

The Redevelopment of the River Club

Environmental Management Programme and Maintenance Management Plan

Report Prepared for

Liesbeek Leisure Properties Trust

Report Number 478320/03 Appendix H

DEA&DP Reference Number: 16/3/3/6/7/2/A7/17/3104/16

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Report Prepared by



July 2019

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Profile and Expertise of EAPs

SRK Consulting (South Africa) (Pty) Ltd (SRK) has been appointed by Liesbeek Leisure Properties Trust as the independent consultants to undertake the Environmental Impact Assessment (EIA) process required in terms of the National Environmental Management Act 107 of 1998 (NEMA).

SRK Consulting was established in 1974 and comprises over 1 300 professional staff worldwide, offering wide-ranging expertise in the natural resources and environmental sectors. SRK's Cape Town environmental department has a proven track record of managing large, complex environmental and engineering projects in the Western Cape, Africa and internationally. SRK has rigorous quality assurance standards and is ISO 9001 accredited.

As required by NEMA, the qualifications and experience of the key individual practitioners responsible for this project are detailed below.

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Certified with the Interim Board for Environmental Assessment Practitioners South Africa (CEAPSA)

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Neither SRK nor any of the authors of this Report have any material present or contingent interest in the outcome of this Report, nor do they have any pecuniary or other interest that could be reasonably regarded as being capable of affecting their independence or that of SRK.

SRK has no prior association with Liesbeek Leisure Properties Trust in regard to the development that is the subject of this Report. SRK has no beneficial interest in the outcome of the assessment which is capable of affecting its independence.

SRK's fee for completing this Report is based on its normal professional daily rates plus reimbursement of incidental expenses. The payment of that professional fee is not contingent upon the outcome of the Report.

Disclaimer

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Acronyms and Abbreviations

BA	Basic Assessment
BAR	Basic Assessment Report
CBD	Central Business District
CR	Contractors Representative
DEA&DP	Department of Environmental Affairs and Development Planning
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
LLPT	Liesbeek Leisure Properties Trust
MMP	Maintenance Management Plan
PA	Principal Agent
NEMA	National Environmental Management Act 107 of 1998 as amended
SRK	SRK Consulting (South Africa) (Pty) Ltd
TRUP	Two Rivers Urban Park
WUA	Water Use Authorisation
WWTW	Waste Water Treatment Works

Glossary

Activity	An activity or operation carried out as part of the construction or operation of the power plant
Aspect	An action, event, product or service, occurring as a component or result of an activity, which interacts with the existing environment (or which results in impacts to it)
Community	Those people who may be impacted upon by the construction and operation of the project. This includes neighbouring landowners, local communities and other occasional users of the area.
Contractor	Any company appointed by the Proponent to undertake construction or related activities on site, and will include the main Contractor, as well as any Sub-Contractors.
Construction Phase	The stage of project development comprising site preparation as well as all construction activities associated with the development.
Contaminated water	Water contaminated by activities on site, e.g. concrete water and run-off from plant / personnel wash areas.
Design Phase	The stage during which detailed layout and development plans are prepared, including the drafting of contract documents for construction.
Environment	The external circumstances, conditions and influences that surround and affect the existence and development of an individual, organism or group. These circumstances include biophysical, social, economic, historical and cultural aspects.
Environmental Authorisation	The authorisation by a competent authority of a listed activity or specified activity in terms of NEMA.
Environmental Impact Assessment	A process of evaluating the environmental and socio-economic consequences of a proposed course of action or project
Environmental Management Measures	Requirements or specifications for environmental management, as presented in the EMPr, some of which are based on the mitigation measures identified in the EIA Report (in this case the BAR).
Hazardous Substance	A substance (including materials and waste) that can have a deleterious (harmful) effect on the environment and those substances declared hazardous substances in terms of the Hazardous Substances Act 15 of 1973.
Impact	A change to the existing environment, either adverse or beneficial, that is directly or indirectly due to the development of the project and its associated activities.
Method Statement	A mandatory written submission by the Contractor to the ERP setting out the plant, materials, labour and method the Contractor proposes using to carry out an activity.
Mitigation Measures	Actions identified in the BAR to manage (avoid, minimise or optimise) potential environmental impacts which may result from the development.
Operational Phase	The stage of the works (including maintenance) following the Construction Phase, during which the development will function or be used as anticipated in the Environmental Authorisation.

Performance indicator	A measurable indicator of the outcome of environmental management, used to assess the success with which mitigation measures have been implemented. Often captures the results of several different monitoring activities.
Phase	A defined period during the life of the project, e.g. the <i>Construction</i> and <i>Operational and Maintenance</i> Phases.
Proponent	The person or organisation implementing the project.
Resources	The personnel, financial, equipment and technical requirements necessary for the successful completion of mitigation measures and for monitoring activities.
Schedule	The schedule or deadline for completion of each mitigation measure, which are recorded to ensure that mitigation measures are implemented in good time and in the correct sequence.
Solid waste	All solid waste including construction debris, chemical waste, broken / redundant equipment, oil filters, wrapping materials, timber, tins and cans, drums, wire, nails, food and domestic waste (e.g. plastic packets and wrappers).
Sub-Contractors	A Sub-Contractor is any individual or Contractor appointed by the main Contractor, to undertake a specific task on site.

1 Introduction

1.1 Background

The Liesbeek Leisure Properties Trust (LLPT or the proponent) operates the River Club in Observatory, Cape Town, which, together with portions of adjacent properties, is collectively referred to as the site (refer to Figure 1-1). The River Club is currently operated by the proponent as a commercial facility, mainly for recreational (golfing) activities and conferencing.

The site is bordered to the west and north-west by the (former) natural channel of the Liesbeek River (the original course of the Liesbeek River), and to the east by the Liesbeek River Canal and the Black River. The site therefore forms a virtual “island” surrounded by these freshwater systems and is positioned in the floodplain of the Black and Liesbeek Rivers.

The site is in a strategically important location within the City – it is a highly accessible site in close proximity to agglomerated places of work such as the Central Business District (CBD), the Voortrekker Road activity corridor and Paarden Eiland, and is also within relatively close proximity to the metropolitan south-east. The site also falls on the north-western edge of the Two Rivers Urban Park (TRUP).

The LLPT is proposing to redevelop the site for commercial, residential, institutional and associated uses. At least 20% of the leasable area at the development will be allocated to residential use, and 20% of the residential area at the development will be “inclusionary housing”.

