative. The value of the penalty imposed shall be as defined in the contract and enforcement shall be at the discretion of the Developer. Such fines must be issued in addition to any remedial costs incurred as a result of non-compliance with the EMPr. The Developer will inform the Contractor of the contravention and the amount of the penalty, and will deduct the amount from monies due under the Contract.

The penalty monies must become the property of the Developer to be used for rehabilitation and maintenance of the site.

Unless stated otherwise in the project specification the penalties imposed per incident or violation must be:

Table 5-1: Penalties Applicable

OFFENCE	AMOUNT
Failure to submit method statements timeously	R 10,000
Failure to demarcate working areas and no-go areas and/or maintain demarcation fences / tape	R 30,000
Working outside of the demarcated areas and/or within the boundaries of the no-go area	R 50,000
Failure to strip topsoil with intact vegetation	R 50,000
Failure to stockpile topsoil correctly and/or to separate soil materials	R 50,000
Failure to stockpile materials in designated areas	R 10,000
Failure to take measures to control dust dispersion on site	R 10,000
Washing of vehicles on site outside of the designated bund facility	R 10,000
Pollution of water bodies and/or groundwater	R 20,000
Failure to implement stormwater management provisions during construction	R 20,000
Failure to control stormwater run-off	R 30,000
Downstream erosion	R 30,000
Failure to provide sanitation	R 10,000
Failure to erect temporary fences around trenches	R 10,000
Failure to provide waste disposal facilities and services	R 50,000
Failure to reinstate disturbed areas within the specified timeframe	R 30,000
Any other contravention of the project specific specification	R 10,000
Insufficient education of staff regarding environmental matters and site housekeeping practices	R10,000
Untidiness and litter at camp	R 5,000
Failure to provide drip trays and/or empty them frequently	R 10,000
Individual not making use of the site ablution facilities	R 5,000
Construction vehicles not adhering to site speed limits (40 km/hr)	R10,000
Failure to maintain a register of incidents on site	R 10,000
Failure to maintain the Environmental File on site	R 10,000
Any contravention with approved Method Statements	R 20,000

The Developer is responsible for the implementation of the EMPr and for compliance monitoring of the EMPr.

The EMPr must be made binding on all contractors (including sub-contractors) operating on the site and must be included with the Contract.

Non-Compliance with, or any deviation from, the conditions set out in this document constitutes a failure in compliance. Non-compliance with the conditions of the EMPr constitutes a breach of Contract.

If a significant non-compliance the Site Manager must be informed and the relevant authorities immediately informed thereafter.

5.3 Removal from Site and Suspension of Works

Failure to remediate after the issue of a financial penalty, depending on the severity and significance of the impact related to non-compliance, the ECO must undertake to report directly to EDTEA (Compliance) recommending that for:

- ✦ High impact: to issue a notice to cease construction;
- ✦ Medium impact: to issue a notice instructing the Client to implement recommended remedial action; or
- ✦ Low impact: ECO to notify, but up to discretion of EDTEA to apply sanction.

The Developer, at the direction of the ECO, or of his own conviction, has the power to remove from site any person who is in contravention of the EMPr, and if required, the Developer can suspend part or the whole of the works, as required.

6 CONFORMANCE WITH THE EMS

THD are accredited with ISO 14001 certification and thereby requires all development to be undertaken within this philosophy. The ISO 14001 Environmental Management System (EMS) is the internationally recognised standard for the environmental management of organisations. It prescribes controls for those activities that have an effect on the environment. These include the use of natural resources, handling and treatment of waste, energy consumption, water resource management and so forth.

This standard specifies requirements for an EMS to enable an organisation to develop and implement a policy and objectives which takes into account legal and other requirements to which the organisation subscribes, and information about significant environmental aspects. It applies to those environmental aspects that the organisation identifies as those which it can control and those which it can influence. It does not itself state specific environmental performance criteria.

All the requirements in ISO 14001 are intended to be incorporated into any EMS. The extent of the application will depend on factors such as the environmental policy of the organisation, the nature of its activities, products and services, the location and the conditions in which it functions. The ISO 14000 family addresses various aspects of environmental management. It provides practical tools for companies and organisations looking to identify and control their environmental impact and constantly improve their environmental performance. The aim of the ISO 14001 standard is to achieve continuous improvement through the cycle outlined in **Figure 6-1**.

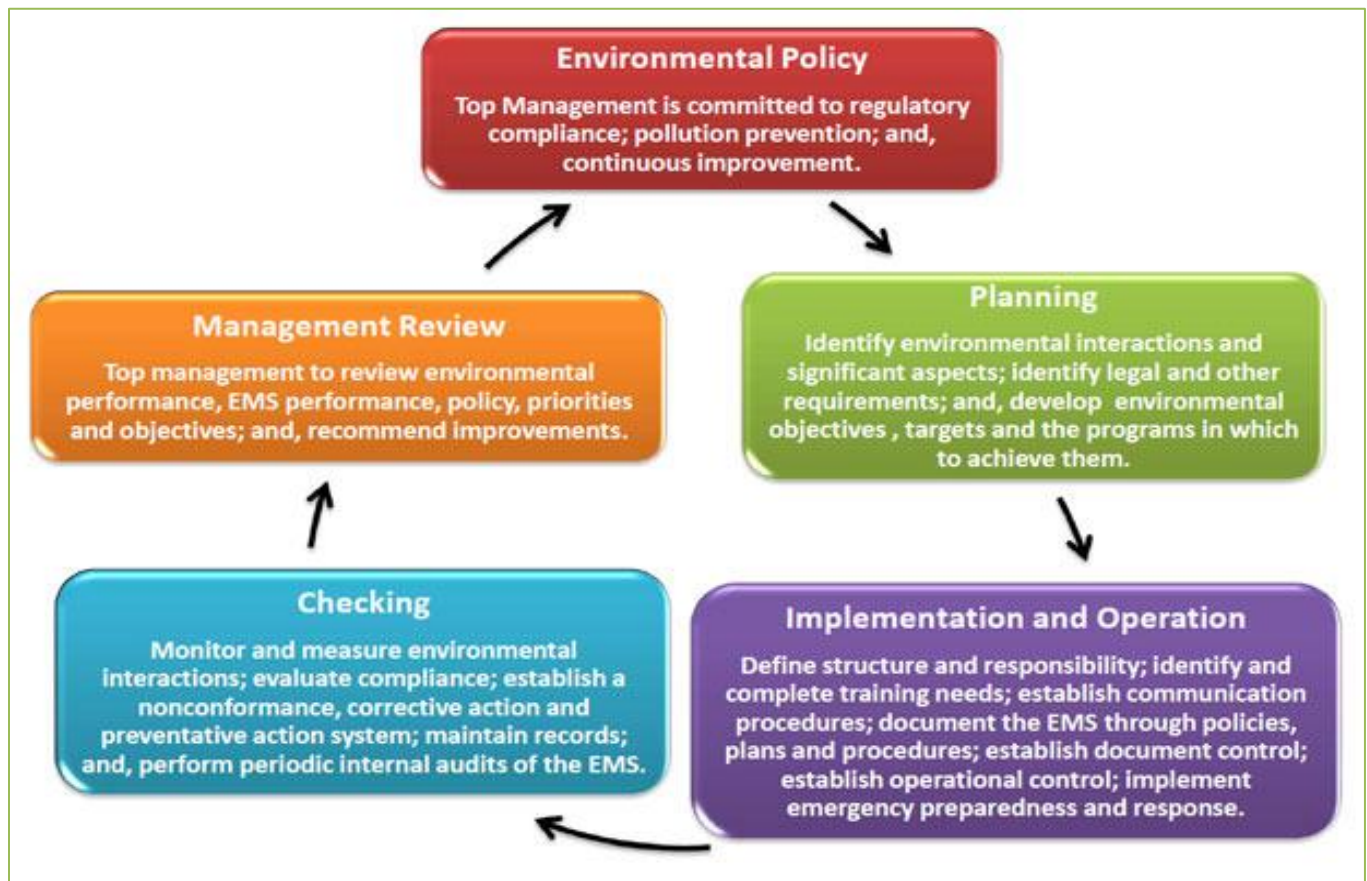


Figure 6-1: The ISO 14001 EMS Cycle of Continuous Improvement

As part of their ISO 14001 certification, THD have a number of Standard Operating Procedures (SOPs) pertaining to environmental management. These are included in **Appendix A**, and this EMPr is aligned with these.

7 DETAILED ENVIRONMENTAL MANAGEMENT PROGRAMME

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

The provisions of this EMPr are binding on the Developer and their teams during the life of the project (i.e. across all phases of the development process). 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 tables hereafter.

Each action within the EMPr is supported by the priority of when the specific action will need to be implemented. Each of these aspects is briefly described below (**Text box 7-1**) for ease of reference.

Text box 7-1: Summary of Aspects included in the EMPr Tables

ENVIRONMENTAL MEASURES, ACTIONS AND CONTROLS:

This section indicates the actions required to either prevent and/or minimise the potential impacts on the environment that is associated with the project.

RESPONSIBILITY:

This section indicates the party responsible for implementing the environmental measures and action plans laid out in the EMPr.

MONITORING FREQUENCY:

This section indicates when the actions for that specific aspect must be implemented and/or monitored.

PRE-CONSTRUCTION PHASE

7.1 Authorisations, Permits and Licences

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
All required authorisations, permits and licences must be obtained by the Developer prior to the commencement of construction.	Developer	Once-off

7.2 Appointment of Contractor

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
The Developer must enforce 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 provision in their budgets for the implementation of the EMPr.	Developer Engineer Contractor	Once-off
The Principal Contractor (including <u>all</u> 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.		

7.3 Preparation of Method Statements

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Method Statements must be submitted by the Contractor to the Developer's SHEQ Manager and the ECO for approval prior to an activity being undertaken and must be adhered to by the Contractor and Project Engineer. These relate to water and stormwater management requirements, traffic requirements, solid waste management requirements, fuel storage and filling and dispensing of fuel (diesel and petrol), hydrocarbon spills, the storage of hazardous materials, standard emergency procedures, <u>working within sensitive environments (e.g. wetlands, Coastal Dune Forest, etc.)</u> , and biohazard control.	Contractor Developer ECO Ecologist	Once-off
The ECO will monitor the implementation of the Statements. All copies of the statements and plans must be submitted to the appointed ECO for approval prior to the activity commencing.		
A qualified ecologist must mark vegetation, such as indigenous trees <u>and plants</u> , which are to be conserved or relocated prior to the Contractor commencing with clearing on site.		

7.4 Appointment of ECO

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>An Independent ECO must be appointed at the Developer's cost to monitor the implementation of the EMPr.</p> <p>The nomination of the ECO must be given to the KZN EDTEA Control Environmental Officer: Compliance Monitoring and Enforcement, in writing, prior to the start of construction. The notification must include contact details for the ECO and details pertaining to the ECO's relevant experience.</p>	Developer ECO	Once-off
<p>Once a nominated representative of the Developer has been approved per site, he/she must be confirmed as the ECO. As such the ECO must undertake monthly site inspections and provide monthly audit reports for the duration of the construction and rehabilitation phases.</p> <p>Each audit report must contain the results of the full audit. These audit results report on whether the response to the audit item is '<u>compliant</u>', '<u>partially compliant</u>', '<u>non-compliant</u>' or 'not applicable'. 'Not applicable' responses are for those aspects of the construction that have not yet started or are not specifically applicable to the contract being considered – this must be decided on a case-by-case basis.</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 <u>compliant</u> items against the total number of applicable items. The higher the score, the better the compliance. Complete compliance will result in a 100% score.</p> <p>Monthly ECO audit reports must be submitted to the KZN EDTEA Control Environmental Officer: Compliance Monitoring and Enforcement.</p>	ECO	Once-off / Monthly
<p>In the event that the ECO for the development changes at any time, this must be communicated, in writing, to the KZN EDTEA Control Environmental Officer: Compliance Monitoring and Enforcement, within fourteen (14) days of appointing the new ECO. The notification must include contact details for the ECO, details pertaining to the ECO's relevant experience and reasons for the change in ECO.</p>	ECO Developer	As required <u>Minimum of 14 Days Prior to Change</u>

7.5 Notice of Construction

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>A written notice must be given to the KZN EDTEA at least seven (7) days prior to the commencement of construction. Commencement for this purpose includes site preparation. The notice must include a date on which it is anticipated that the activity will commence and the reference number for the EA.</p>	Developer ECO	Once-off <u>7 days prior to commencement</u>

7.6 Environmental Training and Awareness

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Construction staff must be educated by the ECO, and the Contractor's EO and/or SHE Officer, as to the provisions included in the EMPr, and in terms of general environmentally-friendly practice.</p> <p>The Developer must enforce that all staff and Contractors / Sub-contractors / Suppliers / Service Providers are trained on the environmental, occupational safety and/or legal responsibilities expected from them. The training must take into account language and literacy requirements as well as measures to determine the effectiveness of the training.</p> <p>Proof of training must be attached to the ECO's audit reports.</p>	<p>Developer ECO EO and/or SHE Officer</p>	<p>Once-off</p>
<p>Consideration of the implications of the EA and EMPr must form part of the formal site induction for all contractors, sub-contractors and casual labourers, in their native language.</p> <p>The induction training will, as a minimum, include the following:</p> <ul style="list-style-type: none"> ▪ 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. 		
<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 weekly "tool box" talks. These talks must be in accordance with the risks and trends associated with the project. Proof of these talks must be kept on site within the Site Environmental File.</p>	<p>EO and/or SHE Officer</p>	<p>Weekly</p>

CONSTRUCTION PHASE

7.7 Site Management

7.7.1 Site Establishment

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Prior to the establishment of the site camp / office, the Contractor will 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 the Developer.</p> <p>This site layout plan must be negotiated and agreed upon by the Developer, the Contractor and the ECO.</p> <p>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.</p>	Contractor	Once-off
<p><u>The construction camp is to be located a minimum horizontal distance of 50 m from any wetland, 500 m away from the Umhlali Estuary, behind the development setback line and above the 1:100 year flood line.</u></p> <p><u>The site camp must be located on a disturbed site that does not require the removal of vegetation, i.e. protected trees or plants.</u></p>		
<p>The construction camp and storage areas must be located in zones of low visibility i.e. behind dense bush or in lower-lying areas. This must however be balanced against the need to be outside of defined buffer zones along watercourses – which remain no-go areas for activities such as construction camp and storage areas.</p> <p>The ECO must approve the location of construction camps.</p>		
<p>Signage must be placed in the area where construction will take place informing the public of the activities taking place.</p>		
<p>The site must be secured and manned on a 24 hour basis.</p>		
<p>The Contractor must provide refuse bins that must be cleaned / emptied and the waste removed from site on a weekly basis.</p>		
<p><u>The construction camp must be kept in an orderly state at all times, to the satisfaction of the ECO. The Contractor must allow 15 minutes prior to close of business for site house-keeping.</u></p>		
<p>Vegetation removed for the site establishment is to be kept to a minimum. No trees are to be removed, unless specific authorisation has been obtained and with the exception of alien weeds and invader plants.</p>		
<p><u>Drainage at the camp site must be designed to prevent the standing / ponding of water or sheet erosion from taking place.</u></p>		

7.7.2 Ablution / Sanitation

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
A minimum ratio of one chemical toilet must be provided per 15 persons. Chemical toilets must be serviced a minimum of once every week. A SCD and/or waste manifest is to be obtained and kept on site. The construction of “long drop” toilets is prohibited. Under no circumstances must open areas or the surrounding bush be used as toilet facilities.	Contractor	Daily
The chemical toilets must be strategically placed (easily accessible to workers, preferably no more than a 300 m from the work-face) and will not be situated within <u>50 m</u> of any watercourse.		
All abluion activities must take place in these facilities, and the waste material must be stored and disposed of at the registered waste disposal site or collected by a waste contractor on a regular (weekly) basis.		
All temporary / portable toilets must be secured to the ground to prevent them from toppling due to wind or any other cause.		
Unauthorised dumping / spilling of waste from toilets into the environment and/or burying of waste are strictly prohibited.		
Ablution facilities must not cause any pollution to any water resource and it must not be a health hazard to the general public.		

7.7.3 Access

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
The construction site must have strict access control to reduce the risks associated with vehicular transportation and pedestrian access on the site.	Contractor	On-going
Access routes on watercourses and steep gradients are not permitted.		
No vehicles must drive onto the retained wetlands, the beach, coastal vegetation or other sensitive sites and no-go areas.		
<u>All sensitive areas must be designated as ‘no-go’ areas and treated as such, unless authorised for rehabilitation purposes is in line with the rehabilitation plan.</u>		
<u>These ‘no go’ areas must be cordoned off and correct signage prohibiting entry must be clearly displayed in both English and isiZulu.</u>		
<u>All site staff must be informed of the prohibition of access to these areas. Any infirngements into these areas must attract an immediate penalty.</u>		
<u>Drainage and erosion protection in the form of cut-off berms or trenched must be provided around the site and areas where there is a potential for erosion.</u>		

7.7.4 Fires

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
No open fires or uncontrolled fires are permitted on site.	Contractor	Daily
Fire fighting measures such as fire extinguishers must be located on site.		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
The workforce must be made aware of fire prevention and fire fighting measures.		

7.7.5 Vehicle Maintenance Yard

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Heavy machinery and construction vehicles are to be <u>parked</u> in a vehicle maintenance yard which must be illustrated on the construction camp layout map <u>submitted to the ECO for approval</u> .	Contractor	Once-off
A dedicated maintenance area must be demarcated with an impermeable surface leading to an oil-water separator. No vehicle must be repaired in any place other than in the dedicated maintenance yard – if such repairs are required the vehicle must be made safe (i.e. no leakage while being removed to the repair facility) and removed at the earliest opportunity to the repair facility. Prior to returning on site the Engineer must declare the vehicle safe to return to site.		On-going
Washing of vehicles on site or at the construction camp is prohibited. The only exception is if a designated bund facility with a separator is constructed at the construction camp or vehicle maintenance yard. The positioning of such a facility must be approved prior to construction by the ECO in consultation with the Engineer.		

7.7.6 Waste Disposal Areas

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
General waste produced on site includes: <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). 	Contractor	Daily
A number of general waste receptacles, including bins must be arranged around the construction camp, on site to collect all domestic refuse, and to minimise littering.		
Different waste bins, for different waste streams (including hazardous waste) must be provided to enforce correct waste separation and subsequent recycling, where applicable. Bins must be clearly marked and lined for efficient control and safe disposal of waste.		
A fenced area must be allocated for waste sorting and disposal on the site, unless otherwise agreed by the ECO.		

7.7.7 'No-Go' Areas

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Demarcation of 'no go' areas must be clearly visible and understood by all employees on site. The following areas must be considered 'no-go' areas (Figure 7-1):</p> <ul style="list-style-type: none"> ▪ The Umhlali River and Estuary including the approved buffer area, unless specific approval has been granted <u>for the installation of boardwalks and emergency vehicular access</u>; ▪ The Coastal Zone seaward of the development setback line, <u>unless specific approval has been granted for the installation of boardwalks and emergency vehicular access</u>; ▪ Coastal Dune forests, <u>unless specific approval has been granted for the installation of boardwalks and emergency vehicular access</u>; ▪ The beach; ▪ All remaining wetland units not authorised in the water use licence <u>(c/f Appendix F for approved list of wetland crossings)</u>; ▪ All graves and a buffer area (20 m) around the graves; and ▪ The open space area, unless rehabilitation work is underway and/or approval has been granted for surplus fill material to be stockpiled in these areas <u>as per the Soil Management Framework Strategy or permission has been granted to work in these areas for the installation of serves (refer to Appendix F for the approved list of wetland crossings) and/or boardwalks and emergency vehicular access routes.</u> <p>Note that additional 'no-go' areas, <u>or expansion of already designated areas</u>, must be identified by the ECO at need, and must be confirmed with the Engineer. Once approved, the additional 'no-go' areas must be considered to be an extension of the already approved controls.</p> <p>All 'no-go' areas must be fenced and demarcated and no unauthorised entry, stockpiling, dumping, or storage must be allowed in these areas. <u>Any infringements on the 'no-go' areas must attract an immediate penalty.</u></p>	<p>Contractor EO ECO</p>	<p>Daily</p>

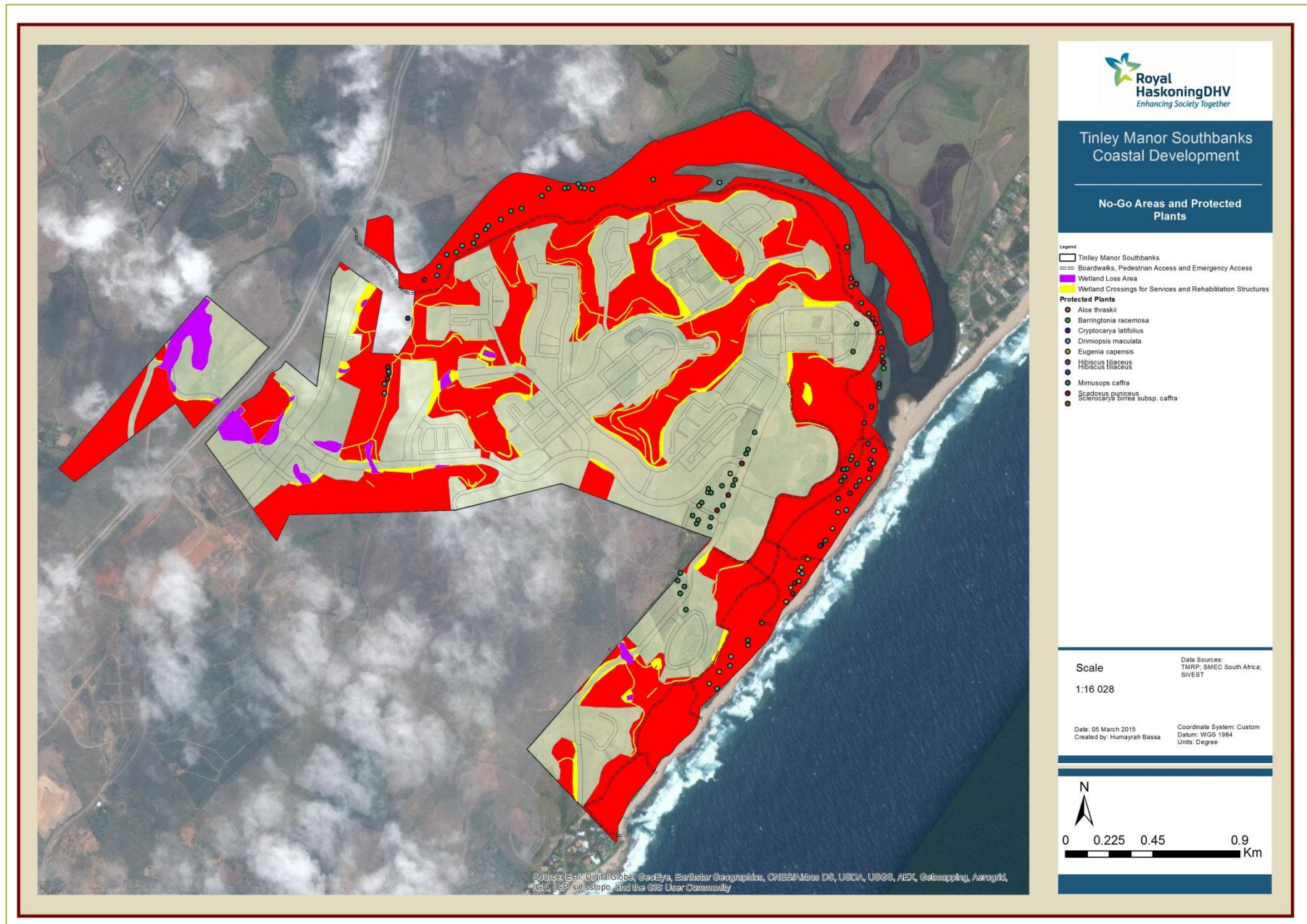


Figure 7-1: ‘No-Go’ Areas, unless authorised for a specific activity or rehabilitation works

7.8 Health and Safety

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The Contractor must adhere to the prescriptions of the relevant health and safety legislation and standards. The Contractor must familiarise himself and his employees with the contents of the aforementioned legislation.</p>	<p>Contractor SHE Officer</p>	<p>On-going</p>
<p>First Aid requirements as required must be on hand at all times, with at least one (1) trained medical officer must be on site at any time when work is being carried out on site.</p>		
<p>The Contractor must implement 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, and safety reflective jackets. Additional items such as safety eyewear, dust masks, ear plugs, etc., must be worn as required with the need to use such being clearly indicated in the relevant areas.</p>		
<p>PPE signs must be erected on site at the areas where it specific items of PPE are required (e.g. high noise level areas and thus ear plugs). The integrity and availability of the signs must be maintained at all times.</p>		
<p>No one must be allowed on site unless they are wearing the minimum 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 for the visitor must then be contacted and must collect the visitor from the site entrance area / site office. No unauthorised visitors or unaccompanied 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 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 health and safety audits (minimum once monthly) on the principal contractor. Similarly, principal contractors must be responsible for carrying out regular audits (minimum once monthly) on their contractors. The results of such audits must be tabled for action and discussed at the Health and Safety Committee meetings or the site meetings.</p>		
<p>The principal contractor must provide evidence by means of a procedure or chart that he is fully aware of the "hierarchy" of incidents that can occur e.g. unsafe situations, near misses, first aid box injuries, medical cases, disabling injuries, etc. The principal contractor must keep an incident register of all such incidents, investigate and apply corrective action to prevent recurrence. The Developer also reserves the right to stop any unsafe work and request incident statistics from the principal contractor. It is thus required that these are maintained in good order and kept in the Site Environmental File.</p>		

7.9 General and Hazardous Substances and Materials

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Storage areas must not be within any watercourses or within <u>50 m</u> of any drainage lines and a minimum of 500 m from the Umhlali River and Estuary.		
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/or groundwater 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. In addition, the storage area(s) must be securely fenced and all hazardous substances (solid, liquid, gas) must be stored therein. Drip trays, a thin concrete slab, or, a facility with PVC lining, must be installed in such storage areas to prevent soil and/or water pollution.		
A daily procedure of inspection and emptying of dip trays must be conducted. Servicing of dip trays must be undertaken when required. Drip trays must be monitored closely during rainy weather and drip trays <u>must be emptied to prevent</u> overflowing and/or spillage.	Contractor Engineer SHE Officer EO	Daily
The bunded area for storage of hazardous substances must have a smooth impermeable surface and the floor of the bunded area must slope towards oil traps.		
Any water that collects in the bund must not be allowed to stand and must be removed immediately.		
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 must be stored on the bare ground. All empty and externally dirty tanks (irrespective of size) must be sealed and stored in an area where the ground is 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.		
All waste fuel and chemical contaminated rags must be stored in leak-proof containers and disposed of at an approved hazardous waste site.		
Storage sites must 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 enforce that accidental spillage does not pollute local soil or water resources.		
MSDSs must be readily available on site for all chemicals and hazardous substances to be used on site.		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
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 required safety measures.		
A 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. Weigh bills must be provided for all hazardous waste being disposed of.		
The Contractor must enforce that his staff are made aware of the health risks associated with any hazardous substances used and has been provided with protective clothing / equipment in case of spillages or accidents and have received the required training.		
Cement / concrete must not be mixed directly on the ground. Cement mixing must be done on hardened surfaces or 'dagga' boards, or mixing trays and impermeable sumps must be used at all mixing and supply points. Cement mixing must be done at least 50 m away from any wetlands and 500 m away from the Umhlali River and Estuary.		
The washing of concrete trucks on site is prohibited.		
Used cement bags must be stored in weather-proof containers to prevent windblown cement dust and water contamination. The bags must also be secured so that they themselves do not become windborne litter. Used cement bags must be disposed of on a regular basis (<u>minimum of weekly</u>) 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.		
No paint products must be disposed of on site. All paint products must be disposed at a hazardous landfill facility.		
The cumulative combined capacity of hazardous substances stored on site must not exceed 80 m ³ at any given time, unless applied for and authorised by the KZN EDTEA.		
The location of all Above-ground Storage Tanks (ASTs) must be identified on the site camp plan prior to construction commencing.		
The Contractor must maintain a record of the sourcing of all materials used during construction.		

7.10 Spills, Incidents and Pollution Control

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Any spillage, which occur, must be investigated and immediate action must be taken according to the requirements of the Spill Contingency Plan (Appendix A). This must also be reported <u>immediately</u> to the ECO and EO.	Contractor EO ECO Developer	On-going
The Developer must enforce that all personnel / workers during the construction phase are trained to deal with		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>spills / leaks or an emergency situation on site.</p> <p>In the event of a spill incident, the Emergency Response SOP (Appendix A) must be followed.</p> <p>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 on discovery.</p> <p>The material, together with any contaminated soil, must be collected in skips or drums (dependent on quantity) and disposed of as hazardous waste to minimise pollution risk and reduce bunding capacity.</p> <p>SDCs must be submitted to the KZN EDTEA within fourteen (14) days of its issue to the KZN EDTEA Control Environmental Officer: Compliance Monitoring and Enforcement.</p>		
<p>In the event that a pollution incident occur on site the Contractor must:</p> <ul style="list-style-type: none"> ▪ Implement reasonable measures immediately to contain and minimise the impacts of the incident; ▪ Notify all persons whose health is 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. 		
<p>Concrete mixing must be confined to as few areas as possible.</p> <p>Areas where concrete was mixed must be cleaned up after use.</p> <p>Concrete mixing is to be undertaken on an impervious surface <u>at least 50 m away from any watercourses.</u></p>		
<p><u>Contaminated water containing fuel, oil, or other hazardous substances must never be released into the environment. Such substances must: (a) be prevented from being released in the first place, and if released (b) immediately be contained, and (c) all contaminated material must be disposed of at a registered hazardous landfill site. The ECO must be informed of all such spillages, and based on the quantum of the spillage and level of negligence linked to event, appropriate penalties must be applied.</u></p>		
<p>In the event of a significant spillage that cannot be contained and which poses a serious threat to the environment, the following Departments must be informed within forty-eight (48) hours of the incident and in accordance with Section 30 of the NEMA:</p> <ul style="list-style-type: none"> ▪ The KwaDukuza Municipality; ▪ Department of Water and Sanitation; ▪ KZN EDTEA Pollution and Waste Management; ▪ The Local Fire Department; and ▪ Any other affected Department. 		
<p>Soil and construction material stockpiles must be bermed to prevent leachate and polluted run-off.</p>		

7.11 Clearing and Protection of Fauna and Flora

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p><u>Prior to commencement of construction, a qualified and skilled botanist must be appointed to survey the construction footprint, identify and mark all protected trees and conservation important species and apply for</u></p>	<p>Contractor Engineer</p>	<p>Daily</p>

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p><u>necessary permits and licences to cut, disturb, damage, destroy, remove, or translocate them.</u></p> <p>All of the nationally protected tree species that occur on the site and within the proposed development nodes need to have GPS co-ordinates associated with them. A licencing process with DAFF must be initiated and approval obtained prior to <u>cutting, disturbing, damaging, destroying, removing or relocating.</u></p> <p>In the event that a permit is not required from DAFF, the ECO and/or an Ecologist must approve the removal of indigenous vegetation. Any relocation undertaken must be done under the guidance of a qualified Botanist. <u>Any protected trees that are destroyed must be replaced on a 1 to 3 basis, i.e. for every single tree lost, 3 individuals of the same species must be re-planted in the Open Space Network.</u></p> <p>The 'No-Go' Zones established, including the Coastal Dune Forests and Umhlali River and Estuary must be strictly adhered to and no vegetation must be removed from these areas. The 40 m buffer to the Coastal Dune Forest must be maintained at all times. The Coastal Dune Forest must be considered a 'no-go' area at all times, except for the installation of boardwalk, pedestrian footpaths, and the rehabilitation / maintenance of the two (2) existing emergency vehicular accesses which will be retained. No wheeled machinery is permitted in the back of beach woody vegetation (Coastal Dune Forest). <u>Boardwalk areas, within the back of beach vegetation and the estuarine fringing vegetation, must be walked by a botanist to ensure that all trees that are not to be modified / affected by the boardwalk are demarcated.</u></p> <p>The two species [<i>Crotalaria vasculosa</i> (Sprawling shrub) and <i>Cyphostemma flaviflorum</i> (Sprague)] which are not protected by the legislation but are considered to be rare and thus deserving of relocation must be removed and placed in areas outside of the development nodes. <u>A qualified ecologist must be present and oversee the relocation.</u></p> <p><u>The extent of disturbance must be limited to the boundary of the development property. No areas outside the construction footprint may be cleared.</u> <u>Terrestrial areas outside of the development property are considered 'No-Go' areas.</u> <u>Access through and construction activities within the No-Go areas are strictly prohibited.</u> <u>Silt fences must be erected on the boundary of the 'No-Go' areas and maintained for the entire duration of the construction period to ensure that no sediment is carried into these 'No-go' areas.</u> <u>Weekly checks must be conducted and reported on to the ECO to ensure that these silt fences are functioning correctly.</u> <u>Toolbox Talks must be presented weekly with the topic of sensitive environments being highlighted and the staff being educated as to their value.</u></p> <p>Removing of vegetation must be restricted to the immediate area for construction. No natural vegetation on surrounding land is to be collected for use as firewood. No animals are to be disturbed unnecessarily and no animals are allowed to be shot, trapped or caught for any reason. <u>Any fauna that are found within the construction zone must be moved to the closest point of natural or semi-natural vegetation outside the construction corridor.</u></p> <p>An emergency procedure for the encounter of dangerous animals / reptiles must be compiled by the Contractor and submitted to the ECO for approval. Workers must be trained with regard to this procedure.</p>	<p>ECO Ecologist</p>	

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p><u>The introduction of alien plant species to the site is prohibited.</u> <u>Alien invasive species must be removed as per the Alien Invasive Eradication Programme included in the Wetland and Open Space Rehabilitation Plan.</u></p>		
<p>Where alien plants have been introduced on to the site during clearing and infilling, they must be removed. The Contractor must develop a Method Statement for the removal of alien invasive species and submit it to the ECO for approval. Plant species, as approved by the ECO, must be planted immediately after the construction phase so that these species can establish and thus prevent large stands of infestations which become difficult to control and manage.</p>		
<p><u>Invasive Alien Plants that have colonised the construction site must be removed. The contractor must consult the Alien Invasive Eradication Programme in the Wetland and Open Space Rehabilitation Plan regarding the method for removal.</u></p>		
<p><u>All bare surfaces across the construction and operational site must be checked for alien invasive plants at the end of every month and alien plants removed by hand pulling/uprooting and disposing to a registered landfill site.</u> <u>Herbicides must only be utilised where hand pulling / uprooting is not possible.</u> <u>Only herbicides which have been certified safe for use in wetlands / aquatic environments by an independent testing authority must be considered. The ECO must be consulted in this regard for approval.</u></p>		
<p>Seeds must be collected for planting at the open spaces. A trained and experienced ecologist must be employed to undertake this task prior to clearing and to provide advice on the need for the relocation of any specific species to this nursery. Seeds must be germinated and saplings replanted.</p>		
<p><u>A plant rescue programme must be undertaken prior to construction to accommodate indigenous plants that fall inside the development footprint. The programme is as follows:</u></p> <ul style="list-style-type: none"> ▪ <u>Prior to commencement of construction, a qualified and skilled botanist must be appointed to survey the construction footprint, identify and mark all protected trees and conservation important species and apply for necessary permits and licences to cut, disturb, damage, destroy, remove or relocate them.</u> ▪ <u>Once the required permits are obtained, the Contractor must uproot the tree or shrub (with the roots intact) and replant the species within the Open Space Network under the supervision of an Ecologist.</u> ▪ <u>Indigenous seeds in the construction footprint must be collected by the Ecologist and provided to the Contractor to plant within the Open Space Network.</u> <p><u>The following protocol for the re-planting of vegetation and seeds must be applied:</u></p> <ul style="list-style-type: none"> ▪ <u>All tree holes must be square in plan (minimum of 600 mm length x 600 mm width x 700 mm deep).</u> ▪ <u>Holes are to be backfilled with excavated soil in a ratio of 3:1 with compost. Where possible, any available topsoil should be placed in the hole at the level where the tree root ball will rest.</u> ▪ <u>All trees must be tied (using a tree tie) to a suitable timber stake planted in the ground to a depth of at least 500 mm. The stake shall have a minimum diameter of 35 mm and shall be at least 300 mm taller than the planted tree.</u> ▪ <u>The planting of shrubs will be in accordance with the tree planting method with the exception that the holes are to be smaller.</u> ▪ <u>Do not plant trees in straight lines but at random distances with approximately 3–5 m gaps between trees.</u> 		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<ul style="list-style-type: none"> Water retaining basins / berm of at least 500 mm diameter must be formed around each tree (do not simply leave the excavated plant hole partially backfilled for this purpose – the berm must be raised above the natural soil level). 		

7.12 Geological Stability and Earth-works

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Detailed Geotechnical Investigations must be undertaken prior to the commencement of earth-works.</p>	<p>Engineer Contractor</p>	<p>On-going</p>
<p>Allowance must be made for on-site inspections and evaluations by an experienced engineering geologist / geotechnical engineer so that stability problems can be timeously identified and remedied. It is required that earth-works be carried out along the guidelines given in SANS 1200 (current version).</p>		
<p>All site disturbances must be limited to the areas where structures must be constructed.</p>		
<p>Subsoil drains must be provided particularly if fills are constructed over water logged / marshy areas and drainage courses.</p>		
<p>Individual dwelling plots on the steeper slopes must be designed to have their axes orientated in an up-downslope direction, rather than along the contours. Therewith, associated cut and fill slopes must be contained within individual plot boundaries.</p>		
<p>Cuts:</p> <ul style="list-style-type: none"> Permanent cut slopes in all unconsolidated colluvial, residual and wind blown sediment must be restricted to a maximum slope batter of 1:2 (26°). Temporary slopes in these materials can be steepened to 1:1,75 (30°) at the discretion of a responsible engineer. Cuts in firmly bedded, favourably dipping (into the slope) sandstone, siltstone or shale, or dolerite bedrock, must be laid back to a batter of 1:1,5 (33°). Cut slopes must not exceed a maximum height of 3 m without being assessed by a responsible engineer or retained if required. All cut embankments must be protected against surface erosion by planting of vegetation after construction. In the event that the above mentioned slope dimensions be not possible due to space restrictions the embankment will need to be retained. In additions, within the loose sandy aeolian sediment, Berea Formation and sandy colluvium, excavations greater than 1.2 m where not battered back must be shored. 		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Fills:</p> <ul style="list-style-type: none"> ▪ For preliminary design purposes, all fill embankment batters must be restricted to 1:2 (26°) and a maximum height of 3 m if not retained. ▪ Given the moderately to steeply sloping nature of the site, ensuring stable founding of the likely fill embankments must be crucial to the success of any future development on site. In light of the above at the detailed design stage stability analysis must be carried out for each proposed fill embankment to determine the site specific founding requirements thereof and the required design slope batters. ▪ Fills must be designed and constructed, as well compacted engineered fills with the intention of minimising internal settlements to the 1–2% of the fill thickness that is expected for well compacted fills. In this regard granular material of G10 or better quality must be positioned in areas where structures are proposed. The use of more clayey materials (> G10 quality) must ideally be prevented or at least minimised, by restricting its use to areas which are not to be developed or for landscaping. In this regard the above must prove difficult given the generally very poor nature of the deeply weathered Vryheid Formation bedrock and overlying material which through laboratory test has been identified are generally impermissible. As such careful planning of available materials and their suitability must be required and must necessitate the import of off-site material. ▪ A clear record must be kept of where different material types are placed, to aid in settlement determinations and structural positioning. Furthermore, it is required that upon construction of the platforms, the cut-to-fill must be surveyed if the platforms are to stand for some time before the construction of the proposed structures. Knowing the exact location of this transition across platforms will prove invaluable when designing the structural foundations. ▪ Working benches must be cut into the side-slopes and seated in competent material, removing any ‘problem’ materials where required. Following which, the fill material must be placed and spread in layers not exceeding a loose thickness of 300 mm. While compaction requirements will vary between materials, a general compaction of 93% and 95% of the material’s maximum Mod AASHTO density for more clayey and sandy materials, respectively, must be achieved prior to the placement of the next layer. The maximum particle size within the fill must not exceed two thirds of the layer thickness. Where piling must be the most likely means of founding, boulders must not be incorporated into the fill. ▪ More clayey materials (residual and colluvial soils) where included in the fill embankments, must be limited to layers of 200 mm loose thickness and where possible sandwiched between more granular material in the lower layers of the fill. As mentioned the clayey layers will exhibit increased consolidation and heave potential in comparison to the less clayey materials, hence must be confined to non-structural portions of the fill. With respect to material workability, moisture control must be critical in achieving compaction control of the more clayey and silty materials. As such both padded and smooth drum rollers must be required for satisfactory compaction of the variable materials. ▪ Once complete the fill embankment must be vegetated to minimise surface erosion. 		
<p>Founding:</p> <ul style="list-style-type: none"> ▪ Where the depth to weathered bedrock is less than about 1.5 m, normal strip or column base foundations are considered feasible provided the foundations are taken through the clayey residual and colluvial soils to bear into firmly bedded shale or sandstone or firm dolerite bedrock. ▪ Where deep colluvial and residual clayey soils occur overlying weathered bedrock, or on cut/fill platforms 		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>where deep fills occur, deep founding measures must be required. In this regard, we recommend that structures be supported on reinforced ground beams spanning deep column base (<2.5 m to bedrock) or end bearing pile foundations (>2.5 m to bedrock) taken into firm weathered bedrock.</p> <ul style="list-style-type: none"> ▪ Similarly for areas underlain by loose Aeolian Dune sand and/or Berea Formation sands and clayey sands, it is recommended structures be supported on reinforced ground beams spanning friction piles taken to the required depth. ▪ Alternatively, for compact structures, where deep clayey soils or loose sandy soils occur, structures must be supported on designed reinforced concrete raft foundations. ▪ With the exception of the raft foundations, given the clayey potentially active soils and sandy potentially collapsible soils present, the ground floor slabs of all structures supported on piles, strips or column bases must be isolated from all walls, columns and foundations and incorporate permissible articulation and joints to accommodate any potential differential settlement that must occur. ▪ Notwithstanding the above, it is required that detailed geotechnical investigations are carried out for the individual developments proposed in the area once the details of these developments are made available. 		
<p>Large excavations for the contractor laydown area, storage areas, or waste areas, are not permitted.</p>		

7.13 Soil Management

7.13.1 Topsoil

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The following protocols must be followed when stripping topsoil:</p> <ul style="list-style-type: none"> ▪ Topsoil must be stripped to a depth of 400 mm (on average) from all areas to be impacted by construction activities and any significant vehicular movement over the topsoil must be restricted. ▪ Under no circumstances must topsoil and subsoil be mixed and topsoil must be kept separate from overburden. ▪ Surface vegetation must be removed first, by blading off, by scarification and/or raking. ▪ <u>Only areas that are to be impacted upon by construction and any significant vehicular movement (i.e. construction access) are to be stripped of topsoil.</u> ▪ Topsoil stripping must consider specific recommendations found within the Soil Management Method Statement. ▪ Selection of equipment and technique for topsoil stripping includes: tracked plant preferable on topsoil with wheeled plant standing on subsoil below the cut. ▪ Topsoil is to be removed in sequential strips (up to 6 m wide). ▪ <u>The topsoil must only be handled twice, once when stripped and stockpiled and the second time for rehabilitation purposes.</u> ▪ The stripping of topsoil must be supervised by the EO who has read and acknowledged that he understands the requirements detailed within the EMPr and any other relevant documents. ▪ <u>Training on the required separation stripping and handling of topsoil must be undertaken with relevant site-</u> 	<p>Contractor EO Engineer ECO</p>	<p>On-going</p>

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
staff.		
The Contractor must strip and stockpile all soil within the work area for subsequent use at a later stage.		
Stockpiles must be located 50 m away from watercourses or drainage lines so as to prevent soil erosion. Stockpiles must only be placed closer if otherwise approved with the KZN EDTEA. Stockpiles must be protected from wind and rain with the use of tarpaulins where required. The Engineer is to use his discretion as to the method of protection to be used, in consultation with the ECO.		
The Contractor must exercise precautions with the storage, handling and transport of all materials that could adversely affect the environment.		