The majority of the site is owned by the proponent.

The National Environmental Management Act 107 of 1998 (NEMA) requires that an Environmental Management Programme (EMPr) be submitted along with the Basic Assessment (BA) Report (BAR) to demonstrate how environmental management and mitigation measures will be implemented. In addition to this requirement, the LLPT will trigger the following activity listed in NEMA during ongoing maintenance of watercourses (including bridges):

- Listing Notice 1, Activity 19: the infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from (i) a watercourse.

The LLPT can undertake this activity during maintenance without the need for Environmental Authorisation (EA) if it is conducted in terms of an approved Maintenance and Management Programme (MMP). The requirements of the Operational and Maintenance Phase section of this EMPr is also intended to meet the requirements of an MMP and, through its approval of this EMPr, authorise LLPT to conduct ongoing maintenance in terms of the maintenance specifications in this document without the need for EA.

The mitigation measures, which were identified during the BA process, apply to the following phases of the development process:

- **The Design Phase:** These measures relate to the detailed layout, planning and design of the development, and will largely be implemented by the design and development team, prior to the commencement of any physical on-site activities. These mitigation measures are presented in Section 2.
- **The Construction Phase:** These mitigation measures are applicable during site preparation and construction on the site of the development and must be implemented by the relevant Contractors and sub-Contractors. These mitigation measures are presented in Section 3.

- **The Operational and Maintenance Phase:** These mitigation measures are applicable during the long-term operation and maintenance of the development and must be implemented by property owners (currently understood to be the LLPT but could include a future Property Owners Association as well). These mitigation measures are presented in Section 4.

As it is expected that the development will exist in the long-term and will not be decommissioned in the foreseeable future, measures related to decommissioning and post-closure rehabilitation are therefore not included in the EMPr.

Note: The EMPr will be submitted to the Department of Environmental Affairs and Development Planning (DEA&DP) for approval along with the BA Report. Once Environmental Authorisation has been issued by DEA&DP, this document may need to be updated to ensure that all relevant conditions of authorisation are adequately captured.

1.2 Content of the EMPr

The Environmental Impact Assessment (EIA) Regulations, 2014 (Government Notice [GN] 982) prescribe the required content in an EMPr. These requirements and the sections of this EMPr in which they are addressed, are summarised in Table 1-1.

Table 1-1: Content of the EMPr as prescribed by the EIA Regulations, 2014

GN 982 Ref.:	Item	Section Ref.:
(a) (i)	Details of the person who prepared the EMPr	Page i
(a) (ii)	Expertise of that person to prepare an EMPr	Page i
(b)	A detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	1.3.2
(c)	A map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating areas that should be avoided, including buffers;	Figure 1-2
(d)	A description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed and mitigated as identified through the environmental impact assessment process for all phases of the development including-	Table 1-4 and Table 1-5
(d)(i)	Planning and design;	Table 2-1
(d)(ii)	Pre-construction activities;	
(d)(iii)	Construction activities	Table 3-2
(d)(iv)	Rehabilitation of the environment after construction and where applicable post closure; and	
(d)(v)	Where relevant, operation activities;	Table 4-1
(f)	A description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraphs (d) will be achieved, and must, where applicable, include actions to-	Table 2-1, Table 3-2, and Table 4-1
(f)(i)	Avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation;	
f(ii)	Comply with any prescribed environmental management standards or practices;	
f(iii)	Comply with any applicable provisions of the Act regarding closure, where applicable; and	
f(iv)	Comply with any provisions of the Act regarding financial provisions for rehabilitation, where applicable;	Section 3.2
(g)	The method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	
(h)	The frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	

GN 982 Ref.:	Item	Section Ref.:
(i)	An indication of the persons who will be responsible for the implementation of the impact management actions;	Sections 2.1, 3.1 and 4.1
(j)	The time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Table 2-1, Table 3-2, and Table 4-1
(k)	The mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f)	Section 3.2
(l)	A program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	
(m)	An environmental awareness plan describing the manner in which-	Table 3-2, Table 3-1 and Table 4-1
(m)(i)	The applicant intends to inform his or her employees of any environmental risk which may result from their work; and	
(m)(ii)	Risks must be dealt with in order to avoid pollution or the degradation of the environment; and	
(n)	Any specific information that may be required by the competent authority.	

1.3 Site and Project Description

1.3.1 Site Description

The site is located in the suburb of Observatory in Cape Town (see Table 3-2 and Figure 1-1) and consists of the properties listed in Table 3-3 and indicated in Figure 3-1. The site is bordered to the west and north-west by the (former) natural channel of the Liesbeek River (the original course of the Liesbeek River), and to the east by the Liesbeek River Canal and the Black River (see Figure 3-4). The site therefore forms an "island" surrounded by these freshwater systems and is positioned in the floodplain of the Black and Liesbeek Rivers. The majority of the site is owned by the proponent, however, a number of other entities also own various smaller portions of the site (see Table 3-3).

Table 3-2: Site details

Physical Address	Observatory Rd Observatory Cape Town 7925
Coordinates	Latitude: 33° 55' 58.20" S Longitude: 18° 28' 28.18" E

Table 3-3: Property details of the site

Erf Number	SG 21 Digit Code	Extent	Property Owner	Zoning
151832	C01600070015183200000	14.8425 ha	LLPT	Open Space 3
26426	C01600070002642600000	0.5092 ha	CoCT	Open Space 2
108936	C01600070010893600000	0.0134 ha	CoCT	Open Space 2
26427	C01600070002642700000	0.0509 ha	CoCT	Open Space 2
15326 Rem	C01600070001532600000	20.8981 ha	CoCT	Community 1 / Open Space 2 / Transport 2
26169	C01600070002616900000	1.8900 ha	CoCT	Transport 2
26170	C01600070002617000000	0.2072 ha	CoCT	Transport 2
26171	C01600070002617100000	0.2024 ha	CoCT	Transport 2

Erf Number	SG 21 Digit Code	Extent	Property Owner	Zoning
26172	C01600070002617200000	0.2043 ha	CoCT	Transport 2
26173	C01600070002617300000	0.2006 ha	CoCT	Transport 2
26174	C01600070002617400000	0.3812 ha	CoCT	Transport 2
26175	C01600070002617500000	0.3840 ha	CoCT	Transport 2