7.13.2 Subsoil

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The following protocols must be followed when stripping subsoil:</p> <ul style="list-style-type: none"> Subsoil stripping must consider specific recommendations found within the Soil Resource Survey and/or Site-specific Soil Management Method Statement. The stripping of subsoil must be supervised by the EO who has read and acknowledged that he understands the requirements detailed within the EMPr and any other relevant documents. Training on the required separation stripping and handling of subsoil must be undertaken with relevant site-staff. 	Contractor EO Engineer EO	On-going
The Contractor must strip and stockpile all soil within the work area for subsequent use at a later stage.		
Stockpiles must be located 50 m away from watercourses or drainage lines and more than 50 m from the designated dune area to prevent soil erosion, unless otherwise approved with the KZN EDTEA. Stockpiles must be protected from wind and rain with the use of tarpaulins where required. The Engineer is to use his discretion as to the method of protection to be used, in consultation with the ECO.		
Different layers of subsoil must be stockpiled separately.		
<p>The Contractor must exercise precautions with the storage, handling and transport of all materials that could adversely affect the environment.</p> <p>If a pollution event occurs polluting any surface or groundwater which would be determined significant in terms of Section 30 of the NEMA, it must immediately be reported to the KZN EDTEA and mitigation measures must be employed as per the Spill Contingency SOP (Appendix A).</p>		

7.13.3 Haulage

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The following protocols must be followed when hauling surplus soil material:</p> <ul style="list-style-type: none"> Haul vehicles must not be overfilled, and must only carry one type of soil to a designated temporary surplus fill material site. The driver must know precisely where the material is required to be stockpiled within the temporary surplus fill material site. Haul vehicles are to keep to designated haul roads within the development footprint only. 	Contractor Engineer Developer	On-going

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<ul style="list-style-type: none"> ▪ Speed limits must be set <u>to 40 km/hr</u> in order to enforce road safety, and this in turn, will aid dust suppression along haul roads. Where speed limits prove ineffective in reducing the amount of dust, routine <u>(minimum three times daily)</u> dust suppression <u>(water spraying)</u> must be undertaken on all active haul roads. ▪ Haulage must consider specific recommendations found within the Soil Resource Survey and/or Site-specific Soil Management Method Statement. ▪ Training must be undertaken with relevant site-staff. 		

7.13.4 Surplus Fill Material Sites

Due to the proposed earth-works, surplus fill material sites (SFMS) within Tinley Manor Southbanks must be established to accommodate surplus fill material until a beneficial end-use can be accommodated. The location of the SFMS must be determined by the Engineer and approved by the ECO prior to establishment. All SFMSs must be located within the approved development footprint and not within any open space areas or within 50 m to any watercourses.

This section must be read in conjunction with the Soil Management and Framework Strategy (**Appendix C**) which must be complied with and must be considered as an extension to the EMPr.

7.13.4.1 Site Establishment, Management and Erosion Control

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
All SFMSs must not be located within <u>50 m</u> to any watercourse and at least 500 m away from the Umhlati River and Estuary.	Engineer Contractor EO ECO	On-going
A signboard must be placed in the area where stockpiling activities such as clearing and infilling will take place informing the public of the activities taking place. Furthermore, 'no-dumping' signs must be erected.		
The Contractor must take responsibility for the site to conform to all contractual aspects and environmental standards applicable.		
The site must be cleared of all inert waste, rubble, foundations and litter, prior to and during stockpiling.		
The following protocols must be followed when stockpiling soil material: <ul style="list-style-type: none"> ▪ The amount of stockpiling of surplus material must be limited as far as practically possible, to prevent unrequired handling of soil resources. Only if the surplus material cannot be allocated directly from site, to a particular option for re-use, is the material allowed to be stockpiled in designated area identified for SFMSs. These designated stockpile areas, referred to as SFMSs, are to be viewed as temporary. If the material cannot be allocated to a particular option for re-use over a reasonable period of time or unless a permanent site has been identified for stockpiling with a beneficial end use intended (e.g. to be rehabilitated into a soccer field, park, mountain bike track, etc.) only then would such a site be deemed permanent. If amended to a permanent status this would need to be approved by the KZN EDTEA. ▪ Soil resources are permitted to be stockpiled in temporary SFMSs for a significant period of time due to the phasing of the development. As such, temporary SFMSs must be evaluated according to the likely environmental impacts associated with where they are situated. Temporary SFMSs must not present a risk 		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>to any sensitive environments such as wetlands and strict mitigation measures must be implemented to prevent or minimise environmental impacts. <u>If soil stockpiles are to be kept for more than 3 months, they must be hydroseeded with common indigenous grasses.</u> If these temporary SFMSs are to be located within designated open space areas <u>for the purposes of re-use of surplus fill material as per the Soil Management Framework Strategy, approval must be obtained from the KZN EDTEA prior to establishment.</u></p> <ul style="list-style-type: none"> ▪ Separate sites must be allocated for different types of soil resources. If space constraints do not allow for completely separate sites, then areas for separate stockpiling must be allocated within stockpile areas. If separate sites are to be allocated, it is required that these are located near likely options for allocation, in order to reduce the distance to haul the material. ▪ Training and signage must be implemented. ▪ Stockpiling must not cause soil erosion, pollution of any watercourses or stormwater inlets or increase the risk of flooding. ▪ Weeds must be removed from stockpiles weekly. ▪ Stockpiling must consider specific recommendations found within the Soil Resource Survey and/or Site-specific Soil Management Method Statement. ▪ Stockpile heights are to be guided by the recommendations contained within the Soil Resource Survey and/or Site-specific Soil Management Method Statement. Generally 2–4 m maximum height is deemed acceptable, depending on space limitations as this sets the viable degree of the stockpile side slopes (see below). Wet soils must be stockpiled to a minimum height due to risk of compaction. ▪ A period of drying and possibly cultivation must be required in order to aerate wet soils. ▪ Restrict the amount of water that can get into dry stockpiles during the storage period by covering stockpiles, as agreed by the ECO. 		
<p>No large rocks or building rubble is permitted to be spoiled at these sites. If building rubble is to be spoiled, a waste management licence as per the requirements of the NEM:WA must be required.</p>		
<p>Dumping of any other material, including litter is prohibited.</p>		
<p>The following protocols must be followed to stabilise stockpile areas (also refer to Section 0):</p> <ul style="list-style-type: none"> ▪ As soon as stockpiling is complete, SFMSs are to be stabilised to prevent erosion and related loss of soil resources. Compaction must exist for subsoil layers, so as to prevent excessive settlement (subsidence), slumping and channelling of stormwater. ▪ Stabilisation includes ensuring slope stability by battering embankments to 1:3 slopes. Slopes must be benched or terraced for additional stability; thus creating platforms that run on contour and are between 2–4 m wide. ▪ Slopes must thereafter be vegetated as the preferred means of erosion control. Note that stockpiles are only permitted to be left un-vegetated if they are to be moved within 6 months. If left un-vegetated such stockpiles must be subject to erosion controls as detailed in the Soil Erosion and Sedimentation Control Plan (Section 0) so as to enforce no wind erosion impacts. ▪ Where a significant risk of erosion exists, erosion control measures must be installed. These must include the use of: (hessian) jute matting, straw bales, and/or geotextile silt fencing. All erosion control measures must be installed according to best practice, and must suit the intended purpose of holding back run-off in 		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>areas prone to erosion.</p> <ul style="list-style-type: none"> In principle, water must be allowed to collect long enough behind erosion controls, to allow sediment to settle out of suspension. As such, careful design consideration must be given to the implementation of stormwater control measures on these sites. 		

7.13.4.2 Rehabilitation and Maintenance

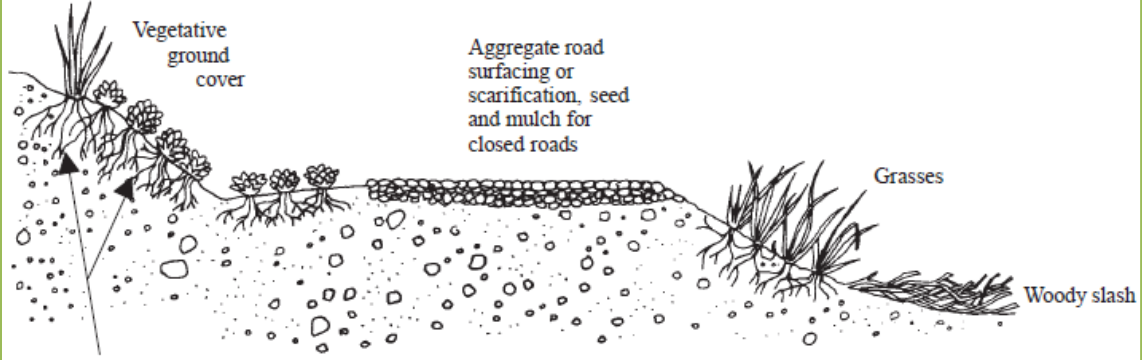
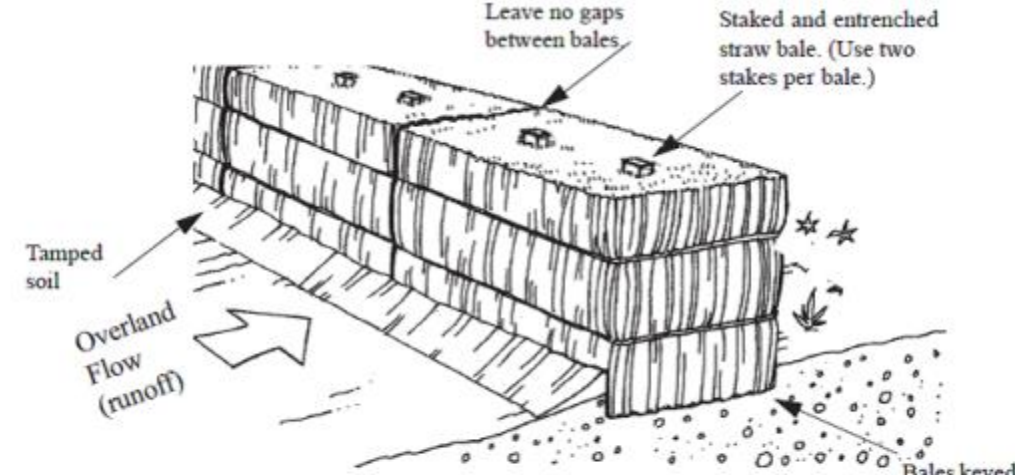
ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Rehabilitation must be undertaken as per the requirements of the approved Wetland and Open Space Rehabilitation Plan.</p>	<p>Contractor Engineer Developer ECO</p>	<p>Weekly</p>
<p>A period of one year must be allowed for following practical completion, unless otherwise specified.</p>		
<p>Cordon off areas that are under rehabilitation as no-go areas using danger tape and steel droppers. If required, these areas must be fenced off to prevent vehicular, pedestrian and livestock access.</p>		
<p>Delay the re-introduction of surplus fill material to all rehabilitation areas until an acceptable level of re-vegetation has been reached. Fencing is permitted to be used, or the area must be covered by branches.</p>		
<p>Re-vegetation must match the vegetation type which previously existed, unless otherwise indicated in the Contract or specified by the ECO.</p>		
<p>Water all transplanted, planted and grassed areas.</p>		
<p>Watering must, commence and continue immediately after the seeds have germinated and growth begins.</p>		
<p>Mow lawns monthly to a height of 50 mm above ground level. This promotes coverage.</p>		
<p>Mowing of veld grass is to take place once a year after the grass has shed its seed and not before the grass has fully grown.</p>		
<p>Where mechanical mowing is not possible, an approved method of cutting the grass by hand (e.g. by means of scythe) is to be used.</p>		
<p>Prune trees and shrubs at the end of winter so as to stimulate growth. Pruning during the growing season is not permitted as this stunts growth.</p>		
<p>Control weeds by means of extraction, cutting or other approved methods.</p>		
<p>For planted areas that have failed to establish, replace plants with the same species as originally specified. The same species as originally specified must be used unless otherwise specified by the ECO.</p>		
<p>A minimum grass cover of 80% is required, and individual plants must be strong and healthy growers at the end of the Maintenance Period.</p>		
<p>In the case of sodding, acceptable cover entails that 100% cover is attained by the specified vegetation.</p>		
<p>Rehabilitation Work are to be spread with additional topsoil, ripped to a depth of 100 mm and re-planted, re-sodded, re-hand sown or re-hydroseeded.</p>		

7.14 Soil Erosion and Sedimentation Control Plan

Erosion control at Tinley Manor Southbanks is fundamental for the protection of water quality. Soil stabilisation and erosion control practices are needed and must be used in areas where soil is exposed and natural vegetation is insufficient. Bare ground must be covered, typically with grass seed and some form of matting or mulch. This will help prevent erosion and subsequent movement of sediment into the Umhlali River and Estuary and/or wetlands. This movement of sediment can occur during and after site establishment or construction, during haulage or from poor land management practices near the road. Most erosion occurs during the first rainy season after construction. Therefore, erosion control measures must be implemented in areas sensitive to erosion such as near watercourses and edges of slopes.

These measures must include:

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Phased construction activities must take place to enforce the removal of vegetation, only as it becomes required for work to proceed. This enables erosion and sedimentation to be minimised and centralised in relatively small areas easier to control and to stabilise.</p> <p>Topsoil storage must be as brief as possible and storage must occur in a bunded area away from watercourses as described above.</p> <div data-bbox="296 402 1398 1198" style="text-align: center;"> <p>Perspective View</p> </div> <p>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 (within 7 days) rehabilitation of exposed soil areas with indigenous vegetation will enforce that soil is protected from the elements. The un-required removal of vegetation especially on steep areas must be prevented. Taking required precautions in terms of design and construction and earth-works, 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 within 7 days. Seeding, anchored mulch, wool binders or erosion control fabrics must be used to provide surface protection and stabilisation until vegetation is established.</p>	<p>Contractor Engineer ECO</p>	<p>On-going</p>

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
 <p>Cross-section</p> <p>Vegetative ground cover Aggregate road surfacing or scarification, seed and mulch for closed roads Grasses Woody slash Deep rooted vegetation for slope stabilization</p> <p>Various erosion control ground covers include seeding and straw mulch, grasses and other mulch, vegetation, rock, slash, chips, and leaves.</p> <p>The use of hay bales and silt and brush barriers as slope protection for exposed slopes is permitted.</p>  <p>Leave no gaps between bales Staked and entrenched straw bale. (Use two stakes per bale.) Tamped soil Overland Flow (runoff) Bales keyed (buried) 10 cm deep into soil.</p> <p>Note: Problems can develop from water running between and under hay bales. Install them carefully. Long-term structures must be periodically cleaned and maintained.</p>		

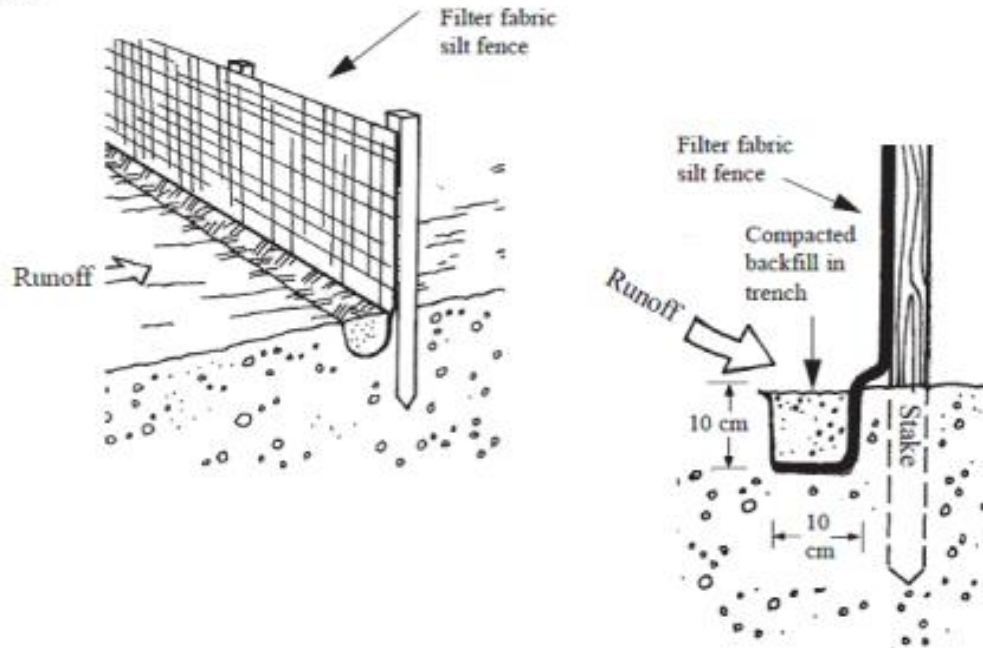
ACTIONS AND CONTROLS

RESPONSIBILITY

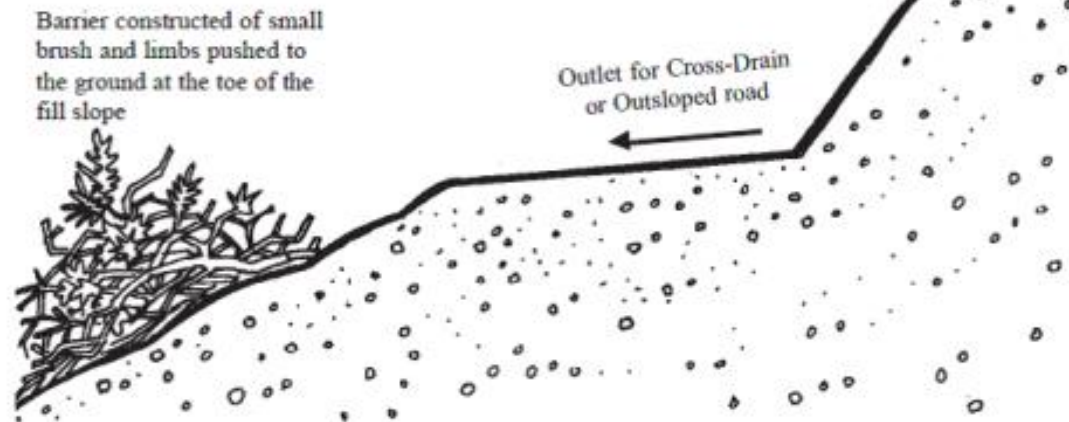
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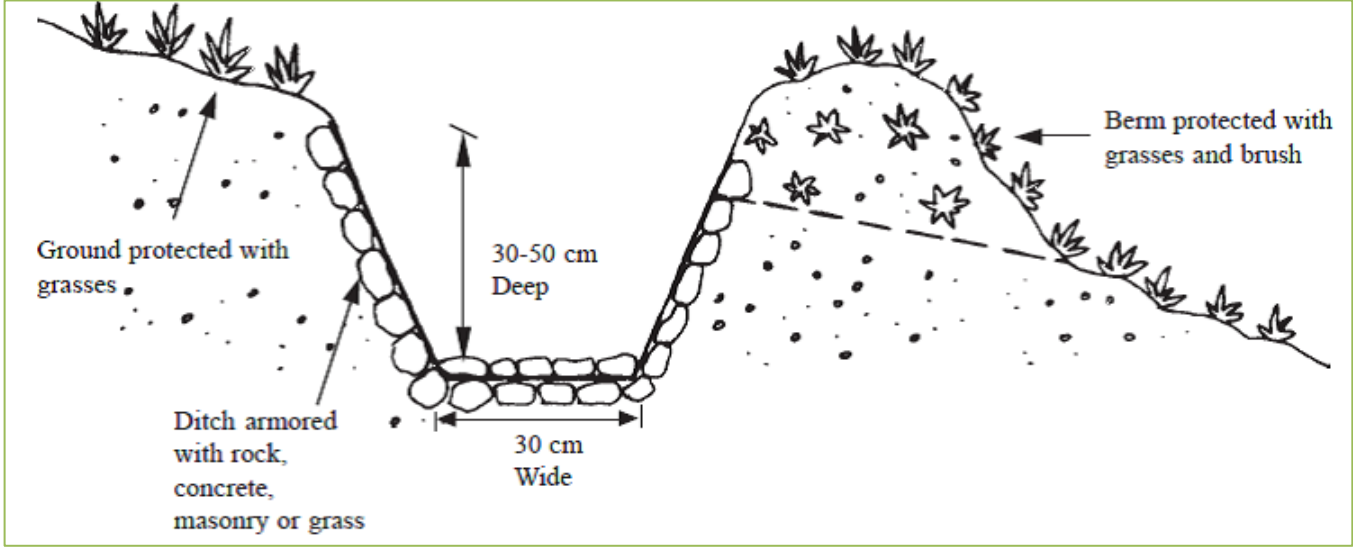
The use of geo-textiles, turf blankets or mats as slope protection for exposed slopes is permitted.

b. Silt Fences



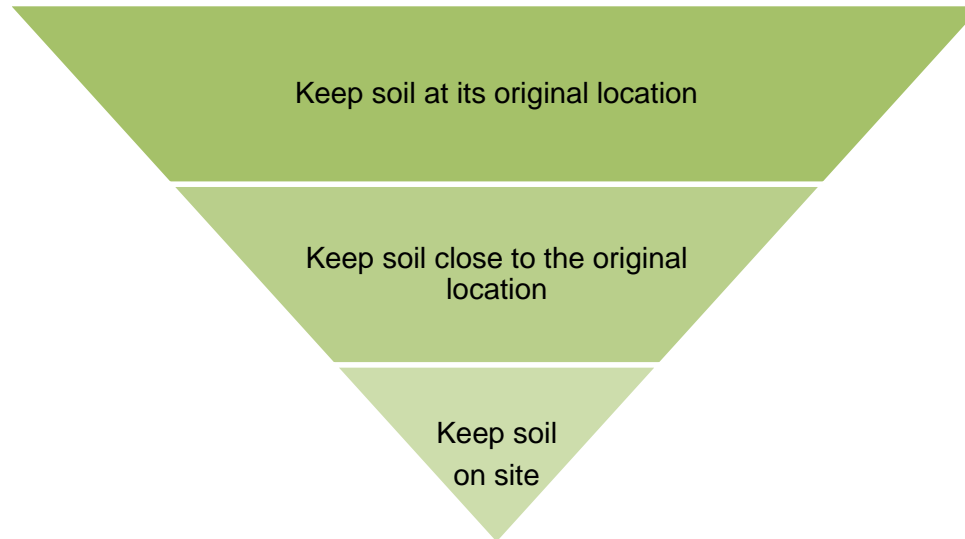
c. Brush Barrier



ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Drainage controls such as vegetated swales or culverts and cut-off trenches, ditched and/or berms must be used to enforce proper management of surface water run-off to prevent erosion and sedimentation.</p>  <p>Ground protected with grasses</p> <p>Ditch armored with rock, concrete, masonry or grass</p> <p>30-50 cm Deep</p> <p>30 cm Wide</p> <p>Berm protected with grasses and brush</p>		
<p>The use of sand bags or Hessian sheets must be used to stabilise bare soil.</p>		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The use of live retaining walls to stabilise slopes is permitted.</p> <p>c. Live Retaining Walls Constructed with Rock or Gabions and Vegetation</p>		
<p>Work areas must be clearly defined and demarcated to prevent unrequired disturbance of areas outside the maintenance areas.</p>		
<p>Constant cognisance of the inherent high erosion risk potential of all soils and sites on the property must be taken and control and preventative measure put in place.</p>		
<p>Construction vehicles must remain in designated demarcated areas.</p>		

When developing a temporary erosion-control plan for a specific site, the following hierarchy must be implemented:



Keeping the soil at its original location is the preferred objective because it causes the least amount of harm to the environment. This option not only protects the surrounding land and water, but also prevents costly redressing of slopes and ditches.

However, keeping the soil at its original location is not always possible due to challenging topography and other site variables. If the soil cannot be kept at its original location, it must be kept close. This option will require some re-grading and redressing of slopes and ditches.

Finally, if site conditions are such that neither of the first two objectives can be met, soil must be kept within the site unless approved by the ECO. Soil transported off-site can cause far-reaching damage to the downstream environment.

Loss of soil from the site must be prevented to the maximum extent practicable.

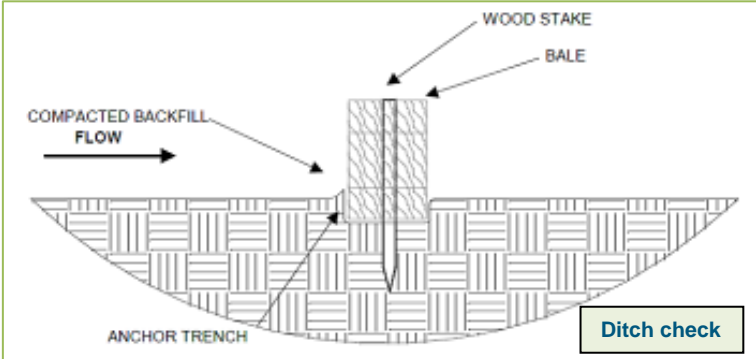
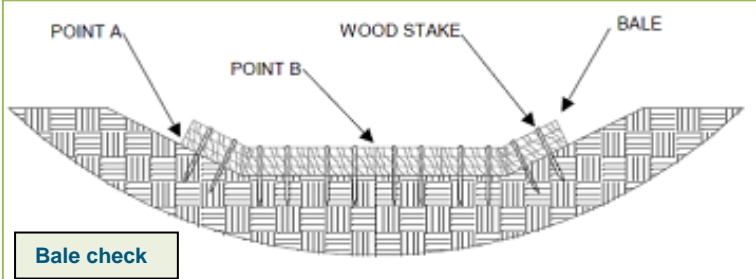
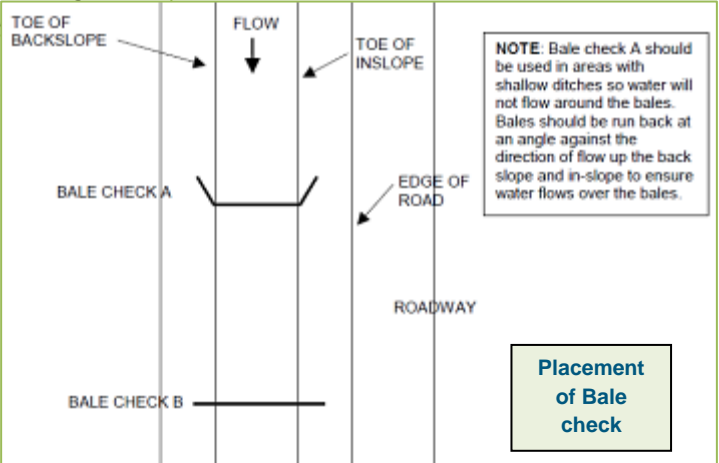
The following sections provide general guidance for implementation of temporary erosion-control measures. The selection of temporary erosion control measures for some situations must be based upon good judgment and past experience under similar conditions and with approval from the ECO.

7.14.1 *Bale Ditch Checks*

The purpose of bale ditch checks is to intercept run-off. The sediment-laden run-off will pond behind the bales, slowing the run-off velocity and allowing most of the suspended sediment to drop out. Water is intended to flow over the bales, not around the side. In ditches with high flows or steep slopes, erosion protection must be required on the downstream side of the bales. This is accomplished by using erosion control blankets or riprap.

The following protocols for the placement of bale ditch checks must be followed:

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Bale ditch checks must be placed perpendicular to the flowline of the ditch.</p>		
<p>The ditch check must extend far enough so that the ground level at the ends of the check is higher than the top of the lowest centre bale. This prevents water from flowing around the check.</p>		
<p>Checks must not be placed in ditches where high flows are expected. Rock checks must be used instead.</p>		
<p>Bales must be placed in ditches with slopes of 6% or less. For slopes steeper than 6%, rock checks must be used.</p>		
<p>Proper Installation Method:</p> <ul style="list-style-type: none"> ▪ Perpendicular to the ditch flow line, excavate a trench that is 150 mm deep and a bale’s width wide. ▪ Extend the trench in a straight line along the entire length of the proposed ditch check. ▪ Place the soil on the upstream side of the trench to save for later use. ▪ Optional: <ul style="list-style-type: none"> ○ On the downstream side of the trench, roll out a length of erosion-control blanket (‘scour apron’) equal to the length of the trench. Place the upstream edge of the erosion-control blanket along the bottom upstream edge of the trench. The erosion-control blanket must be anchored in the trench with one row of 200 mm landscape staples placed on 460 mm centres. The remainder of the erosion control blanket (the portion that is not lying in the trench) will serve as the downstream scour apron. This section of the blanket must be anchored to the ground with 200 mm landscape staples placed around the perimeter of the blanket on 460 mm centres. The remainder of the blanket must be anchored using two evenly spaced rows of 200 mm landscape staples on 460 mm centres placed perpendicular to the flow line of the ditch. ○ Place the bales in the trench, making sure that they are butted tightly. Two stakes must be driven through each bale along the centreline of the ditch check, approximately 150–200 mm in from the bale ends. Stakes must be driven at least 460 mm into the ground. ○ Once all the bales have been installed and anchored, place the excavated soil against the upstream side of the check and compact it. The compacted soil must be no more than 75–100 mm deep and must extend upstream no more than 600 mm. 	<p>Contractor ECO</p>	<p>On-going</p>
<p>List of common placement / installation mistakes!</p> <ul style="list-style-type: none"> ▪ Do not place a bale ditch check directly in front of a culvert outlet, it will not stand up to a concentrated flow. ▪ Do not place bale ditch checks in ditches that likely will experience high flows, they will not stand up to concentrated flow. ▪ Do not exceed spacing guidelines provided by the ECO. ▪ Do not allow water to flow around the ditch check. Make sure that the ditch check is long enough so that the ground level at the ends of the check is higher than the top of the lowest centre bale. ▪ Do not place bale ditch checks in channels with shallow soils underlain by rock. If the check is not anchored sufficiently, it will wash out. ▪ Bale ditch checks must be dug into the ground. Bales at ground level do not work because they allow water to flow under the check. 		

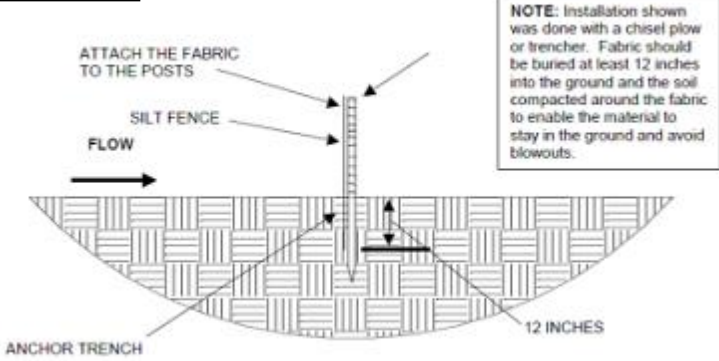
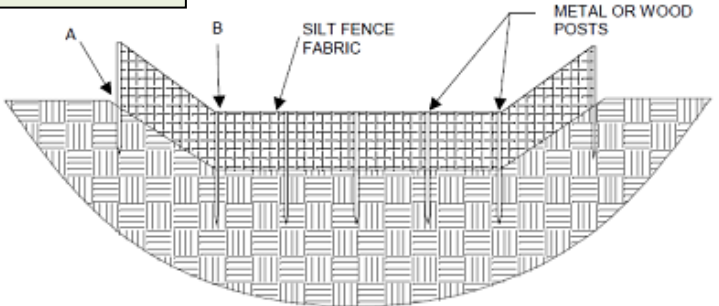
ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Bale ditch checks must be inspected every seven days and within 24 hours of a rainfall of 10 mm or more.</p>  <p>Ditch check</p>  <p>Bale check</p> <p>NOTE: Point A must be higher than point B so water will flow over and not around the bales.</p>  <p>Placement of Bale check</p> <p>NOTE: Bale check A should be used in areas with shallow ditches so water will not flow around the bales. Bales should be run back at an angle against the direction of flow up the back slope and in-slope to ensure water flows over the bales.</p>		

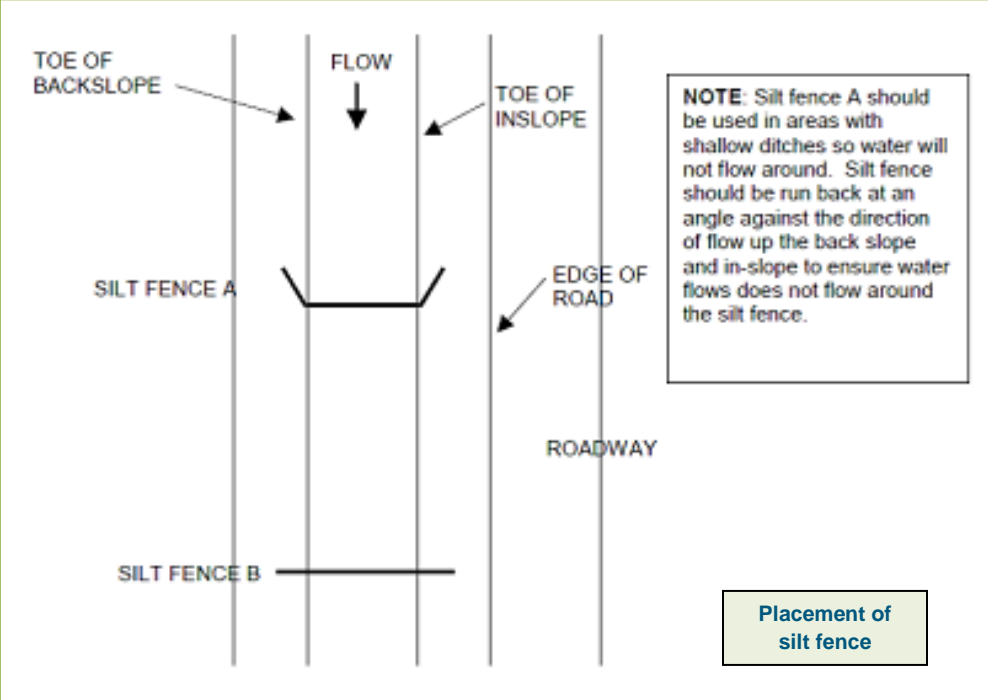
7.14.2 Silt Fence Ditch Checks

Silt fence ditch checks operate by intercepting, ponding and filtering sediment-laden run-off. Ponding the water reduces the velocity of the incoming flow and allows most of the suspended sediment to settle. As the ponded water percolates through the silt fence fabric, much of the remaining suspended sediment is filtered out. Silt fence ditch checks work well in ditches with low flows and moderate slopes.

The following protocols for the placement of silt fence ditch checks must be followed:

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Place silt fence in ditches where it is unlikely to be overtopped. Water must flow through a silt fence ditch check, not over it. Silt fence ditch checks often fail when overtopped.</p> <p>Silt fence ditch checks must be placed perpendicular to the flowline of the ditch.</p> <p>The silt fence must extend far enough so that the ground level at the ends of the fence is higher than the top of the low point of the fence. This prevents water from flowing around the check.</p> <p>Checks must not be placed in ditches where high flows are expected. Rock checks must be used instead.</p> <p>Silt fence must be placed in ditches with slopes of 6 % or less. For slopes steeper than 6%, rock checks must be used.</p>	Contractor	On-going
<p>Proper Installation Method:</p>		
<ul style="list-style-type: none"> ▪ Perpendicular to the ditch flow line, excavate a trench that is at least 150 mm deep by 100 mm wide. Extend the trench in a straight line along the entire length of the proposed ditch check. Place the soil on the upstream side of the trench for later use. ▪ Roll out a continuous length of silt fence fabric on the downstream side of the trench. Place the edge of the fabric in the trench starting at the top upstream edge of the trench. Line all three sides of the trench with the fabric. Backfill over the fabric in the trench with the excavated soil, and compact. After filling the trench, approximately 600–900 mm of silt fence fabric must remain exposed. ▪ Lay the exposed silt fence on the upstream side of the trench to clear an area for driving in the posts. Just downstream of the trench, drive posts into the ground to a depth of at least 600 mm. ▪ Place posts no more than 1.2 m apart. ▪ Attach the silt fence to the anchored post with staples, wire, zip ties or nails. 		
<p>List of common placement / installation mistakes!</p>		
<ul style="list-style-type: none"> ▪ Water must flow through a silt fence ditch check, not over it. Place silt fence in ditches where it is unlikely to be overtopped. Silt fence installations quickly deteriorate when water overtops them. ▪ Do not place silt fence posts on the upstream side of the silt fence fabric. In this configuration, the force of the water is not restricted by the posts, but only by the staples (wire, zip ties, nails, etc.). The silt fence will rip and fail. ▪ Do not place a silt fence ditch check directly in front of a culvert outlet. It will not stand up to the concentrated flow. ▪ Do not place silt fence ditch checks in ditches that likely will experience high flows. They will not stand up to concentrated flow. ▪ Follow prescribed ditch-check spacing guidelines. If spacing guidelines are exceeded, erosion will occur between the ditch checks. 		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<ul style="list-style-type: none"> Do not allow water to flow around the ditch check. Make sure that the ditch check is long enough so that the ground level at the ends of the fence is higher than the low point on the top of the fence. Do not place silt fence ditch checks in channels with shallow soils underlain by rock. If the check is not anchored sufficiently, it will wash out. 		
<p>Silt fence ditch checks must be inspected every seven days and within 24 hours of a rainfall of 10 mm or more.</p> <div data-bbox="401 402 1184 862"> <p>Side view</p>  </div> <div data-bbox="401 862 1184 1305"> <p>Elevation view</p>  </div>		

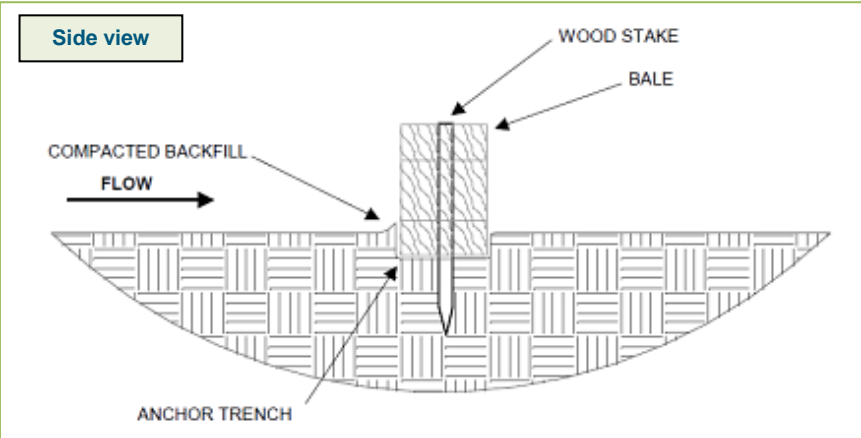
ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
 <p>NOTE: Silt fence A should be used in areas with shallow ditches so water will not flow around. Silt fence should be run back at an angle against the direction of flow up the back slope and in-slope to ensure water flows does not flow around the silt fence.</p> <p>Placement of silt fence</p>		

7.14.3 Bale Slope Barriers

Bale slope barriers operate by intercepting and ponding sediment-laden run-off. Ponding the water dissipates the energy of the incoming flow and allows much of the suspended sediment to settle. Water exits the bale slope barrier by flowing over the bales.