The site is in a strategically important location within the City – it is a highly accessible site in close proximity to agglomerated places of work such as the CBD, Voortrekker Road activity corridor and Paarden Eiland, and is also within relatively close proximity to the metropolitan south-east. The site also falls on the north-western edge of TRUP (see Section 4.3.4),

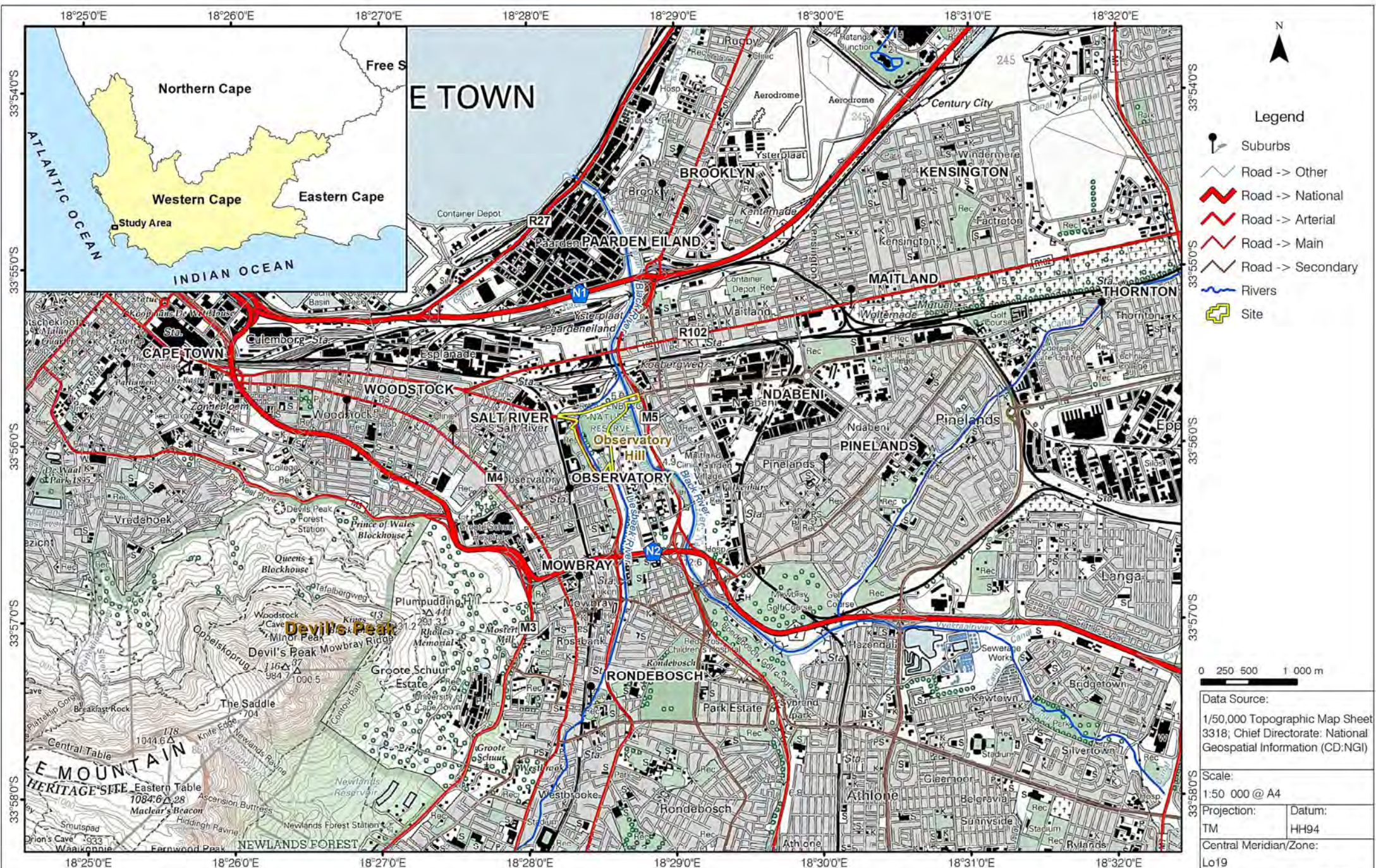
The Black River and M5 motorway have historically been barriers between communities to the east and west of the river banks, and the area around the river has become an unattractive edge, derelict and inaccessible to pedestrians (this includes the current access to The River Club along Observatory Road). This is largely due to the presence of two high security institutions (Valkenberg Hospital and the SAAO), and limited public access to and through the River Club site and to the east of the Black River and the M5.

The site is currently predominantly used by the proponent as a commercial recreational enterprise comprising a golf driving range with a “mashie” 9-hole golf course in the north-east of the site, conference and function venue, restaurant and bar. A bird hide is located on the site which overlooks the new Liesbeek River channel and current confluence with the Black River. Beyond the mashie course is vacant land owned by the Passenger Rail Agency of South Africa (PRASA).

The River Club building (the main building), built in 1939, has been converted into a recreational and conference facility. A number of surrounding buildings on the property are rented to businesses for commercial use. The River Club parking area is to the south of the building, and the main access to the River Club is from the south off Observatory Road (see Figure 3-4).

Undeveloped portions of the site are mostly grassed (lawn) or open ground, with scattered trees. Dense reed beds are located on the eastern edge of the site along the Black River. Cape Flats Dune Strandveld, Cape Flats Sand Fynbos and Peninsula Shale Renosterveld would historically have occurred at the site. However, other than the interfaces with the Black and Liesbeek Rivers, the site is now completely transformed from an ecological perspective.

Liesbeek Parkway (south), Albert Road (north-west) and Station Road (west) provide access to the site (see Figure 3-4). Although the M5 runs almost parallel to the eastern boundary of the site, access from the M5 is not currently possible.



Legend

- Suburbs
- Road -> Other
- Road -> National
- Road -> Arterial
- Road -> Main
- Road -> Secondary
- Rivers
- Site



Data Source:
 1/50,000 Topographic Map Sheet
 3318; Chief Directorate: National
 Geospatial Information (CD:NGI)

Scale:
 1:50 000 @ A4

Projection:	Datum:
TM	HH94
Central Meridian/Zone:	
Lo19	



REDEVELOPMENT OF THE RIVER CLUB LOCALITY MAP

Date:	Compiled by:
09/07/2019	FUBM
Project No:	Fig No:
478320	1
Revision: A	Date: 09 07 2019



Legend

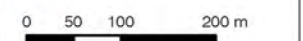
- Suburbs
- Railway
- Roads
 - Other
 - Secondary
 - Main
- Rivers
 - Perennial
- Development Outline

Floodlines

- 1:10 year flood
- 1:50 year flood
- 1:100 year flood

Ecological Sensitivity

- Very low local sensitivity
- Low local sensitivity
- Moderate local sensitivity
- High local sensitivity



Data Source:
 1/50,000 Topographic Map Sheet 3318; Chief Directorate: National Geospatial Information (CD:NGI)
 Google Earth Imagery

Scale:
 1:8 000 @ A4

Projection: TM	Datum: WGS84
Central Meridian/Zone: Lo19	
Date: 29/04/2019	Compiled by: FUBM
Project No: 478320	Fig No: 2
Revision: A	Date: 10 07 2019



REDEVELOPMENT OF THE RIVER CLUB ECOLOGICAL SENSITIVITY

1.3.2 Project Description

Two main alternatives were considered in the BA process, the Riverine Corridor Alternative, and the Island Concept Alternative. The Riverine Corridor Alternative was found to be the preferred alternative because it entails higher significance ecological benefits, and lower significance heritage impacts than the Island Concept Alternative. The EMPr is assuming that the Riverine Corridor Alternative (the preferred development alternative) is authorised.

The development will be built in several phases, and will include two precincts. The major roads and services will be installed during the first Phase. Precinct 1 will be development in the south of the site and Precinct 2 will be developed to the north. The phasing of the precincts will depend on market demand. A recreational corridor (or park) with ecological function will be located between the two precincts.

Key elements of the project and associated infrastructure are described below:

- **Buildings for commercial, retail and residential use**, occupying approximately 4.5 ha of the site;
- **Hard landscaping**, including covered pedestrian space, roads, recreation and leisure facilities (including foot and cycle paths, and other facilities), stormwater and electrical infrastructure, courtyards and some landscaped parking, occupying approximately ~4 ha of the site;
- **Open space**, including the rehabilitation of the Liesbeek Canal, ecological setbacks, the infilled original course of the Liesbeek River, and the park, occupying approximately ~9.3 ha of the site;
- **Waste management facilities**, collection, sorting, temporary storage and collection areas;
- **Water supply infrastructure**, supplying potable water to buildings through serviced pipeline connections;
- **Electrical infrastructure**, two ring feed loops (one for each precinct). Each building will be equipped with a dedicated power transformer and MV Switch Panel, and will be connected to one of the ring feed loops. The mains connection will comprise one or two mini-sub-stations;
- **Stormwater infrastructure**, vegetated stormwater swales underlain by a piped drainage network will provide stormwater storage capacity;
- **Sewerage**, including temporary effluent containment tanks; and
- **Roads and parking**, comprising surfaced access and internal roads, bridges some surface parking, basement parking, traffic management infrastructure (e.g. traffic circles) and bridges occupying approximately 3.2 ha of the site.

1.4 Potential Impacts and Management Outcomes

A summary of the potential impacts of the proposed development identified and assessed in the BA Report is presented in Table 1-4. Additional details on the nature of these impacts are provided in the BAR (SRK Consulting Report No: 478320/3, July 2019).

Table 1-4: Potential impacts of the proposed project

Impact	Description	Impact Status
<i>Construction Phase</i>		
Air Quality	Nuisance from dust and exhaust emissions	Negative
Noise	Nuisance from noise	Negative
Ecological	Water contamination and deterioration of habitat quality	Negative
	Loss of riverine wetlands along the Black River margin	Negative
	Faunal mortalities	Negative

Impact	Description	Impact Status
	Change in aquatic habitat quality	Positive
	Change in terrestrial habitat quality	Negative
	Change in faunal connectivity	Positive
	Change in floral species composition	Positive
Socio- economic	Wealth creation through investment	Positive
	Increased employment, income and skills development	Positive
Traffic	Delays to road users during upgrades to the M5 / Berkley Road and Link Road / Liesbeek Parkway intersections	Negative
	Delays to road users from construction vehicle traffic	Negative
Cultural- historical	Loss or damage to palaeontological and archaeological resources	Negative
	Loss of structures on the site with heritage value	Negative
Visual	Altered sense of place from construction activities	Negative
<i>Operational and Maintenance Phase</i>		
Hydrology	Change in flood hazard at surrounding properties	Negative
Ecological	Changes to habitat quality and ecological functioning of the Liesbeek Canal	Positive
	Changes to habitat quality and ecological functioning of the original course of the Liesbeek River	Positive
	Changes to habitat quality and ecological functioning of the Raapenburg Wetland	Insignificant
	Contamination of the Liesbeek and Black Rivers	Negative
	Changes to habitat quality in rehabilitated areas	Negative
	Faunal mortalities	Negative
Socio- economic	Increased employment, income and skills development	Positive
	Increased government revenue	Positive
	Increase in centrally located housing, including inclusionary housing	Positive
	Densification facilitating improved connectivity, transport systems and TRUP implementation	Positive
	Change in public amenity value of the site	Positive
	Increase in property values in surrounding areas	Positive
	Gentrification in surrounding residential areas	Negative
	Change in the quality of life in the area	Insignificant
	Pressure on service provision	Insignificant
Traffic	Delays to road users from development related traffic	Negative
Cultural- historical	Change in historical character of the site	Negative
	Change in the heritage value of the Liesbeek River floodplain	Positive
	Changes in historical setting of the SAAO	Negative
Visual	Altered sense of place caused by the change in character of the site	Negative
	Visual intrusion	Negative
	Altered sense of place and visual quality caused by light pollution at night	Negative

The mitigation and enhancement measures stipulated in the BAR and in this EMPr seek to meet the impact management outcomes listed in Table 1-5.