The following protocols for the placement of bale slope barriers must be followed:

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>A slope barrier must be used at the toe of a slope when a ditch does not exist. The slope barrier must be placed on nearly level ground 1.5–3.0 m from the toe of a slope. The barrier is placed away from the toe of the slope to provide storage for settling sediment.</p>	Contractor	On-going
<p>When practicable, bale slope barriers must be placed along contours to prevent a concentration of flow.</p>		
<p>Bale slope barriers also can be placed along right-of-way fence lines to keep sediment from crossing onto adjacent property. When placed in this manner, the slope barrier will not likely follow contours.</p>		
<p>Proper Installation Method:</p> <ul style="list-style-type: none"> Along the length of the planned slope barrier, excavate a trench that is 150 mm deep and a bale’s width 		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>wide. Make sure that the trench is excavated along a single contour. When practicable, slope barriers must be placed along contours to prevent a concentration of flow. Place the soil on the upslope side of the trench for later use.</p> <ul style="list-style-type: none"> Place the bales in the trench, making sure that they are butted tightly. Two stakes must be driven through each bale along the centreline of the ditch check, approximately 150–200 mm in from the bale ends. Stakes must be driven at least 460 mm into the ground. Once all the bales have been installed and anchored, place the excavated soil against the up-slope side of the check and compact it. The compacted soil must be no more than 75–100 mm deep. 		
<p>List of common placement / installation mistakes!</p> <ul style="list-style-type: none"> When practicable, do not place bale slope barriers across contours. Slope barriers must be placed along contours to prevent a concentration of flow. Concentrated flow over a slope barrier creates a scour hole on the down-slope side of the barrier. The scour hole eventually undermines the bales and the barrier fails. Do not place bale slope barriers in areas with shallow soils underlain by rock. If the barrier is not anchored sufficiently, it will wash out. Bale slope barriers must be dug into the ground. Bales at ground level do not work because they allow water to flow under the barrier. 		
<p>Bale slope barriers must be inspected every seven days and within 24 hours of a rainfall of 10 mm or more.</p> 		

ACTIONS AND CONTROLS		RESPONSIBILITY	MONITORING FREQUENCY
<p>Placement of bale slope barrier</p> <p>SLOPE BARRIER 1</p> <p>SLOPE BARRIER 2</p> <p>SLOPE BARRIER 3</p>	<p>NOTE:</p> <p>Slope barrier 1 should be used on steep slopes, high embankment areas where soils are highly erodible, or in sensitive areas.</p> <p>Slope barrier 2 should be used on relatively flat slopes.</p> <p>Slope barrier 3 should be used on slopes that drain in two directions (down the embankment and steep road grades). This will pond the water to allow the sediment to settle or filter out of the water.</p> <p>Point A should be higher than point B as illustrated in Sections 1 to 4.</p>		

7.14.4 Silt Fence Slope Barriers

Silt fence slope barriers operate by intercepting and ponding sediment-laden slope run-off. Ponding the water reduces the velocity of the incoming flow and allows most of the suspended sediment to settle. Water exits the silt fence slope barrier by percolating through the silt fence.

The following protocols for the placement of silt fence slope barriers must be followed:

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
A slope barrier must be used at the toe of a slope when a ditch does not exist. The slope barrier must be placed on nearly level ground 1.5–3.0 m away from the toe of a slope to provide storage for settling sediment.	Contractor	On-going
When practicable, silt fence slope barriers must be placed along contours to prevent concentrated flows.		
Silt fence slope barriers also can be placed along right-of-way fence lines to keep sediment from crossing onto adjacent areas. When placed in this manner, the slope barrier will not likely follow contours.		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Proper Installation Method:</p> <ul style="list-style-type: none"> Along the length of the planned slope barrier excavate a trench that is 150 mm deep by 100 mm wide. Make sure that the trench is excavated along a single contour. When practicable, slope barriers must be placed along contours to prevent a concentration of flow. Place the soil on the up-slope side of the trench for later use. Roll out a continuous length of silt fence fabric on the down-slope side of the trench. Place the edge of the fabric in the trench starting at the top up-slope edge. Line all three sides of the trench with the fabric. Backfill over the fabric in the trench with the excavated soil, and compact. After filling the trench, drive posts into the ground to a depth of at least 600 mm. Place posts no more than 1.2 m apart. Attach the silt fence to the anchored post with staples, wire, zip ties or nails. <p>List of common placement / installation mistakes!</p> <ul style="list-style-type: none"> When practicable, do not place silt fence slope barriers across contours. Slope barriers must be placed along contours to prevent concentration of flow. When the flow concentrates, it overtops the barrier, and the silt fence slope barrier quickly deteriorates. Do not place silt fence posts on the up-slope side of the silt fence fabric. In this configuration, the force of the water is not restricted by the posts, but only by the staples (wire, zip ties, nails, etc.). The silt fence will rip and fail. Do not place silt fence slope barriers in areas with shallow soils underlain by rock. If the barrier is not sufficiently anchored, it will wash out. Silt fence slope barriers must be dug into the ground; silt fence at ground level does not work because water will flow underneath. 		
<p>Silt fence slope barriers must be inspected every seven days and within 24 hours of a rainfall of 10 mm or more.</p> <div data-bbox="386 959 1192 1364" style="border: 1px solid black; padding: 10px;"> <p>Side view</p> </div>		

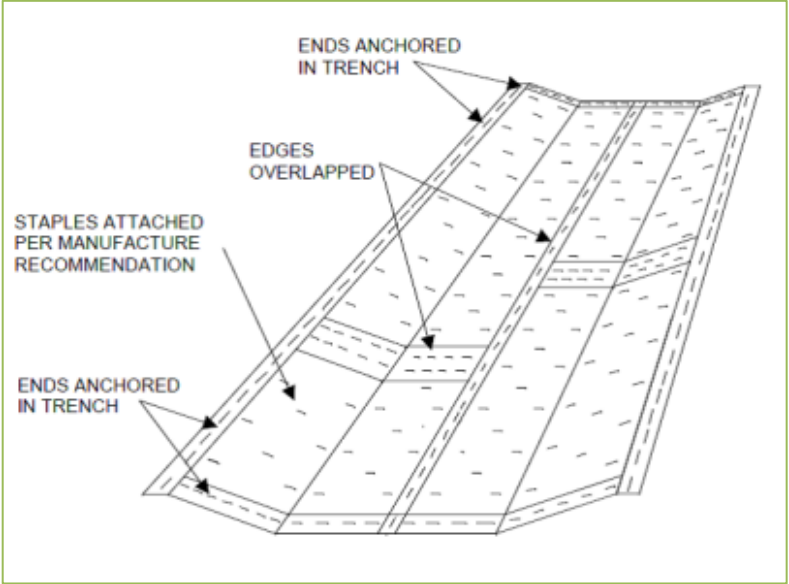
ACTIONS AND CONTROLS		RESPONSIBILITY	MONITORING FREQUENCY
<p>Placement of silt fence slope barrier</p>	<p>NOTE:</p> <p>Slope barrier 1 should be used on steep slopes, high embankment areas, where soils are highly erodible, or in sensitive areas.</p> <p>Slope barrier 2 should be used on relatively flat slopes.</p> <p>Slope barrier 3 should be used on slopes that drain in two directions (down the embankment and steep road grades). This will pond the water to allow the sediment to settle or filter out the water.</p> <p>Point A should be higher than point B as illustrated in Sections 1 to 4.</p>		

7.14.5 Erosion Control Blankets

Silt fence slope barriers operate by intercepting and ponding sediment-laden slope run-off. Ponding the water reduces the velocity of the incoming flow and allows most of the suspended sediment to settle. Water exits the silt fence slope barrier by percolating through the silt fence.

Erosion-control blankets are used to help limit erosion and establish vegetation on slopes and in ditches where conventional seeding and/or structural methods would be insufficient. By reducing the negative effects of rainfall impact and run-off, erosion control blankets provide slopes and ditches with a temporary, stable environment for seeds to germinate. Temporary erosion-control blankets are constructed of a variety of materials, including straw, wood excelsior, coconut or some combination thereof. These materials usually are stitched or glued to some type of synthetic or natural fibre netting, which is either biodegradable or photodegradable (broken down by light).

The following protocols for the placement of erosion control blankets must be followed:

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The erosion control blankets must be used in areas of high flow and/or steep slopes where erosion will occur before grass growth.</p>		
<p>The blankets also must be placed in areas of poor soil quality hinders for normal grass growth.</p>		
<p>Proper Installation Method:</p> <ul style="list-style-type: none"> ▪ Prepare the soil and apply the seed before installing blankets. ▪ Anchor the blankets into a 150 mm by 150 mm trench. Backfill and compact the trench after stapling the blanket in accordance with the manufactures recommendations. ▪ Roll out the blanket in the direction of flow. Overlap the ends of the blanket if additional rolls are needed. Place the upstream blanket on top of the new roll and staple. Use a double row of staples staggered 100 mm apart. A minimum overlap of 300 mm is required. ▪ Continue to place blankets in the above fashion, remembering to overlap all edges. ▪ The terminal end of the blankets must be anchored. 		
<p>List of common placement / installation mistakes!</p> <ul style="list-style-type: none"> ▪ Enforce the ends are properly secured. ▪ Install a sufficient number of staples to hold the blanket in place. ▪ Overlap the blanket to enforce water that flows on top of the blanket and is unable to flow under the blanket. 		
<p>Erosion control blankets must be inspected every seven days and within 24 hours of a rainfall of 10 mm or more.</p>		
	<p>Contractor</p>	<p>On-going</p>

7.14.6 Seeding

Seeding is by far the most efficient and cost-effective method for controlling on-site erosion. The key to controlling erosion with seeding is the timeliness of the application. Seeding must be initiated within seven days after grading activities have temporarily or permanently ceased on a portion of the project site. On-site erosion and off-site sedimentation will continue to occur as long as a section of exposed earth remains.

The following protocols for seeding must be followed:

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
The seed mixes and depth of soil to be used for seeding must be recommended by a qualified Ecologist as recommended in an approved Wetland and Open Space Rehabilitation Plan.	Contractor Developer	On-going

7.15 Air Quality

7.15.1 Pollution Management and Odour Control

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Any oil containing equipment or containers must be managed in a manner so as to prevent oil exposure to atmosphere – the aim being to limit evaporation of volatiles to atmosphere.	Contractor	Daily
Odours from chemical toilets and waste must be managed. Toilets must be serviced daily or weekly, as required, to enforce no spillages from overfilling, and to enforce minimal odour generation. Chemical toilets must be cleared and cleaned at least weekly.		
Removal and disposal of litter and debris must be undertaken during periods of high ventilation.		
No fires (for cooking or heating) are to be allowed on site. Cooking and heating alternatives for staff must be organised.		
Vehicles must be maintained to prevent excessive emissions and smoke. Similarly equipment must be serviced on a regular basis (<u>at least monthly</u>) to enforce acceptable emission levels and no leakages of hazardous substances. It is reiterated that all plant equipment when parked must use drip trays if any leakages are found to occur.		

7.15.2 Dust Control

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Dust track-on from disturbed areas to paved road surfaces must be prevented by making use of one of the following measures to: <ul style="list-style-type: none"> ▪ Road sweeping. ▪ The use of chemical dust suppression or a biodegradable soil stabilising agents must be investigated for use on disturbed areas to reduce the amount of dust where water suppression is insufficient. ▪ Wet suppression to the roads using a light spray of water with / without a dust suppressant. ▪ The quantities of dust suppressant / water used must not result in run-off, erosion and/or muddied areas. ▪ Any usage of water must be efficient and must enforce minimal usage. 	Contractor Engineer ECO	Daily
Vehicles transporting sand or finer grained materials must be covered to prevent dangers/nuisance to other road users.		
If water is abstracted from a water resource for dust suppression, a Water Use Licence/ General Authorisation must be obtained from the DWS prior to first abstraction.		
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.		
Shade-cloth fencing is to be used to reduce dust aggravation.		
Construction activities are to be contained to reasonable hours during the day, and not during 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.		
Surplus fill material sites and stockpiles must be positioned such that they are not vulnerable to wind erosion.		
A dust suppression register as well as a complaints register must be kept.		
All complaints received need to be investigated with remedial action taken communicated to the affected party within 14 days.		

7.16 Waste Management

7.16.1 General Waste

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
General waste produced on site includes: <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). 	Contractor	Daily
A number of general waste receptacles, including bins must be arranged around the Construction Camp, on site to collect all domestic refuse, and to minimise littering.		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Bins must be clearly marked and lined for efficient control and safe disposal of waste.</p> <p>Different waste bins, for different waste streams must be provided to enforce correct waste separation.</p> <p>All waste material generated on site, prior to being collected for safe disposal, must be stored undercover and within a designated and fenced waste storage area which must be bunded and hard surfaced.</p> <p>Access control to this area must be managed.</p> <p>General waste produced on site is to be collected in skips for disposal at a registered landfill site.</p> <p>Hazardous waste is not to be mixed or combined with general waste earmarked for disposal at the municipal landfill site.</p> <p>No general waste is to be disposed of at the SFMS.</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 (daily) 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 waste receptacles at the Construction Camp.</p> <p>The Contractor must enforce that all general waste is disposed of at a licensed waste disposal facility.</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 must 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. Within fourteen (14) days of its issue, a copy of the safe disposal certificates must be forwarded to:</p> <p style="padding-left: 40px;"><i>The Assistant Manager Compliance, Monitoring and Enforcement Component Department of EDTEA iLembe District</i></p>		

7.16.2 Hazardous and Industrial Waste

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<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 Permitted Hazardous Waste Landfill Site. The EO must identify an approved waste disposal site at the inception of the project and the ECO must approve this.</p>	<p>Contractor ECO</p>	<p>Daily</p>

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
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).		
A hazardous waste disposal certificate must be obtained from the waste removal company as evidence of correct disposal and kept on site within the Site Environmental File.		
It must 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:		
<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. 		

7.16.3 Wastewater

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
All wastewater generated at the proposed development must be disposed of in a manner <u>that is not detrimental to the environment</u> and in accordance with relevant environmental legislation, so as not to cause any surface or subsurface water pollution or health hazard.	Contractor	Daily
Wastewater including cement-contaminated water must not enter any watercourse and must be managed by the site manager to enforce that the existing water resources on and off site are not polluted by activities emanating from the above development.		
Contaminated wastewater including cement-contaminated water must not enter any watercourse and must be managed by the Contractor to enforce that the existing water resources on and off site are not polluted by activities emanating from the above development.		
Used oil and wastewater must be disposed of at a ROSE registered facility. An SDC is to be obtained by the Contractor and kept on site within the Site Environmental File.		

7.17 Water Management

7.17.1 Water Pollution Management (including groundwater and soil contamination)

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
The flow direction of any surface water run-off must be established prior to disturbing any area.	Contractor Engineer ECO	Daily
The stockpiling of soil or any other material must not be allowed <u>within 50 m of</u> a watercourse or water body in order to prevent pollution or impede surface run-off.		
Dirty water originating from maintenance activities is to be contained and disposed of at a <u>ROSE Foundation facility</u> , to prevent the contamination of soil and/or any watercourses.		
Bathing or washing of clothes, equipment, or machinery (i.e. plant) within any watercourse is prohibited.		
Erosion and loss of soil must be prevented by minimising the construction areas exposed to surface water run-off. Reference is made to Section 0 for mechanisms to enforce such minimisation.		
Bare areas are to be rehabilitated <u>within 7 days of the activity ending</u> .		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>All water consumption on site must be recorded on a daily basis.</p> <p><u>Abstraction of water from the permitted watercourses can only commence once the water use authorisation has been received from the Department of Water and Sanitation.</u></p>		

7.17.2 River and Estuary Management

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p><u>No construction is permitted below the 1: 100 year floodline or recommended 10 m amsl contour (whichever is intercepted first from the point of development), as these areas are susceptible to erosion during storm events, flooding and natural backflooding of the estuary.</u></p> <p>To further reduce run-off velocities and the chances of erosion, wetlands and riparian habitats must be rehabilitated as directed by the ECO.</p> <p>Stormwater management as per the approved SMP must be implemented, prior to directed flow entering such wetlands and the estuary, to prevent scouring and exacerbated erosion.</p> <p>The buffer / conservation area must include the entire Umhlali Estuary (i.e. below 5 m amsl contour), as well as the remaining area below the hazard line (Figure 2-5 and Figure 7-1).</p> <p>No indigenous vegetation along the estuary margin must be removed, <u>unless authorised by the ECO and/or Ecologist for the installation of boardwalks and the emergency vehicular access.</u> This will serve to maintain the natural ecological functioning of the riparian and estuarine areas as well as function as an ecological corridor between terrestrial and aquatic environments.</p> <p>The estuarine vegetation (reed beds, swamp forest), as well as existing wetland and riparian habitats, must be retained and allowed to function naturally, enabling it to continue to perform important ecosystem services.</p> <p>Dumping of vegetation off-cuts in aquatic habitats is prohibited.</p> <p><u>Weekly inspections of the estuary must be undertaken by the EO and any accumulated waste removed and disposed of at a landfill site.</u></p> <p>Apart from the existing WWTW, the entire sewer network must be located outside of the estuarine boundary.</p> <p>The stormwater system must be kept separate from the sewer system.</p> <p>There must be no untreated effluent or wastewater discharged into the Umhlali Estuary under any circumstances.</p> <p>Monitoring of <i>in situ</i> turbidity and total suspended solids pre-construction and during construction <u>is required by the DWS and must be done on a quarterly basis.</u></p> <p>Wind-screening and stormwater control must be implemented to prevent soil loss from the site and reduce erosion channels forming (e.g. network of co-ordinated shallow drains must be constructed during the land clearing phase).</p> <p>Soil stockpiles must be positioned at least 500 m away from the estuary and 50 m away from a watercourse and stormwater drains, and not on steep slopes.</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 licence / general authorisation from the Department of Water and Sanitation.</p> <p><u>The abstraction of water from the Umhlali River / Estuary is prohibited.</u></p>	<p>Contractor Developer Ecologist ECO</p>	<p>Daily</p>

7.17.3 Coastal Management

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The development setback line and limited development line³ must be adhered to at all times (Figure 2-5 and Figure 7-1).</p>	<p>Contractor Engineer Ecologist ECO</p>	<p>Daily</p>
<p>No informal access tracks are to be created through the coastal dune vegetation. Coastal access to be controlled via approved access routes (i.e. elevated wooden boardwalks, pedestrian pathways and 2 emergency vehicular accesses along exiting sugarcane roads (Figure 7-1)).</p>		
<p>There must be no access to the coastal dune forest during construction. This area must be cordoned off and treated as a no-go zone, unless approved for the installation of boardwalks, pedestrian pathways, and/or emergency vehicular access.</p>		
<p>The removal of vegetation must only be undertaken as it becomes required for work to proceed and unrequired removal of indigenous vegetation (especially in steep areas) must be prevented. An ecologist must walk the route prior to any removal of vegetation.</p>		
<p>Stormwater management must be implemented prior to directed flow entering the coastal corridor to prevent scouring and exacerbated erosion.</p>		
<p>Boardwalks are to be constructed using a permissible material (wood). The use of concrete for boardwalks is prohibited.</p> <p>The following must be implemented:</p> <ul style="list-style-type: none"> ▪ <u>Materials must consist of either treated wood or poly-prop or eco-wood to ensure the maintenance of the landscape character as far as possible and to ensure durability.</u> ▪ <u>The optimal elevation of the boardwalk must be determined by a dune ecologist, specifically in terms of allowing for the continued growth of dune vegetation without blocking sunlight.</u> ▪ <u>The exact route through the dune environment must be determined on-site in association with a dune ecologist who must identify no-go areas upfront.</u> ▪ <u>Design of access (ramp and/or stairs) onto the beach as well as the decks must take cognisance of the dynamic nature of the beach sand and be able to accommodate variation in heights.</u> ▪ <u>Boardwalks must be elevated above the vegetated dune cordon and other sensitive environments. The height of the boardwalk can vary but must be elevated ~1 m above the substrate.</u> ▪ <u>Any protected trees as well as the unnecessary clearing of any coastal vegetation is prohibited.</u> ▪ <u>Boardwalks located in forested areas must wind around existing trees, rather than removing them so that the forest canopy remains intact.</u> ▪ <u>The construction methodology must be appropriate to the site and local conditions of the proposed boardwalks and specific method statements must be submitted by the contractor(s) for approval by the ECO, prior to construction.</u> ▪ <u>Clearance of vegetation must be kept to a minimum and cleared by hand.</u> 		

³ Specific distances between the proposed coastal setback line and limited development line are modelled and are therefore not consistent. Therefore the shapefile of the coastal setback line and limited development line must be provided by the Engineer to the Contractor prior to construction commencing. The coastal setback line and limited development line are illustrated and included in the 'No-Go' illustrations in this EMPr.

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
The coastal dune vegetation must not be cleared or pruned to facilitate improved vistas or parking areas. Alien plant encroachment must be carefully controlled and any removal undertaken followed up with a monthly maintenance programme.		
Litter bins must be located adjacent the access routes and cleared weekly.		
The discharge of stormwater must be controlled to avoid any erosion to the dunes.		
No discharge of effluent into the coastal corridor is permitted.		
Regulations with respect to harvesting of natural resources (fish and bait) must be enforced.		