Table 1-5: Impact Management Outcomes of the EMPr

Impact	Impact Management Outcome
<i>Construction Phase</i>	
Air Quality	Prevent dust from causing a nuisance to local communities
Noise	Prevent noise from causing a nuisance to local communities
Ecological	Prevent water contamination and protect and enhance habitat quality
	Minimise the loss of riverine wetlands along the Black River margin
	Reduce faunal mortalities during construction and operations
	Improve aquatic and terrestrial habitat quality, and improve faunal connectivity
	Improve floral species composition
Socio- economic	Enhance the intensity of economic benefits on the local community and economy
Traffic	Reduce delays to road users
Cultural- historical	Prevent loss or damage to palaeontological and archaeological resources
	Mitigate the loss of structures on the site with heritage value
Visual	Reduce visual clutter
<i>Operational and Maintenance Phase</i>	
Hydrology	Prevent increased flood hazard on local communities (i.e. users of the Liesbeek Parkway)
Ecological	Improve the habitat quality and ecological functioning of the Liesbeek Canal
	Enhance the habitat quality and ecological functioning of the swale at the original course of the Liesbeek River
	Prevent changes to habitat quality and ecological functioning of the Raapenburg Wetland
	Prevent contamination of the Liesbeek and Black Rivers
	Prevent changes to habitat quality in rehabilitated areas
	Reduce faunal mortalities
Socio- economic	Enhance the intensity of economic benefits on the local community and economy
Traffic	Reduce delays to road users
Cultural- historical	Enhance the heritage value of the Liesbeek River floodplain
	Mitigate changes in historical setting of the SAAO
Visual	Mitigate changes to the sense of place of the site
	Mitigate and prevent visual intrusion, as far as possible

2 Measures Applicable to the Detailed Design Phase

2.1 Roles and Responsibilities

The key role players during the Design Phase of the project are:

- LLPT (the proponent); and
- Consultants responsible for the detailed design and construction planning for the development.

Their roles and responsibilities during the detailed Design Phase with respect to the implementation of the EMPr are outlined below.

LLPT:

- Ensure that the consultant team is aware of and takes into consideration all relevant measures in the EMPr; and
- Confirm that all relevant environmental management measures in the EMPr have been incorporated into the project design on completion of the Design Phase.

Consultants:

- Take cognisance of all relevant measures in the EMPr and ensure integration thereof in the detailed design; and
- Reference the environmental management measures applicable to the construction (Section 3) and operational and maintenance (Section 4) phases of the Project in all documents that will be applicable to future phases of the Project (e.g. tender documents).

2.2 Environmental Management Measures

The environmental management and mitigation measures that must be implemented during the Design Phase, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are laid out in Table 2-1 below.

Table 2-1: Environmental management and mitigation measures that must be implemented during the *Design Phase*

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
Authorisations	1.	Ensure that all required licences and permits have been obtained before the start of construction. These include, but may not be limited to: <ul style="list-style-type: none"> Water Use Authorisations. 	<ul style="list-style-type: none"> LLPT 	<ul style="list-style-type: none"> Before construction commences 	<ul style="list-style-type: none"> Keep record of all permits, licences and authorisations 	<ul style="list-style-type: none"> Required licences/permits on file
Environmental Compliance	2.	Appoint an independent ECO with experience in freshwater ecology to oversee construction activities	<ul style="list-style-type: none"> LLPT 	<ul style="list-style-type: none"> Before construction commences 	<ul style="list-style-type: none"> Review appointment documentation 	<ul style="list-style-type: none"> ECO appointment documents
	3.	Compile a detailed costing for implementation of rehabilitation efforts, landscaping and ongoing management, including allowance for acquisition and planting and / or nursery propagation of sufficient local indigenous plants to achieve the required landscaping objectives and emergency rehabilitation (e.g. in the event of a flood)	<ul style="list-style-type: none"> Consultants 	<ul style="list-style-type: none"> Before construction commences 	<ul style="list-style-type: none"> Review rehabilitation plan and financial provisions 	<ul style="list-style-type: none"> Rehabilitation plan and financial provisions
	4.	Include the EMPr in all tender documents to ensure that sufficient resources are allocated to environmental management by Contractors	<ul style="list-style-type: none"> LLPT and consultants 	<ul style="list-style-type: none"> Prior to call for tenders 	<ul style="list-style-type: none"> LLPT to check tender documents and contract 	<ul style="list-style-type: none"> Incorporated in tender documents
	5.	Get sign-off of any pertinent changes to the project description that will affect ecological resources by a botanist, freshwater ecologist and/or faunal ecologist	<ul style="list-style-type: none"> LLPT 	<ul style="list-style-type: none"> Prior to change in project description 	<ul style="list-style-type: none"> Review signed off designs 	<ul style="list-style-type: none"> Changes to the project description with / without sign-off
Employment	6.	Set targets for the use of local labour based on the needs of the proponent and the availability of existing skills and people that are willing to undergo training	<ul style="list-style-type: none"> LLPT 	<ul style="list-style-type: none"> Call for tenders 	<ul style="list-style-type: none"> LLPT to check tender documents and contract Keep record of how targets were determined Keep record of staff by origin Keep record of training provided 	<ul style="list-style-type: none"> Incorporated in tender documents Percentage of local staff Percentage of BEE staff
	7.	Ensure that Contractors from outside the local area that tender for work meet the required targets for how many locals are given employment				
	8.	Consider implementing labour-intensive rather than capital-intensive work methods wherever possible				
	9.	Consider purchasing resources from local sources wherever possible				
Waste Management	10.	Develop a waste management plan, describing: <ul style="list-style-type: none"> Expected type and amount of waste; Measures to reduce waste; Type and expected volume of recyclable waste; Recycling facilities that will collect / receive waste; Type of storage for different waste types; and Waste Contractors that will collect waste. 	<ul style="list-style-type: none"> Consultant team 	<ul style="list-style-type: none"> During Design Phase 	<ul style="list-style-type: none"> Review of waste management plan 	<ul style="list-style-type: none"> Adequate provision for waste disposal

¹ Unless otherwise indicated, monitoring will be undertaken by LLPT, supported by the authorities where the requirement is specifically stipulated in a licence or permit.