7.17.4 Wetland Management

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p><u>Only wetlands which are permitted to be infilled or crossed for the installation of services, the irrigation dam and/or boardwalks are permitted to be impacted upon as detailed in the layout and co-ordinates table of crossing provided in Appendix F. Work within wetlands is also required for the installation of wetland rehabilitation structures as provided for in Appendix F.</u></p> <p><u>All construction footprint areas must remain as small as possible, and must not encroach into surrounding sensitive areas as defined in the 'no-go' map (Figure 7-1).</u></p> <p><u>The riparian and drainage line systems not proposed to be crossed for the installation of services and/or infilled for the earth-worked platforms, and their associated buffer zones are off-limits to construction vehicles and personnel. Any plant or person who contravenes this condition and accidentally traverses into the 'no-go' area will be subject to an immediate penalty.</u></p> <p><u>The boundaries of the 'no-go' area and the construction footprint areas must be clearly defined.</u></p> <p><u>The entire boundary of the wetland along the working corridor must be screened off with snow-fencing / shade-cloth or a similar barrier. This barrier must not be easily permeable to humans, so as to prohibit access to the wetland. The barrier must be on the wetland side of the clearing activities.</u></p> <p><u>The use of machinery within the wetland during construction must be limited to only the areas of infilling and/or crossing (i.e. road crossings, sewer crossings, etc. for which a water use licence has been obtained from DWS).</u></p> <p><u>The area of construction must be pegged out and no machinery or personnel are allowed outside of this demarcated area.</u></p> <p><u>All equipment to be used within the sensitive working areas (wetlands) must be checked daily for oil and diesel leaks before gaining access to these working areas. Any vehicles showing leakage must immediately be banned from working in these areas until the leakage is fixed and a penalty imposed.</u></p> <p><u>No vehicular access to the wetland outside of the demarcated construction Right of Way (ROW) is permitted. The excavator used must not leave the ROW to access any part of the wetland. All machinery operators must be made clearly aware of this requirement.</u></p> <p><u>The working servitude in wetlands must not exceed 10 m on either side of the approved installation.</u></p> <p><u>A 30 m buffer from the edge of the permanent zone must be maintained to all wetlands which will not be infilled, unless specifically authorised or where rehabilitation work is underway (Appendix F). The wetland must be</u></p>	<p>Engineer Contractor Developer ECO</p>	<p>Daily</p>

ACTIONS AND CONTROLS

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MONITORING FREQUENCY

pegged to demarcate it and prohibit workers or vehicles from entering onto the wetland. Only 8.29 ha of wetland area is permitted to be permanently infilled (lost) as illustrated below. The remaining 75.98 ha of wetland must be rehabilitated following the installation of services as part of the Wetland and Open Space Rehabilitation Plan.



Construction activities must be scheduled to minimise the duration of exposure to bare soils on site, especially steep slopes. The full extent of works must not be stripped of vegetation prior to commencing other activities.

A row of silt fences, sandbags, shade-cloth or snow fencing must be established along the wetland buffer edge prior to construction commencing to prevent sedimentation and/or pollution entering the wetland.

These silt fences and sandbags must be checked weekly and maintained and must only be removed once vegetation has successfully colonised following the rehabilitation period.

Any steep or large embankments expected to be exposed during the 'rainy' months must either be armoured

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>with fascine like structures / silt fences or grassed immediately with strip sods established at regular intervals (50–100 cm) down the bank with hydro-seeding between the strip sods.</p>		
<p>Where the bare surface of platforms slope towards the edge of an embankment, silt fences and sandbags must be established along the crest of the embankment. If preferential flow routes on the sloped platform occur, these flow routes must be intercepted with a series of sandbags.</p>		
<p>All platforms above buffer zones must have a slight back-fall to divert run-off away from the fill embankments. Platform run-off must be diverted away from the platforms <i>via</i> some sort of diversion structure, preferably a grassed swale or open drain. This run-off must be diverted into the formal stormwater network.</p>		
<p>Once the roads and platform formal stormwater reticulation network are established, silt traps and sand bags must be used throughout the construction site to prevent eroded sediment from being washed into the wetlands from un-grassed, bare/exposed areas. This applies particularly to areas where earth-works occur directly above or in the vicinity of the wetlands.</p>		
<p>Under no circumstances must any of the construction workers or staff access the wetland without prior approval from the ECO. All staff must be informed of this requirement.</p>		
<p>No machinery must cross a wetland as a short-cut between two points. Any contractor who does so must be liable for a fine as a non-compliance offence. Note further that if a Section 24G notice is served due to such an activity, all costs related thereto, including being co-respondent in any legal processes, must be passed on to the relevant offender and/or their company.</p>		
<p>A spill kit must be present on site at all times of operation. The kit must be used immediately must any diesel or hydraulic fluid spills occur. The ECO must be notified immediately when a spill occurs.</p>		
<p>No stockpiling / banks / berms are allowed in the wetland, unless approved by the ECO in consultation with EDTEA and the DWS.</p>		
<p>Sewer manholes must not be located within the wetland and its associated buffer, i.e. the horizontal and vertical alignments of the pipes must remain constant when passing through these sensitive areas.</p>		
<p><u>The full length of works must not be stripped of vegetation at once.</u> <u>The contractor must submit a clearing and earth-works plan to the ECO for approval prior to construction occurring. This plan must indicate how clearing and earth-works are going to progress across the site. This can be done in a phased approach. Ground cover removal must follow this plan and there must be no deviation from the plan unless approved by the ECO prior to being undertaken.</u></p>		
<p>Flows into wetland areas must be at pre-development velocity so that there are no additional impacts as a result of the maintenance activities on the watercourses.</p>		
<p>A combination of sandbags and silt fences must be established along the edge 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 embankments.</p>		
<p>Pipes or culverts under the road must not concentrate flow but must aim to allow even movement of water under the road bed across the entire wetland.</p>		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Re-vegetation must take place immediately after completion of the construction activities. If re-vegetation of exposed surfaces cannot be established immediately due to phasing issues, rows of sand bags or silt fences must be established along the contours at regular intervals (50–100 cm) to slow run-off and capture eroded soil.</p>		
<p>Once shaped, all exposed / bare surfaces and fill embankments must be vegetated immediately. Embankments steeper than 1:3 must be vegetated using strip sods established at regular intervals (50–100 cm) down the bank and hydro-seeding in between. Embankments with a slope less than 1:3 must be hydro-seeded and the temporary erosion control measures removed only once re-colonisation is successful. In the winter months, the newly grassed areas must be watered daily until re-colonisation is successful.</p>		
<p>Run-off from the platforms must not be allowed to flow over the edges of the platform and down the embankments. Ponding must not be allowed to occur. In this regard, platform run-off must be diverted away from the platforms via some sort of diversion structure, preferably an open drain. This run-off must be diverted into the formal stormwater network. However, sediment must be removed from the run-off before being discharged into the formal system. This can be achieved by using temporary sediment capture ponds.</p>		
<p>Effort must be made to enforce that the stormwater system including pipes, drains, headwalls and Reno-mattresses are not silted up during the construction phase. Siltation must be minimised by ensuring that the roads and paths remain clear of sediment. Sediment on the roads from erosion or construction traffic must be cleared at the end of every day between September and March and at the end of every week between April and August. The need to clear must be minimal if the all bare slopes (sediment sources) are re-vegetated immediately and erosion protection and silt control applied where grassing is not feasible.</p>		
<p>After every rainfall event, the contractor must check the site for erosion damage and rehabilitate this damage immediately. Erosion rills and gulleys must be filled-in with material and silt fences or fascine work must be established along the gully for additional protection until grass has re-colonised the rehabilitated area.</p>		
<p>Disturbance to the wetland soils along linear infrastructure route(s) must be restricted to an established construction right-of-way (ROW) (10 m on either side of the activity) corridor. The width of the ROW corridor within the wetlands must be demarcated and fenced off during the site setup phase to the satisfaction of the ECO.</p> <p>The construction ROW for trenched crossings must comprise the following:</p> <ul style="list-style-type: none"> ▪ A one-way running track of a maximum width of 3 m, ▪ A pipeline trench zone of a maximum width of 2 m; and ▪ An up-slope subsoil stockpile corridor of a maximum width of 1.5 m. <p>The construction ROW for pipe bridge crossings must comprise the following:</p> <ul style="list-style-type: none"> ▪ A one-way running track of a maximum width of 3 m; and ▪ Pipe bridge pier construction zones. <p>The ROW must be established by topsoil along the construction ROW being stripped and stored outside of the wetlands in designated stockpiles areas. These turfed topsoil stockpiles must be wetted to enforce that the clayey soils remain moist. The location of these topsoil stockpiles must be agreed upon by the ECO prior to</p>		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>construction commencing.</p> <p>Once the ROW is established, all wetland areas outside of the demarcated ROW must be considered no-go areas. This also includes the access ROWs.</p> <p>All pipes and equipment must be stored outside of the wetland areas in a stockpile area approved by the ECO.</p> <p>Any water entering the trench must be pumped out of the trench and into a filtering system, such as a silt trap / hay-bale trap.</p> <p>A dewatering site must be identified and must be on flat ground away from the edge of the channel and preferably in a well vegetated area.</p> <p>Once the pipe is laid into the trench, the subsoils must be reinstated in the same order they were excavated.</p>		
<p>Erosion protection measures (e.g. Reno-mattresses) must be established below any box culverts.</p>		
<p>The final design for the wetland crossing must be approved by the wetland specialist prior to construction commencing.</p>		
<p>Proof of financial provision of these mitigation measures must be submitted to the ECO prior to construction commencing.</p>		

7.18 Stormwater Management

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The Stormwater Management Plan (Appendix B) must be implemented to enforce proper management of stormwater on the site during and after construction to enforce that pollutants and sediment are not released into any water resources.</p>	<p>Contractor Engineer Developer</p>	<p>Daily</p>
<p>The increase in catchment run-off must be balanced against the combined effects of evapo-transpiration from catchment vegetation, evaporation from water bodies plus the retention and re-use of both storm run-off and treated wastewater.</p>		
<p>The potential increase in flood peaks must be mitigated to at least pre-development levels by the provision of sufficient stormwater attenuation facilities at micro and macro levels.</p>		
<p>The potential increase in flood volumes must be mitigated by subsoil infiltration, retention of run-off in on site facilities for irrigation use and unsaturated wetland areas where evaporation and infiltration can help to reduce flood run-off rates.</p>		
<p>The final SMP must be approved by KwaDukuza Municipality prior to implementation.</p>		
<p>Designs for the buildings and site development in general must prevent concentration of stormwater run-off both spatially and in time and is required to provide for on-site management of stormwater run-off to limit peak flows to pre-development levels.</p>		
<p>Detailed plans to control and prevent erosion by water must be agreed prior to the commencement of any works, including site clearance, on any portion of the site. For further guidelines, refer to Section 0.</p>		
<p>Removal of vegetation cover must be undertaken in a phased manner.</p>		
<p>Soil erosion measures as detailed in Section 0 must be implemented.</p>		
<p>Landscaping and re-vegetation of areas not occupied by buildings or paving must be programmed to proceed</p>		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>immediately after building works have been completed, or have reached a stage where newly established ground cover is not at risk from the construction works.</p>		
<p>On-site stormwater control systems, such as swales, berms, soil fences and stormwater management facilities 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 enforce complete erosion and pollution control at all times.</p>		
<p>Earth-works on sites are to be kept to a minimum. Where embankments have to be formed, stabilisation and erosion control measures must be implemented immediately.</p>		
<p>Stormwater must not be allowed to pond in close proximity to existing building foundations.</p>		
<p>Prior to any physical work proceeding on site, a stormwater control plan (SCP) detailing the proposed stormwater control measures are to be formulated. No work is to be undertaken without an approved SCP.</p>		
<p>The SCP must describe what control measures are to be implemented before and during the construction period, as well as the final stormwater control measures required for the site on completion of site development. Plans must indicate who is responsible for the design of the control measures and who is, or must be, designated as the responsible person on site during each stage of the implementation of the control measures.</p>		
<p>SCPs must show that all the provisions, regulations and guidelines contained in this document have been taken into account.</p>		
<p>In the event of a failure to implement the approved stormwater control plan, the contractor must be responsible for rectifying all consequential environmental damage at his own cost. The Developer is therefore advised to enforce that all members of the professional team and contractors are competent to undertake the development work and are insured.</p>		
<p>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.</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 KwaDukuza Municipality and must take measures to enforce spillages of the substance(s) can be contained to prevent contamination of the water resources within the development area.</p>		
<p>No stormwater, wash water, or wastewater is to be directed towards any permanent water body or wetland without the installation of a permissible filtration system to prevent pollution, including silt, from entering such water body.</p>		
<p><u>Stormwater management facilities are to be located outside of wetlands and the 30 m wetland buffer, unless where authorised to be located within wetlands and/or the buffer (Figure 7-2 and Appendix F).</u></p>		

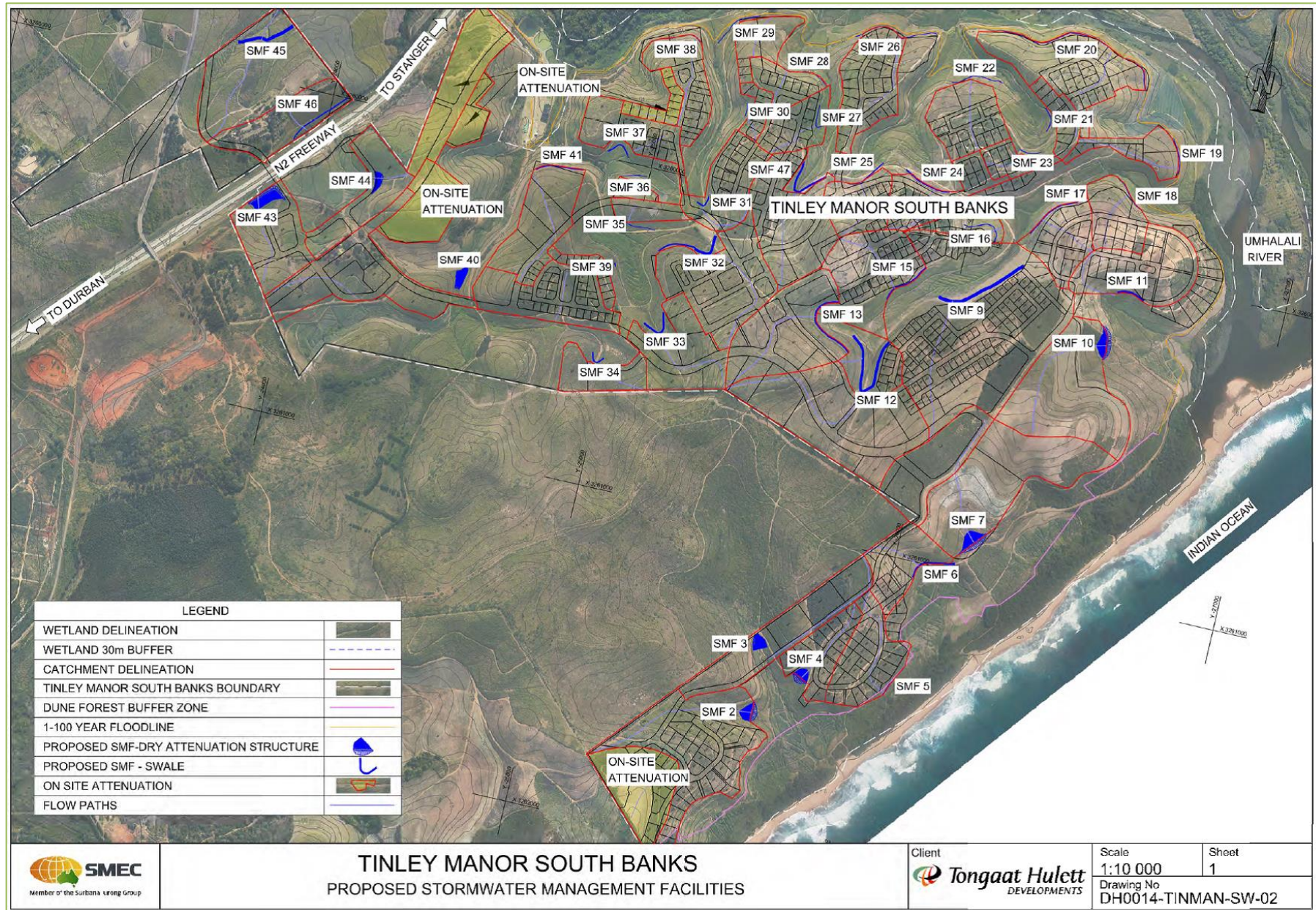


Figure 7-2: Stormwater Management Facilities within Tinley Manor Southbanks

7.19 Traffic and Safety

7.19.1 Lane Closures (interchanges)

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Temporary loading and off-loading areas and holding of construction vehicles must be designed prior to construction activities to enforce that the most preferable access and haulage routes has been identified.	Contractor	Daily
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.		
No heavy construction vehicles are to use main roads during peak traffic periods (i.e. 06h00–9h00 and 15h00–18h00). <u>The Traffic Management Plan (Appendix E) must be implemented.</u>		

7.19.2 Pedestrian Protection

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Pedestrians must be protected from construction activities at all times.	Contractor	Daily
Pedestrian conflict with site access and construction vehicles must be managed by a traffic officer.		
The construction site camp must remain fenced for the entire construction period.		

7.19.3 Construction Vehicles

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Access to site of all construction and material delivery vehicles must be strictly controlled. <u>Construction vehicles must access site as per</u>	Contractor	Daily

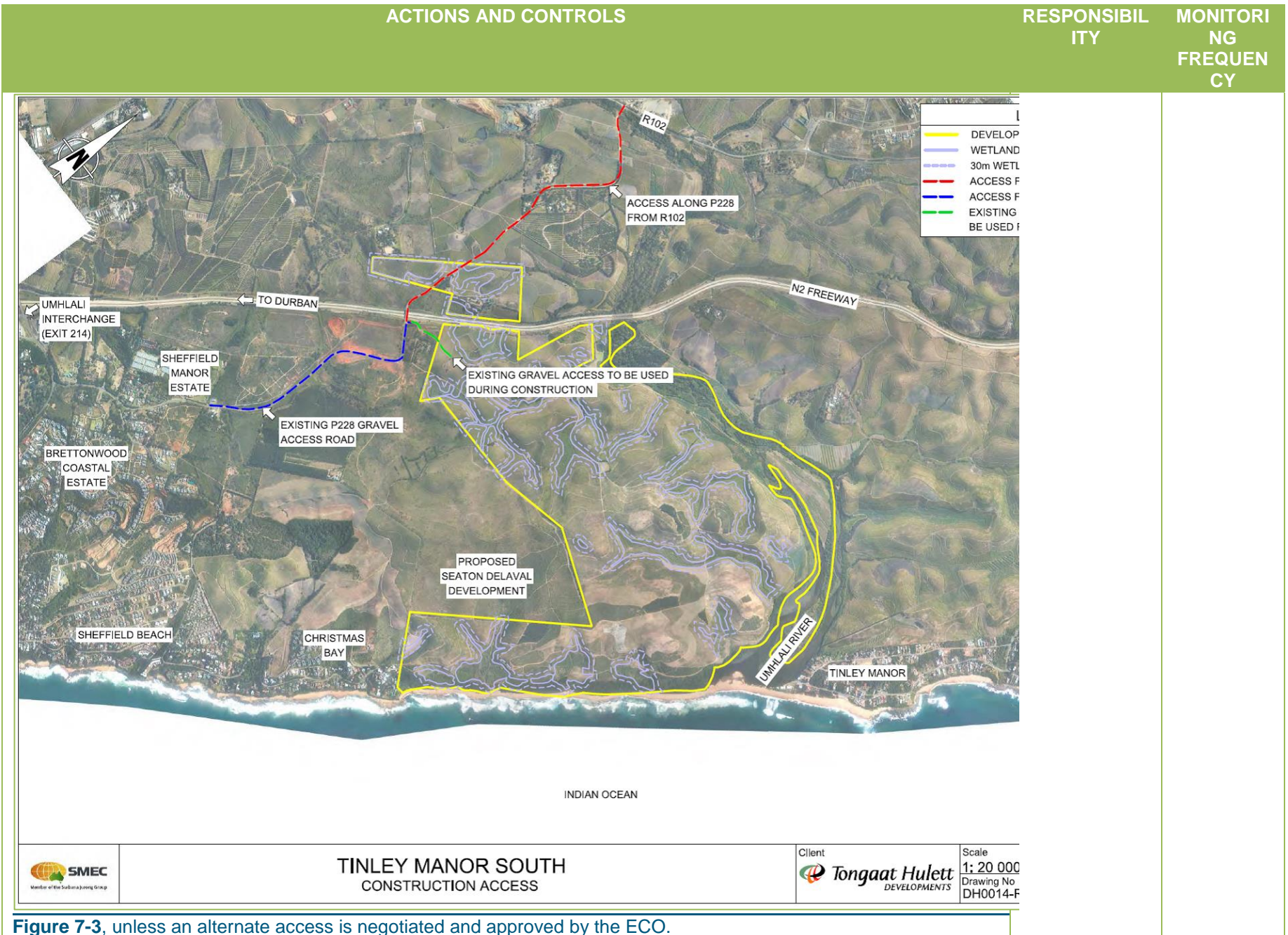


Figure 7-3, unless an alternate access is negotiated and approved by the ECO.

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Holding of all construction vehicles to be controlled to enforce that through traffic is not unnecessarily impeded.</p>		
<p>Vehicles and equipment must be serviced regularly (<u>at least monthly</u>) to prevent the contamination of the area from oil and hydraulic fluid leaks etc.</p>		
<p>Any emergency services that need to be done on site must be done under the supervision of the site agent. If there are significant issues with any vehicles that require major servicing – this must be carried out off-site.</p>		
<p>All speed limits must be adhered to. Within site, a speed limit of 40 km/hr must be implemented.</p>		
<p>Machinery or equipment used on site must not constitute a pollution hazard in respect of the above substances. The Contractor must order such equipment to be repaired or withdrawn from use if they consider the equipment or machinery to be polluting and irreparable.</p>		
<p>Covered receptacles must be available at all times and placed for the disposal of waste. All used oils, grease or hydraulic fluids must be placed therein and these receptacles must be removed from the site on a regular basis (weekly) for disposal at a registered or licenced disposal facility.</p>		

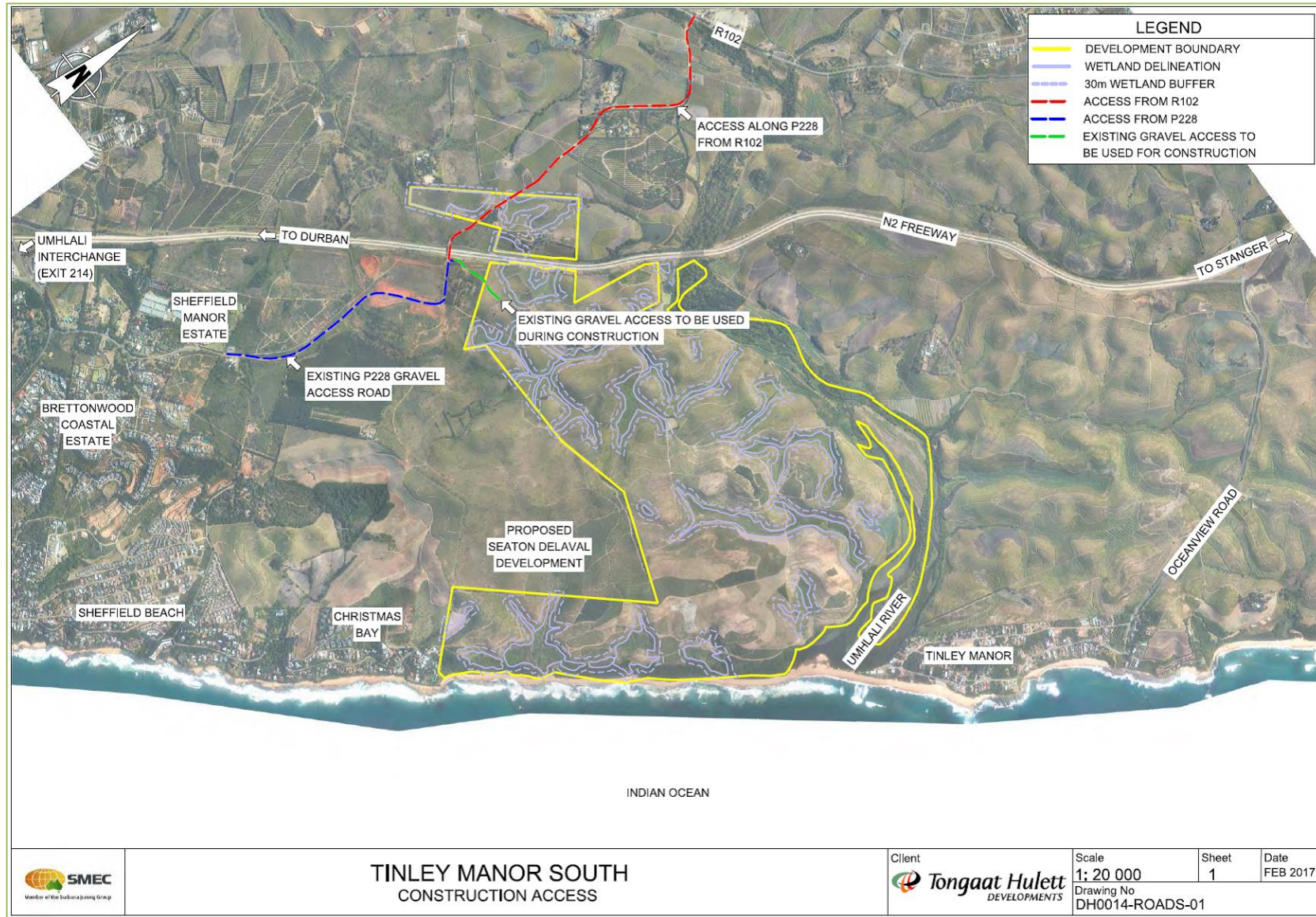


Figure 7-3: Construction access to site

7.19.4 Road Maintenance

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Contractors must enforce 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	On-going
Staff must be employed to clean surfaced roads adjacent to construction sites where materials have spilt.		
All temporary road signs to be removed and pavement reinstated at completion of works.		
All covered road signs to be reinstated.		

7.20 Noise

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Neighbouring landowners must be notified about construction activities at least 48 hours prior to commencement of the activity.	Contractor	Daily
All construction vehicles and equipment must be kept in good repair and must be fitted with standard silencers prior to construction.		
Stationary noisy equipment (e.g. 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 85 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 must be utilised except where required in terms of SANS standards or in emergencies.		
Noise from labourers must be controlled. Workers must be educated regarding the minimisation of noise levels on site.		
Noise suppression measures must be applied to all construction equipment. Construction equipment must be kept in good working order and fitted with silencers which are kept in good working order. Must the vehicles or equipment not be in good working order, the Contractor must be instructed to remove the offending vehicle or machinery from site.		
<p><u>Loitering by labourers is prohibited.</u></p> <p><u>The Contractor must provide an adequate eating and rest area for labourers within the construction camp away from neighbouring communities to prevent noise nuisance.</u></p>		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<u>Construction activities are to be contained to daylight hours Monday to Saturday unless consent has been obtained from the ECO and neighbouring landowners have been provided with prior warning.</u>		
Neighbours are to be given at least two (2) days warning prior to any blasting, piling or other 'noisy' activities.		

7.21 Heritage

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Contractors and workers must be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the National Heritage Resources Act (Act No. 25 of 1999), Section 51 (1).		
If an artefact on site is uncovered, work in the immediate vicinity must be stopped immediately. The point of discovery must be demarcated and the matter must be reported to the local police station and Amafa aKwaZulu-Natali for investigation.		
<u>The contractor must prevent any person from removing or damaging any such article and must immediately, upon discovery thereof, inform the Construction Engineer.</u>	Contractor	On-going
Work must only resume once clearance is given in writing by the archaeologist and/or Amafa aKwaZulu-Natali.		
There are two occurrences of graves as described in Section 2.2.6 and illustrated in Figure 2-4 . These areas are to be marked as 'No-Go' Areas and a buffer to the graves is to be established. All graves must be accorded the highest level of protection and must not be disturbed without both family consent and a permit from Amafa aKwaZulu-Natali.		

7.22 Social Considerations

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Working hours are restricted to daylight hours. In the event that work is required after these hours, the ECO must be notified and any person who resides in close proximity to the site a must also be notified.		
All neighbouring landowners and those that are disturbed due to construction activities are to be notified of construction activities and provided with regular feedback (quarterly) on the status of construction.		
The Contractor is to arrange for a candidate to assist with the appointment of local labour and assist with labour disputes.	Contractor	On-going
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. The contractor must appoint an HIV/AIDS Awareness Officer for the duration of the construction period. Activities for HIV/AIDS awareness and prevention must be broad based, targeting both individuals and groups. They must consist of: <ul style="list-style-type: none"> ▪ Information posters in public places both on and off site (eating places, bars, guest houses, etc.); 		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<ul style="list-style-type: none"> ▪ 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 will 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. 		

7.23 Incident Management

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Types of incidents:</p> <ul style="list-style-type: none"> ▪ There are two types of incidents: <ul style="list-style-type: none"> ○ The first type is a reportable incident. A reportable incident is defined according to the National Environmental Management Act (NEMA), Section 30 as an '<i>unexpected sudden occurrence, including a major emission, fire or explosion leading to serious danger to the public or potentially serious pollution of detriment to the environment, whether immediate or delayed</i>'. A reportable incident is also, according to the National Water Act, Section 20, any incident or accident in which a substance (a) pollutes or has the potential to pollute a water resource; or (b) has, or is likely to have, a detrimental effect on a water resource. ○ The second type of incident is a general incident and it is defined as a minor incident or non-conformance to the Construction Environmental Management Plan that is confined to the construction area and / or has minimal impacts on the environment with no long-term effects. <p>If a reportable incident occurs on the site, an incident report must be completed by the EO and checked by the ECO who will then be responsible for submitting the incident report to the EDTEA.</p>	<p>Contractor ECO</p>	<p>On-going</p>

7.24 Reporting & Record Keeping

7.24.1 Complaints Register

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>Complaints received must be registered and recorded by the contractor and also brought to the attention of the contractor. Both parties will respond accordingly.</p> <p>The following information must be recorded in the case of any complaint / incident:</p> <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	On-going
<p>All complaints received must be investigated and a response is to be given to the complainant within 7 days.</p>		

7.24.2 Environmental Incident Register

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>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.</p> <p>The following information must be provided:</p> <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	On-going

POST-CONSTRUCTION / OPERATIONAL PHASE – REHABILITATION / MAINTENANCE / OPERATIONS

7.25 Construction Camp

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
All structures comprising the construction camp are to be removed from the site and surrounding areas, including all chemical toilets and ablution facilities.	Contractor Developer	Post- Construction
The area that previously housed the construction camp 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 camp area must be ripped, all imported materials removed, and the area must be topsoiled and re-grassed according to the re-vegetation specifications provided by the Developer's landscaper.		
The Contractor must arrange the cancellation of any temporary services timeously.		

7.26 Materials and Infrastructure

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
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.		

7.27 Rehabilitation

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
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
All remaining construction materials, building rubble and waste are to be removed from the site.		
All disturbed surfaces compacted by construction 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.		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
Locally indigenous vegetation must be included in the landscape for the site. The Wetland and Open Space Rehabilitation Plan must be complied with.		
Final rehabilitation must be completed within a period specified by the Engineer.		
Rehabilitation of wetlands must be done in accordance to an approved Wetland and Open Space Rehabilitation Plan.		
A minimum buffer of 30 m must be established around all wetland systems that are to be retained.		
<u>Monitoring of wetlands must be done in accordance with the Monitoring Programme contained in the Wetland and Open Space Rehabilitation Plan.</u>		
The site and surrounding areas is to be cleared of all litter.		
Surfaces are to be checked for waste products from activities such as concreting or asphaltting.		
All embankments are to be trimmed, shaped and replanted to the satisfaction of the ECO.		
The Contractor is to check that all watercourses are free from building rubble, spoil materials and waste materials.		
All areas that have been disturbed by construction activities (including the construction camp area) must be cleared of alien vegetation.		

7.28 Site Closure

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
A meeting is to be held on site between the Developer and the ECO to approve all remediation activities and enforce that the site has been restored to a condition acceptable to the ECO and the Developer.	ECO Developer Management Association	Post- Construction
A site close-out audit is to be undertaken by the ECO prior to handover of the site by the Contractor.		
<u>A Conservation Management Plan for the operational phase of the site must be compiled and implemented prior to the site closure and commencement of the Operational Phase.</u>		
The post-construction audit report must be submitted the KZN EDTEA Control Environmental Officer: Compliance Monitoring and Enforcement, within thirty (30) days of the completion of construction.		

7.29 Monitoring and Maintenance

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
An 'as-built' layout plan must be submitted to the KZN EDTEA within sixty (60) days of completion of construction.	Developer	Once-off
The conditions of the development must be monitored for a period of three years after the development is complete to enforce that: <ul style="list-style-type: none"> ▪ Erosion is controlled; 		Annually

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<ul style="list-style-type: none"> ▪ The stormwater run-off measures are working; ▪ An Environmental Complaints Register must be kept detailing complaints received, date, response and action taken; ▪ Any maintenance where intrusive works occur must adhere to the mitigation measures put in place in the EMPr; and ▪ Where such measures are impractical due to the nature, duration and extent of maintenance works, a maintenance method statement must be developed prior to maintenance works being undertaken. 		
<p>The Management Association that is to be set up for End-use Developers and tenants must create a stewardship programme that is binding on all tenants. Levies paid by the owners / tenants must contribute to open space rehabilitation and management towards open space areas.</p>	<p>Developer End-User Developers / Tenants</p>	<p>On-going</p>

7.30 Architectural and Design Controls

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The following architectural and design controls must be written into the Sales Agreement:</p> <ul style="list-style-type: none"> ▪ Use of solar and other alternative energy mechanisms to minimise the effective footprint of the greater site on bulk infrastructure, e.g. solar geysers and/or use of geyser blankets. ▪ Low energy / energy efficient lighting, use of motion sensors on security lighting, and ‘down-lighter’ options to limit ambient light pollution. ▪ In the event that street lights are required, fittings that focus the light toward the ground and prevent light spill (outside of the road and sideway area) must be utilised. ▪ Commercial buildings must not be illuminated at night apart from minimal security lighting. ▪ Passive cooling and/or heating mechanisms; ▪ Water saving mechanisms, e.g. low flush volume toilets, inclusion of conservancy tanks to store stormwater off roofs for use in landscaping, aerated shower heads and taps, grey water harvesting, consideration of dry compost toilets; ▪ Structural design so as to limit excessive heating or cooling of buildings, e.g. use of efficient ceiling insulation mechanisms; ▪ Use of landscaping, e.g. trees and groundcover, to enhance energy efficiency; ▪ Preferential use of locally sourced resources which are obtained in an environmentally sustainable manner; ▪ Inclusion of home office facilities within the design of buildings to limit long distance daily travel (where feasible), etc.; ▪ In order to conform with the scale of existing urban form, it is required that the structure heights for all residential land uses must be limited to 6 storeys; ▪ Buildings must be painted with natural colours or natural materials must be used such as, face brick and stone cladding; 	<p>Developer End-User Developers / Tenants</p>	<p>On-going</p>

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<ul style="list-style-type: none"> Brand-specific colours must be limited to signage on the buildings and this must be limited, and Non-reflective materials must be utilised where possible. If not used, this must be motivated. 		

7.31 River and Estuary Management

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>The conservation area must include the entire Umhlali Estuary (i.e. below 5 m amsl contour), as well as the remaining area below the 10 m amsl contour, which constitutes a horizontal buffer area between 16 m (in severe case) and 257 m wide depending on topographical constraints.</p>	<p>Developer End-User Developers / Tenants</p>	<p>On-going</p>
<p>No further transformation of this land for development or removal of natural vegetation is permitted, apart from invasive alien vegetation removal and sensitive pruning along the boardwalks.</p>		
<p>No indigenous vegetation along the estuary margin must be removed, unless approved for the installation and/or maintenance of elevated boardwalks, pedestrian pathways and the emergency vehicular access. This will serve to maintain the natural ecological functioning of the riparian and estuarine areas as well as function as an ecological corridor between terrestrial and aquatic environments.</p>		
<p>The estuarine vegetation (reed beds, swamp forest), as well as existing wetland and riparian habitats, must be retained and allowed to function naturally, enabling it to continue to perform important ecosystem services.</p>		
<p>Dumping of vegetation off-cuts in aquatic habitats is prohibited.</p>		
<p>Monthly inspections of the estuary must be undertaken by the Management Association and any accumulated waste removed and disposed of at a registered disposal facility.</p>		
<p>Artificial environments such as lawns and sports grounds must also be restricted by the estuary boundary. Any clearing of vegetation within this area for improved vistas must not take place, and must require approval if required by the ecologist.</p>		
<p>Areas that were previously planted with sugarcane within the estuarine functional zone must be rehabilitated to reflect the natural supporting habitats of the estuary (e.g. swamp forest, reed beds, wetlands, riverine habitats).</p>		
<p>Although boardwalks must be constructed within the estuarine boundary, the design must enforce the unobstructed / unimpeded flow of water, the least disturbance to sensitive habitats, the shortest span, and that the least harmful materials and methods are used, to enforce minimal impact on the aquatic environment.</p>		
<p>The construction of solid concrete jetties and slipways, and other hard edges, on the estuary must not be allowed.</p>		
<p>If the boardwalks and bird hides are damaged during a storm or flood event, damage is required to be assessed and measures taken to remove all debris from the estuary and re-construct the damaged boardwalk, if deemed viable.</p>		
<p>Every effort must be made to reduce the level of nutrients introduced to the Umhlali Estuary through treated wastewater and special water quality standards must be set for the discharge of treated wastewater to the system.</p>		

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
<p>If the use of chemicals is required, a trained aquatic scientist and horticulturalist must be consulted in order to determine what chemicals can be used, in what quantities and during which seasons.</p>		
<p>The sensitivity of the estuarine ecosystem, its supporting habitats and associated biota, fishing and bait collecting regulations, and susceptibility of the estuary to overexploitation must be communicated. This could possibly be achieved through (a) the establishment of an information / visitors centre, (b) the distribution of informative brochures and posters, and (c) placement of educational signboards throughout the development complex.</p>		
<p>Regulations with respect to harvesting of natural resources (fish and bait) must be enforced.</p>		
<p>Access to designated fishing and bait collection points must be formalised (e.g. via elevated boardwalks) to prevent the impacts of trampling and habitat disturbance.</p>		
<p>Although the Umhlali Estuary is naturally shallow, the use of motorised boats during the deeper closed mouth phase must not be permitted, and other low impact recreational activities, such as canoeing, are preferred.</p>		
<p>Any alien invasive vegetation and weeds that are introduced and become established as a result of habitat disturbance must be removed.</p>		
<p>The design of the development perimeter fencing must consider the movement of animals between the estuary and the conservation areas.</p>		
<p><u>A Conservation Management Plan for the management of the open space area (including the estuary) must be compiled prior to the operational phase commencing.</u></p>		
<p><u>The construction of solid concrete jetties and slipways on the estuary is prohibited.</u></p>		
<p><u>All structures within the Estuarine Functional Zone (i.e. wooden boardwalks, viewing areas, fencing) and up to 100 m of the Estuarine Functional Zone (i.e. roads, stormwater structures, fencing) must be regularly maintained (minimum of annual basis), to prevent any environmental damage or pollution.</u></p>		
<p><u>Regulations with respect to harvesting of natural resources (i.e. fish and bait) must be enforced. This is within the ambit of DAFF monitoring officials, in accordance with the Marine Living Resources Act (Act No. 18 of 1998).</u></p>		
<p><u>The sensitivity of the estuarine ecosystem, its supporting habitats and associated biota, fishing and bait collecting regulations, and susceptibility of the estuary to overexploitation must be communicated to all residents and visitors. This must be achieved through the strategic placement of educational signboards throughout the development complex and along the boardwalks.</u></p>		
<p><u>Although the Umhlali Estuary is naturally shallow, the use of motorised boats during the deeper closed mouth phase is not permitted, and other low impact / non-motorised recreational activities, such as canoeing is permitted.</u></p>		
<p><u>Through a dedicated and approved Invasive Alien Plant eradication programme, any alien invasive vegetation and weeds that are introduced and become established as a result of habitat disturbance must be removed, and regularly controlled (monthly).</u></p>		
<p><u>The abstraction of water from the Umhlali River / Estuary for irrigation of the open space is prohibited.</u></p>		

7.32 Coastal Management

ACTIONS AND CONTROLS	RESPONSIBILITY	MONITORING FREQUENCY
The development setback line and limited development line must be adhered to at all times (Figure 2-5 and Figure 7-1).	Developer End-User Developers / Tenants	On-going
No informal access tracks can be created through the coastal dune vegetation.		
Coastal access to be controlled via approved access routes.		
Mass tourism access is prohibited.		
No informal access routes are allowed. In the event that any existing informal access routes are encountered, these must be rehabilitated and access via them restricted.		
No vehicular access to the beach, other than for emergency vehicles, is permitted.		
Boardwalks are to be maintained. If the boardwalks are damaged during a storm or flood event, damage is required to be assessed and measures taken to remove all debris and re-construct the damaged boardwalk, if deemed viable.		
Litter bins must be located adjacent the access routes and cleared weekly.		
The design of the development perimeter fencing must consider the movement of animals (e.g. antelope).		
The discharge of stormwater must be controlled to prevent any erosion.		
No discharge of effluent into the coastal corridor is permitted.		
<u>Public access to the beach via boardwalks, pedestrian pathways and emergency vehicular access must be provided for. A private beach is prohibited.</u>		
Regulations with respect to harvesting of natural resources (fish and bait) must be enforced.		