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
Planning and Design – Ecological Corridors	11.	Retain an ecological corridor of at least 10 m along the southern property boundary of the site	• LLPT and consultants	• During Design Phase	• Review final designs and project implementation	• Final design and implementation incorporates design mitigation
	12.	Retain an ecological corridor of at least 10 m between the Berkley Road Extension and the northern building line of the site (with the exception of a single choke-point at the north-western corner of the development)				
	13.	Retain a recreational buffer area of at least 65 m wide between Precinct 1 and Precinct 2 (the park)				
	14.	Install culverts for faunal movements with a height of at least 1 500 mm or provide light sources in culverts where required.				
Planning and Design: - Liesbeek Canal	15.	Rehabilitate the canalized river course, and include the experience of this, the Raapenberg Bird Sanctuary and the Observatory complex as an integral part of a continuous public space system that already exists upstream of the River Club site on the banks of the Liesbeek River	• LLPT and consultants	• During Design Phase	• Review final designs and project implementation	• Final design and implementation incorporates design mitigation
	16.	Remove the western wall of the canal and its base				
	17.	Install stepped gabions on the remaining eastern canal wall to a depth slightly lower than the wet season base-flow level				
	18.	Provide an ecological corridor of at least 25 m for channel flow (other than at the pinch-point in the south-eastern corner of the development), including a short low bank, shaped roughly to a slope of 1:4 to create a slightly elevated floodplain to accommodate within-year (winter high-flows) floods				
	19.	Retain an ecological corridor of at least 15 m from upslope of the 1:1 year floodline at the pinch-point in the south-eastern corner of the development, and vegetate this area with appropriate low-growing vegetation for the first 7.5 m and other riparian vegetation thereafter				
	20.	Allow the river to meander in this corridor naturally				
	21.	Extend the ecological corridor further to the west where opportunities to do so exist				
	22.	Retain a substantial setback immediately north of the confluence of the Liesbeek and Black Rivers to celebrate the likely location of a precolonial river crossing				
	23.	Install a 1 m high gabion wall at the eastern boundary of the ecological corridor to restrict the movement of Western Leopard Toad into the development area				
	24.	Include a recreational buffer area (where space allows) and pathways to east of the ecological corridor				

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
	25.	Install a 1 m high gabion wall at the eastern boundary of the recreational buffer area to restrict the movement of Western Leopard Toad into the development area				
Planning and Design – Vegetated Swale at original course of Liesbeek River	26.	Install eight culverts under the bridge crossing the swale to allow for faunal movement	<ul style="list-style-type: none"> • LLPT and consultants 	<ul style="list-style-type: none"> • During Design Phase 	<ul style="list-style-type: none"> • Review final designs and project implementation 	<ul style="list-style-type: none"> • Final design and implementation incorporates design mitigation
	27.	Pipe stormwater flows that currently enter the channel from urban areas to the west of Liesbeek Parkway under the swale				
	28.	Step the eastern (development) side of the swale up steeply using gabions to discourage western leopard toad passage into the development				
	29.	Use toad barriers edging the rehabilitated swale as the foundations for pathways				
	30.	Create at least two artificial wetland ponds, each with a diameter of at least 10 m, in the proposed swale				
	31.	Ensure artificial wetland ponds in the swale retain moisture throughout the year (by excavating these below the summer water table or by lining these artificial features)				
	32.	Allow stormwater to daylight in open channel vegetated bioretention swales				
	33.	Gently slope the sides of artificial wetland ponds (at a gradient of 1:5 or less steep)				
	34.	Get sign-off of the final design of artificial wetland ponds by a faunal and aquatic ecologist				
	35.	Retain a section of steep bank on the western bank of the original course of the Liesbeek River or install WLT barriers on the western bank of the original course of the Liesbeek River				
36.	Get sign off from a faunal specialist on the final location of culverts under the bridge through the swale					
Planning and Design – Park between Precinct 1 and 2	37.	Extend the open space network across the site to connect the two river corridors	<ul style="list-style-type: none"> • LLPT and consultants 	<ul style="list-style-type: none"> • During Design Phase 	<ul style="list-style-type: none"> • Review final designs and project implementation 	<ul style="list-style-type: none"> • Final design and implementation incorporates design mitigation
	38.	Install five culverts for faunal movements under the road that crosses this area				
	39.	Manage at least 40% of this corridor as an indigenous planted habitat without lawns or pathways				
	40.	Shape the side slopes of the road running through the recreational buffer area between Precinct 1 and Precinct 2 to be as steep as possible (or introduce physical WLT barriers to prevent WLTs from entering the road surface)				

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
	41.	Incorporate planted swaths in the east-west recreational buffer zone between Precinct 1 and Precinct 2, and integrate these into the rehabilitated canal corridor below the lowest footpath (e.g. by raising the paths in this area)				
Planning and Design - Buildings	42.	Ensure that 20% of Gross Leasable Area is residential, and that 20% of residential units are dedicated to the inclusionary housing market	<ul style="list-style-type: none"> • LLPT and consultants 	<ul style="list-style-type: none"> • During Design Phase 	<ul style="list-style-type: none"> • Review final designs and project implementation 	<ul style="list-style-type: none"> • Final design and implementation incorporates design mitigation
	43.	Acquire precinct plan approval from the CoCT prior to the approval of building plans				
	44.	Design buildings in terms of the following principles: <ul style="list-style-type: none"> • Buildings on the Berkley Road (northern) part of the development should have greater bulk and height than the southern part opposite the SAO site. • Buildings at precinct entrances should be designed to reflect gateways and emphasise the hierarchy of spaces in the precinct. • Buildings on prominent corners and edges should contain architectural features that highlight the significance of these buildings. • Along internal streets, emphasis shall be placed on the interface between buildings and the public realm in order to promote an attractive and pedestrian friendly urban environment. • The design of buildings around public accessible spaces shall be appropriately scaled and contribute to the creation of safe spaces. • Any parking structures that are above finished ground level shall be screened or shall incorporate an active interface so that hard edges and blank walls are avoided. 				
	45.	Locate larger buildings to the north of the site				
	46.	Utilise (easterly) views across Raapenberg Bird Sanctuary				
	47.	Express each building unit individually where buildings are linked together (with architectural details – insets, overhangs, range of visually compatible materials)				
	48.	Introduce a variety of building forms and heights to ensure varied grain and fragmentation				
	49.	Create a visual link with the natural character of Raapenberg Bird Sanctuary with the portion of the site bordering the Sanctuary				
50.	Ensure visual and physical pedestrian permeability through development parcels					