8 METHOD STATEMENT FOR WETLAND CROSSINGS

This method applies for the following:

- ✦ Infilling of wetlands for earth-worked platforms;
- ✦ Installation of engineering services (e.g. pipelines, sewer lines, electricity lines, road and road embankments, stormwater management facilities);
- ✦ Installation of the irrigation storage dam;
- ✦ Installation of wetland rehabilitation structures; and
- ✦ Installation of boardwalks.

The construction methodology adopted for the wetland crossings will be dependent on:

- ✦ The season within which construction is undertaken; and
- ✦ The permanent / semi-permanent saturation status of the wetland.

This Method Statement is a guideline for the Contractor. A detailed Method Statement must be submitted by the Contractor to the ECO for approval prior to construction commencing.

Ultimately, the method to be adopted by the approaching construction stage will be dictated by the saturation status of the wetland (wet or dry), in order to protect and preserve existing hydrological functionality. At all times, the Contractor must take cognisance of the measures detailed within the Environmental Management Programme (EMPr), Wetland and Open Space Rehabilitation Plan (**Appendix B**) and all other relevant documentation.

General guidelines for construction of the wetland crossing are provided below, following which the sequence to be followed by the Contractor shall be elaborated upon.

8.1 General Guidelines & Site Preparation

8.1.1 Pre-Construction Plant Rescue and Relocation

Prior to commencement of construction, a qualified ecologist must be commissioned to undertake a search and rescue for protected trees and plants of conservation importance within the development footprint at the watercourse crossing.

The appointed ecologist must identify plant relocation sites with the open space area and apply for the necessary permits to remove and relocate these plants.

8.1.2 Site Preparation Prior to Re-vegetation

8.1.2.1 General Land Preparation Measures

The following are general land preparation requirements for all wetland and riparian areas requiring rehabilitation / re-vegetation:

- ✦ All rubble, litter, foreign materials and waste products must be removed from wetlands and riparian areas and disposed of at proper local waste disposal / landfill facilities. Minimise additional disturbance by limiting the use of heavy vehicles and personnel during clean-up operations.
- ✦ Any large plumes of sediment washed into the wetlands from upslope must be removed, taking care not to remove or disturb the natural soil profile.
- ✦ All Invasive Alien Plants (IAPs) and weeds must be removed from target sites. The Contractor must consult the ECO and the Wetland and Open Space Rehabilitation Plan regarding the method of removal. Herbicides must only be utilised where hand pulling / uprooting is not possible. Only herbicides which have been certified safe for use in wetlands / aquatic environments by an independent testing authority must be considered. The ECO must be consulted in this regard.

- ✦ All embankments must be shaped to the specification of the project or recommendations of the Engineer and Wetland specialists. Prior to commencing with any re-vegetation activity (e.g. planting / seeding), it is important that disturbed wetlands / riparian areas must be adequately prepared in advance.
- ✦ Where significant soil compaction has occurred, the soil must be ripped in order to reduce the bulk density of the soil such that vegetation can establish. Rip and / or scarify all disturbed and compacted areas of the construction site. The ECO, with the assistance of the Engineer, must specify whether ripping and/or scarifying is necessary, based on the site conditions. Do not rip and/or scarify areas that are saturated with water, as the soil will not break up.
- ✦ In addition, any erosion features immediately upslope and/or within the wetland habitats that have been created during the construction/installation must be stabilised. This must also include the need to deactivate any erosion headcuts / rills / gullies that may have developed. Compacted soil infill, rock plugs, gabions or any other suitable measures must be used for this purpose.
- ✦ Immediately after ripping and scarifying disturbed areas, about 300 mm of topsoil must be applied on top. The thickness of the topsoil maybe reduced at the instruction of the engineer only if 300 mm of topsoil compromises the integrity of the works.
- ✦ Topsoil must be placed in the same area from where it was originally stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas. Where topsoil is lost during construction as a result of erosion, topsoil must be imported to the site and re-established. Such topsoil must be sourced responsibly and legally.
- ✦ The topsoil must be compacted to similar compaction levels as natural soils in the area. The Engineer must provide detailed advice on this.
- ✦ For seeding, the soil must be prepared to optimise germination. This is typically undertaken by hand hoeing to loosen the soil in the seedbed but must be firm enough to facilitate good contact between the seeds and the soil.

8.1.2.2 Existing Road Batters and Roadside Drains

The following are land preparation requirements for road batters and side drains that must be taken into account:

Road batters and associated road infrastructure range from gentle to steep slopes on which vegetation must be established. Where slopes are gentle, general land preparation requirements will apply but where slopes are steep, soft intervention techniques must be employed to provide sufficient slope stabilisation.

As a principle, soft interventions must be favoured over hard interventions to ensure that the rivers and stream retains their natural flow regimes and habitat.

The following soft interventions are required for steep slopes:

- ✦ Soil savers;
- ✦ Vegetation blankets or mats;
- ✦ Geo-cells; and
- ✦ Fibre rolls or bags.

It is important to note that bioengineering interventions are vulnerable to failure if not adequately implemented or poorly maintained.

Retaining structures such as silt fences, sandbags, hay bales, brush packs, timber logs placed in continuous lines following the slope contours or cut-off trenches must be used across the entire slope to retain eroded sediment.

The use of sand bags or timber logs placed at intervals along the contour of slopes to retain sediment and stabilise the soils must be considered.

Temporary sediment barriers must remain in place until such time as re-vegetation and stabilisation of disturbed areas is judged to be a success and the risk of erosion / sedimentation has been reduced to a respectfully low level.

Note that care must be taken not to disturb the vegetation, river banks, soils or in-stream areas during site clean-up. No natural material (e.g. sediment, rocks, stones) must be removed during this activity.

Slope instability or where slumping / erosion of stream banks has occurred, these must be identified and recorded during and immediately after the initial clearing. These areas must then be stabilised / repaired using interventions depending on the extent / intensity of erosion / destabilisation and risk of further bank instability. Potential measures suitable for bank stabilisation may include:

- ✦ Compaction of soils on stream banks by hand (no machinery to be used within sensitive riparian areas);
- ✦ Planting of indigenous ground-cover to stabilise soils on stream banks;
- ✦ Use of rock pack for eroded banks; and
- ✦ Use of gabion baskets for eroded banks.

8.1.2.3 Wetlands

The following are additional land preparation requirements for wetlands that must be taken into account in addition to the general land preparation measures described above:

- ✦ Re-establish the natural water flow patterns within the wetland through re-shaping of disturbed areas.
- ✦ The original surface topography of the wetland prior to disturbance must be reinstated as close as possible through appropriate earthworks / landscaping, taking care not to disturb additional wetland areas adjacent to the disturbed zone. Use of manual labour during re-shaping of the landscape is required however light construction vehicles (e.g. bobcats) can also be used under strict supervision from the ECO / Wetland specialist.
- ✦ Wetland soils are considered highly erodible and sensitive to disturbance, therefore erosion control measures such as soil savers, eco-logs, sand bags and biodegradable silt fences must be installed prior to re-vegetation.
- ✦ In general, fertilizer / lime are prohibited for re-vegetation in wetlands / riparian areas (particularly in wetlands that have inherently lower nutrient levels, as this may promote increased weed growth).
- ✦ A weed-free mulch is required to help retain moisture for germination. Mulch must be crimped in if possible to limit floatation if flooding is likely to occur. It is very important that mulch not be derived from stands of invasive exotic species or weeds.

8.2 Construction Activities

8.2.1 Access

Access to the works areas are required for the transport of plant, machinery and materials during construction and will be via a temporary load spreading access.

Where machinery is to be used, the precautionary mitigation measures outlined in **Section 7** must be implemented to minimise their environmental impact when entering a wetland. Vehicles with tracks (as opposed to tyres) are recommended as the wider the track the more load spreading and therefore less compaction. The specific type of vehicle must be approved by the ECO prior to commencement of the works.

Clearing and grubbing works must be undertaken over the trench line and access roads (if required) only. This will require the removal of vegetation, topsoil and sods, all of which must be used for the sole purpose of rehabilitation.

The method adopted during this phase of construction will depend on the saturation status of the wetland.

The temporary access in a saturated wetland will comprise a geotextile, which will underlie an amount of locally sourced stone-material appropriately wide to allow subsequent construction operations to proceed in a safe manner, providing a safe stable working platform to support plant during construction.

Alternatively the contractor may consider gaining access to saturated wetland areas via suitable bog-mats.

Where a dry wetland is encountered, topsoil stripping must also be minimised and stored in a similar manner to protect it from vehicular compaction and washout. In this situation, no locally sourced stone-material must be laid to complement the temporary access, as a safe working platform can be provided on the dry stable underlying strata.

If precipitation is encountered, access through such areas must be restricted, to prevent compaction of soils. Furthermore, if access is urgently required, or rainfall is encountered during a vital phase of construction, the method employed for a saturated wetland must be implemented to protect the underlying geology and permit construction to proceed in a safe manner.

8.2.2 Excavations

Where material is excavated from the works area at a saturated wetland, the excavations must be side dug from the temporary access, with careful separation of soil types/ strata as identified. Where a previously dry wetland is saturated, a temporary access must be installed to prevent rutting and degradation of the exposed subsoil, to permit construction to proceed.

Where excavating operations progress to a dry seasonal wetland, the excavation must be dug on-line, creating a much narrower excavation, with less subsoil removed as a result, and at a greater speed. The soils must be removed in such a way that they can be easily reinstated (if required) in the reverse order.

A common approach is to be applied to all wetlands, with regard to removal of excavated material, whether side dug or on-line. The soil that is removed from the excavation at its deepest point must be laid closest to the excavation. The first layer of topsoil must be laid furthest away from the excavation. This ensures that soil layers (strata) are well separated and can be more successfully re-used for rehabilitation elsewhere.

Subsoil must not be stored on geotextile, but instead must be laid directly on the un-stripped topsoil.

Where special conditions occur, such as the presence of an impermeable clay layer, the foreman must be advised accordingly on site by an Environmental Representative of the contractor, and must be instructed via signage at the entrance to the wetland area to ensure it is clearly returned to the same depth and compaction as the surrounding layer.

Where trench breakers are required, these will be imported and installed by an experienced crew, as instructed by the Engineer, using information provided in the relevant specialist reports.

However, if a saturated wetland is encountered, it must be important to ensure that any backfill (where required) to excavations is not overly compacted, such that it creates a sub-surface dam. In these areas, it is proposed that mechanical compaction is minimised as far as possible. The principal aim will be to restore the backfilled material to a compaction resembling that of the trench walls and existing strata (where possible).

Where a dry wetland is encountered, backfill (where required) must be done to the standard specification using mechanical aids, if and when practicable.

Depending on the type of material removed from the excavated area, it may be necessary to import amounts of layering material. This is typically defined by the Engineer according to the Developer's specifications.

Any large boulders encountered during excavations will likely not be returned to the excavation, but rather removed off site and disposed of according to the requirements outlined in the EA and EMPr. Excess soil material will be temporarily windrowed and used within the rehabilitation phase elsewhere on site.

During excavation, or any other relevant works, the watercourse and its banks will be monitored weekly by the EO.

8.3 Re-vegetation of Disturbed Areas

To be done in accordance with the Wetland and Open Space Rehabilitation Plan.

9 METHOD STATEMENT FOR DUNE VEGETATION ACCESS

This method applies for the following:

- ✦ Installation of boardwalks;
- ✦ Formalisation of pedestrian pathways; and
- ✦ Formalisation of emergency vehicular access roads.

This Method Statement is a guideline for the Contractor. A detailed Method Statement must be submitted by the Contractor to the ECO for approval prior to construction commencing.

At all times, the Contractor must take cognisance of the measures detailed within the Environmental Management Programme (EMPr), Wetland and Open Space Rehabilitation Plan (**Appendix B**) and all other relevant documentation.

General guidelines for construction are provided below, following which the sequence to be followed by the Contractor shall be elaborated upon.

9.1.1 Pre-Construction Plant Rescue and Relocation

Prior to commencement of construction, a qualified ecologist must be commissioned to undertake a search and rescue for protected trees and plants of conservation importance along the alignments and construction ROW (10 m on either side of the access path).

The appointed ecologist must identify plant relocation sites with the open space area and apply for the necessary permits to remove and relocate these plants.

9.1.2 Site Preparation & Installation

The following are general land preparation requirements for all Dune Forest areas requiring rehabilitation / re-vegetation:

- ✦ Clearance of vegetation must be kept to a minimum and cleared by hand.
- ✦ All rubble, litter, foreign materials and waste products must be removed from wetlands and riparian areas and disposed of at proper local waste disposal / landfill facilities. Minimise additional disturbance by limiting the use of heavy vehicles and personnel during clean-up operations.
- ✦ Any large plumes of sediment washed into the Dune Forest from upslope must be removed, taking care not to remove or disturb the natural vegetation or soil profile.
- ✦ All Invasive Alien Plants (IAPs) and weeds must be removed. The Contractor must consult the ECO and the Wetland and Open Space Rehabilitation Plan regarding the method of removal. Herbicides must only be utilised where hand pulling / uprooting is not possible. Only herbicides which have been certified safe for use by the ECO may be utilised.
- ✦ The ROW must be clearly defined with shade-cloth fencing and 'No-Go' areas must be clearly marked.
- ✦ Vegetation and topsoil must be cleared for the installation of the wooden piers of the boardwalks.
- ✦ Immediately after ripping and scarifying disturbed areas, about 300 mm of topsoil must be applied on top. The thickness of the topsoil may be reduced at the instruction of the engineer only if 300 mm of topsoil compromises the integrity of the works.
- ✦ Topsoil must be placed in the same area from where it was originally stripped. If there is insufficient topsoil available from a particular soil zone to produce the minimum specified depth, topsoil of similar quality may be brought from other areas. Where topsoil is lost during construction as a result of erosion, topsoil must be imported to the site and re-established. Such topsoil must be sourced responsibly and legally.
- ✦ The topsoil must be compacted to similar compaction levels as natural soils in the area. The Engineer must provide detailed advice on this.

- ✦ For seeding, the soil must be prepared to optimise germination. This is typically undertaken by hand hoeing to loosen the soil in the seedbed but must be firm enough to facilitate good contact between the seeds and the soil.
- ✦ Materials must consist of either treated wood or poly-prop or eco-wood to ensure the maintenance of the landscape character as far as possible and to ensure durability.
- ✦ Materials (including wood) must be stored outside of the Dune Forest area and transported to the site of installation only as required.
- ✦ Boardwalks must be elevated above the vegetated dune cordon and other sensitive environments. The height of the boardwalk can vary but must be elevated ~1 m above the substrate.
- ✦ Boardwalks located in forested areas must wind around existing trees, rather than removing them so that the forest canopy remains intact.

9.1.3 Re-vegetation

To be done in accordance with the Wetland and Open Space Rehabilitation Plan.

10 ENVIRONMENTAL CODE OF CONDUCT

One of the objectives of the EMPr is to enforce 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 Contractor to enforce that each contractor, sub-contractor and workforce understand and adhere to the Code of Conduct.

ENVIRONMENTAL 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!

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 stormwater 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;
- Do not trespass into 'No-Go' Areas;
- Do not trespass into the Coastal Dune Forest of the Umhlali Estuary riparian area;
- 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 and authorisation has been received;
- 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.

11 ENVIRONMENTAL STEWARDSHIP PROGRAMME

11.1 Background

Tinley Manor Southbanks will eventually see a number of tenants and end-use developers present on site. They will legally need to comply with this Environmental Stewardship Programme as well as the specific requirements of the EA for Tinley Manor Southbanks, the EMPr, all permits and/or licences, as well relevant Environmental Legislation applicable in South Africa.

Environmental stewardship refers to responsible use and protection of the natural environment through conservation and sustainable practices.

Environmental stewardship also allows for on-going improvement and movement past minimum requirements to best practice over time.

11.2 Purpose

The Environmental Stewardship Programme aims to maintain and/or improve environmental conservation and management at and around Tinley Manor Southbanks in compliance with all regulatory requirements.

The programme provides long-term support for matters of environmental significance and has provided opportunities for all tenants to contribute in the stewardship and protection of the natural environment.

The aim of the Environmental Stewardship Programme is to:

- ✦ Improve habitat conditions across the landscape;
- ✦ Increase viability, integrity and buffers to high quality remnants for ecological communities;
- ✦ Improve the long-term protection of nationally endangered species and ecological communities;
- ✦ Improve the condition and function of ecological communities; and
- ✦ Create enduring changes in land manager attitudes and behaviours towards environmental protection and sustainable land management practices.

11.3 Programme Details

1. In terms of section 24F of the National Environmental Management Act (NEMA), Act No. 107 of 1998 (as amended), failure to comply with the conditions of the Environmental Authorisation constitutes an offence for which a convicted person must be liable to a fine not exceeding R 5 million or imprisonment for a period not exceeding ten years or both such fine and such imprisonment. Once a property has been transferred to a tenant, owner or site developer by the primary developer (Tongaat Hulett Developments), the new tenant, owner or site developer will assume direct and full responsibility for all activities on his/her site during construction and into the operational phase and must be held accountable to all competent authorities by either the primary developer (Tongaat Hulett Developments) and/or any Management Association established in the event of any transgressions. The new tenant, owner or site developer is ultimately responsible for ensuring compliance with the environmental specification and upholding the primary developer's (Tongaat Hulett Developments) environmental commitment to 100% compliance with all National, Provincial and local legislation that relates to management of this environment.
2. All new tenants, owners or site developers must be responsible for compliance with the provisions for Duty of Care and remediation of damage in accordance with section 28 of the NEMA.
3. The new tenant, owner or site developer is obliged to be familiar with and comply with the requirements of the following documentation for Tinley Manor Southbanks:
 - a) Environmental Authorisation for Tinley Manor Southbanks – *once issued*;
 - b) Final Amended Environmental Impact Assessment Report for the Proposed Tinley Manor Southbanks;

- c) Water Use Licence for Tinley Manor Southbanks – *once issued*;
 - d) DAFF Licence for the removal / relocation of protected trees – *once issued*;
 - e) Ezemvelo KZN Wildlife Permits for the removal / relocation of indigenous plants – *once issued*
 - f) Stormwater Management Plan for Tinley Manor Southbanks, dated March 2015;
 - g) Wetland and Open space Rehabilitation Plan for Tinley Manor Southbanks – *once compiled*;
 - h) Soil Management Framework Strategy for Tinley Manor Southbanks, dated March 2017; and the
 - i) Traffic Management Plan.
4. In compliance with the requirements of the EA and EMPr, the new tenant, owner or site developer must appoint an independent ECO who must be responsible to undertake monthly site audits for the specific property. The independent ECO must submit monthly ECO audit reports to the primary ECO appointed by the primary developer (Tongaat Hulett Developments) as well as all competent authorities as detailed in the EMPr. The cost of the ECO is to be borne by the site specific tenant, owner or site developer.
 5. The new tenant, owner or site developer is obliged to prepare a Spill Contingency Plan for his/her site as well as construction phase Method Statement which detail how and when a process must be carried out, detailing possible dangers / risks, and the methods of control required.
 6. The new tenant, owner or site developer must become a member of any Management Association implemented by the primary developer (Tongaat Hulett Developments).
 7. The new tenant, owner or site developer must pay levies for the management and maintenance of the surrounding open spaces as per the Environmental Stewardship Programme.
 8. Application of a penalty clause will apply for incidents of non-compliance to all new tenants, owners or site developers. The penalty must be issued by the primary developer (Tongaat Hulett Developments). The penalty imposed must be per incident at the discretion of the primary developer. The value of the penalty imposed must be as defined in **Section 4.2** of the Environmental Management Programme. The penalty monies must become the property of the Management Association to be used for rehabilitation and maintenance of the site and surrounding open spaces.
 9. All new tenants, owners or site developers must be responsible for the implementation of the EMPr. Non-compliance with the conditions of the EMPr constitutes a breach of Contract. The primary developer (Tongaat Hulett Developments) reserves the right to suspend part or the whole of the works, as required.

12 DECLARATION OF UNDERSTANDING OF EMPr

A Declaration of Understanding of the EMPr as presented below must be signed by a representative of each Developer, Engineer, Contractor and ECO and kept within the Site Environmental File.

DECLARATION OF UNDERSTANDING OF THE ENVIRONMENTAL MANAGEMENT PROGRAMME DATED _____

I, _____

Representing _____

declare that I have read and understood the contents of the Environmental Specifications (which include the Environmental Management Programme, the Environmental Authorisation, the Project Specifications and this guideline document) for Contract _____

I also declare that I understand my responsibilities in terms of enforcing and implementing the Environmental Specifications for the aforementioned Contract.

Signed: _____

Place: _____

Date: _____

Witness 1: _____

Witness 2: _____

APPENDIX A:

THD STANDARD OPERATING PROCEDURES

APPENDIX B:
STORMWATER MANAGEMENT PLAN

APPENDIX C:

*SOIL MANAGEMENT FRAMEWORK
STRATEGY*

APPENDIX D:

*WETLAND AND OPEN SPACE
REHABILITATION PLAN*

APPENDIX E:

TRAFFIC MANAGEMENT PLAN

APPENDIX F:

*APPROVED WETLAND CROSSINGS, PHASING
PLANS & SENSITIVITY MAPS*



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