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
Planning and Design – Liesbeek Parkway	51.	Plan for, and design, the raising of the portion of the Liesbeek Parkway that will be vulnerable to high hazard flooding following infilling of the site	<ul style="list-style-type: none"> • LLPT and consultants 	<ul style="list-style-type: none"> • During Design Phase 	<ul style="list-style-type: none"> • Review final designs and project implementation 	<ul style="list-style-type: none"> • Final design and implementation incorporates design mitigation • Dualling of Liesbeek Parkway
	52.	Optimise signals at the intersection of Station Road and Liesbeek Parkway				
	53.	Upgrade Liesbeek Parkway to a 4-lane dual carriageway road between Link Road and Station Road				
	54.	Upgrade Liesbeek Parkway Between Link Road and Malta Road to a 4-lane when required by subsequent developments				
	55.	Upgrade the Link Road and Liesbeek Parkway intersection during Phase 1 by: <ul style="list-style-type: none"> • Northern leg: Adding an additional lane and shared turning on approach, and fully extend the merging lane on departure; • Eastern leg: Adding a new approach into the development; and • Southern leg: Adding an additional turning lane on approach, and adding an additional through lane and merging lane on departure. 				
Planning and Design – Berkley Road	56.	Extend Berkley Road over the Black and Liesbeek Rivers to link with Malta Road / Liesbeek Parkway to accommodate one lane of traffic in each direction	<ul style="list-style-type: none"> • LLPT and consultants 	<ul style="list-style-type: none"> • During Design Phase 	<ul style="list-style-type: none"> • Review final designs and project implementation 	<ul style="list-style-type: none"> • Final design and implementation incorporates design mitigation
	57.	Include multiple intersections to access the site off Berkley Road, subject to approval from the City				
	58.	Install two 1500 mm x 1500 mm box culverts above the 1:50 year floodline on each bank of the Black River to facilitate faunal passage through the road structure				
	59.	Include three additional culverts at the Liesbeek swale crossing on the eastern terrestrial margins of the swale to allow faunal movements during flood events (i.e. seven culverts in total)				
	60.	Install unlined grassed channels to channel stormwater from Berkley Road into the Black River, where possible				
	61.	Ensure that a 5 m corridor is retained between the built development edge on the north-western corner of the development and the Berkley Road Extension road reserve (which may occur in the road reserve)				
	62.	Include culverts under the extension of Berkley Road onto the site (one between each of the access roads onto the site)				

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
	63.	Pull the extent of the fill platform of the Berkley Road Bridge on the eastern bank of the Black River back to at least 5 m from the top of the bank to retain a faunal movement corridor at this structure				
	64.	Upgrade the M5 and Berkley Road intersection to a single point interchange during Phase 1				
	65.	Undertake further upgrades to the intersection between the M5 and Berkley Road during subsequent phases subject to a Services Agreement with the City				
Planning and Design – Internal Roads and Parking	66.	Utilise (westerly) views towards Devils Peak in movement routes where possible	• LLPT and consultants	• During Design Phase	• Review final designs and project implementation	• Final design and implementation incorporates design mitigation
	67.	Implement traffic calming measures on the link road through the development during Phase 1.				
	68.	Design roadways to be as narrow as practicably possible.				
	69.	Establish and/or retain screening avenues of trees along internal roads to prevent light trespass				
	70.	Install gabions (or similar structures) with a minimum height of 0.5m on the edges of roads on the outer perimeter of each development precinct in line with toad protection measures				
	71.	Pave access roads with attractive materials that meet functional requirements and local specifications				
	72.	Upgrade the intersection at the main entrance to the development on Berkley Road during subsequent phases subject to a Services Agreement with the City				
	73.	Arrange above-ground parking bays (if required) in small groups rather than in large, unbroken lots				
	74.	Screen parking bays with buildings and vegetation as far as possible				
Planning and Design – Sewerage	75.	Install sewerage pump stations with a 6 hour overflow capacity	• LLPT and consultants	• During Design Phase	• Review final designs and project implementation	• Final design and implementation incorporates design mitigation
Planning and Design: - Public and Non-motorised Transport	76.	Make allowance in the layout for a future potential high quality non-motorised transport (NMT) network	• LLPT and consultants	• During Design Phase	• Review final designs and project implementation	• Final design and implementation incorporates design mitigation
	77.	Provide taxi drop-off points				
Planning and Design - Other	78.	Integrate the site with surroundings without creating a 'rat-run' for vehicles	• LLPT and consultants	• During Design Phase	• Review final designs and project implementation	• Final design and implementation
	79.	Retain visual links to the Black River				

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
	80.	Provide a publically accessible open space system				incorporates design mitigation
	81.	Respect and reflect the shape of the course of the Liesbeek River in the design of the development				
	82.	Commemorate the Vaarsche Drift crossing				
	83.	Incorporate visually permeable green or black fencing (if required) into low walls				
	84.	Install culverts for faunal movements with a height of at least 1 500 mm or provide light sources in culverts where required.				
	85.	Any sewer manholes in open space areas should be located where overflows can be easily detected				
	86.	Design pitfall-type structures (drains, stormwater canals, channels, water features and all manhole type structures) to limit access and allow toad escape options, where required				
	87.	Design fencing (if required) to allow faunal movements (i.e. create 300 mm high x 100 mm wide access holes at least every 10m along a length of fence, and do not electrify fencing within 300 mm of the ground)				
Landscaping and Rehabilitation Plan	88.	Appoint landscape architects with a proven ability to create landscapes that adequately mimic natural river and wetland environments to compile a landscaping and rehabilitation plan	• LLPT	• During Design Phase	• Review appointment of landscape architects	• Landscape architects appointment
	89.	Compile a landscaping and rehabilitation plan including detailed annotations regarding the ecological landscaping requirements, dimensions and minimum requirements (incorporating essential mitigation for the development)	• Landscaping architects	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and includes all incorporates design mitigation
	90.	Incorporate a detailed implementation programme into the landscaping and rehabilitation plan taking ecological considerations into account	• Landscaping architects	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and includes all incorporates design mitigation
	91.	Get sign-off of the landscaping and rehabilitation plan by a botanist, freshwater ecologist and faunal ecologist	• LLPT	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan signed off by specialists prior to construction
Landscaping and Rehabilitation – Ecological Corridors and Buffer Areas	92.	Landscape ecological corridors and recreational buffer areas to provide high quality cover for WLTs, including low and medium height vegetation cover with mixed plant species	• LLPT	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and incorporates design mitigation • Landscaping plan implemented
	93.	Link landscaped areas to create continuous ecological corridors as far as possible				
	94.	Integrate Renosterveld habitat into ecological setbacks and corridors				

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
	95.	Landscape the ecological corridor on the southern property boundary with indigenous vegetation to provide a diversity of heights and densities of plants				
	96.	Integrate physical shelters for WLTs into landscaped areas (such as natural logs, or artificial structures such as pieces of broken pots or ceramic piping cut lengthwise)				
Landscaping and Rehabilitation – Vegetated Swale at Original Course of Liesbeek River	97.	Infill the channel to create a wide vegetated open swale with ecological, amenity and stormwater polishing functions	• LLPT	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and incorporates design mitigation • Landscaping plan implemented
	98.	Provide terrestrial and breeding season habitat for WLTs in this area				
	99.	Connect artificial wetland ponds to the main east-west faunal corridors with planted landscaped swathes				
	100.	Vegetate artificial wetland ponds with indigenous wetland vegetation with a range of textures, height and densities				
	101.	Shape the eastern bank of the Black River (at a gradient of 1:4 or flatter) to a distance of 10 m up and downstream of the Berkley Road Bridge, and vegetate this zone				
Landscaping and Rehabilitation – Liesbeek Canal	102.	Vegetate gabions along the eastern canal wall with appropriate species and provide areas of higher spatial diversity (e.g. by adjusting installation marginally)	• LLPT	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and incorporates design mitigation • Landscaping plan implemented
	103.	Vegetate the short low western bank with <i>Phragmites australis</i> reedbed and other indigenous plant species typical of lowland rivers in this area				
	104.	Vegetate the western floodplain with a range of indigenous plant species (it is likely that <i>Phragmites australis</i> reeds and possibly <i>Typha capensis</i> bulrush would dominate)				
	105.	Reshape the eastern bank of the earth channel downstream of the existing canal all the way to the Black River to mimic the rehabilitated profile upstream, and plant this area accordingly				
	106.	Replace existing willow trees along on the eastern bank of the earth channel downstream of the existing canal with indigenous riverine trees that will supply roosting and /or nesting areas to riverine birds				
Landscaping and Rehabilitation - Park between Precinct 1 and 2	107.	Landscape the recreational buffer area between Precinct 1 and Precinct 2 with wide swathes of indigenous planted vegetation that ensure continuous vegetated, unlawned cover along the length of the corridor for toad movements	• LLPT	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and incorporates design mitigation • Landscaping plan implemented

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
Landscaping and Rehabilitation – Buildings	108	Use large trees and vegetated berms to soften the interface between open spaces and buildings on site.	• LLPT	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and incorporates design mitigation • Landscaping plan implemented
	109	Use vegetation to break up large expanses of hard surface.				
Landscaping and Rehabilitation – Berkley Road	110	Reshape the eastern bank of the Black River where it fronts the site to the approval of an aquatic specialist	• LLPT	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and incorporates design mitigation • Landscaping plan implemented
Landscaping and Rehabilitation – General	111	Select water wise indigenous plants for landscaping in open spaces and private gardens	• LLPT	• During Design Phase	• Review landscaping plan and project implementation	• Landscaping plan produced and incorporates design mitigation • Landscaping plan implemented
	112	Design pathways / walkways to prevent the passage of WLTs into the main development area.				
	113	Limit the extent of lawns				
	114	Limit the extent of lawns in the swale as far as possible				
	115	Investigate the material and tree planting palettes used for the landscaping along Liesbeek Parkway to extend the green movement corridor along Liesbeek Parkway adjacent to the site				
Method Statements	116	Compile detailed method statements for watercourse construction and flow diversion demonstrating how downstream sedimentation and/or turbidity would be avoided, making allowance for emergency rehabilitation of the Raapenburg Wetland should the Liesbeek River flood during construction	• Consultants	• During Design Phase	• Review signed off method statements	• Method statements in place and signed off by a freshwater ecologist
	117	Get sign off of method statements for watercourse construction and flow diversion from a freshwater ecologist				
Stormwater Management	118	Develop a final stormwater management plan for the entire development area, to promote infiltration and reduce run-off from the development	• Consultants	• During Design Phase	• Review detailed layout plans	• Approval of final design • Stormwater infrastructure included in final design
	119	Get CoCT approval of the final stormwater management plan				
	120	Ensure that designs include the installation of erosion control and abatement structures at stormwater outlets				
Lighting	121	Limit high intensity lighting (e.g. make use of low-level lighting fixtures such as bollards, where possible, to avoid light spillage)	• Consultants	• During Design Phase	• Review detailed layout plans	• Lighting included in detailed design and compliant with measures
	122	Where possible direct lighting inwards and downwards to avoid light spillage and trespass				

Design Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ¹	Performance Indicators
	123	Reduce the height of lighting masts as far as practicable				
	124	Install down light luminaires to illuminate vertical structures or surfaces such as signs. If the only alternative is to up-light the element, the correct luminaire must be fitted to avoid light spillage.				
Dust Management	125	Inform all registered local stakeholders of the impending construction, including the presence of the complaints register and potential for dust entrainment, at least 4 weeks before construction commences.	<ul style="list-style-type: none"> • LLPT 	<ul style="list-style-type: none"> • 4 weeks prior to the commencement of construction 	<ul style="list-style-type: none"> • Check notices 	<ul style="list-style-type: none"> • Proof of stakeholder notifications
	126	Compile a Dust Management Plan(s) for construction that includes: <ul style="list-style-type: none"> • A site map with: <ul style="list-style-type: none"> - Prevailing wind directions during construction period (i.e. relevant season); - Property boundaries; - Areas to be cleared; - Barriers to be installed; - Location and timing of bulk earthworks; - Location of stockpiles; and - Location of unsurfaced access roads; • Routine dust control measures; • Emergency dust control measures; • Resources required for dust management (equipment, staff and financial); and A contact number for reporting complaints and concerns regarding dust from construction activities.	<ul style="list-style-type: none"> • Consultants 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> •

3 Measures Applicable to the Construction Phases

3.1 Roles and Responsibilities

The key role players during the Construction Phases of the project are anticipated as follows:

- LLPT (the proponent);
- Principal Agent (PA), who will oversee the activities of the Contractors on site;
- Contractors responsible for construction;
- Any sub-Contractors hired by the Contractors; and
- Environmental Control Officer (ECO).

The anticipated Construction Phase organogram is presented in Figure 3-1 below and shows the proposed lines of communication during this phase. All instructions relating to the EMPr will be given to the Contractor via the PA. In an emergency situation, the ECO may give an instruction directly to Contractors / sub-Contractors. Both Contractors and ECO will report issues of concern to the PA, who in turn will report on progress to the proponent. The proponent will retain responsibility for ensuring that Contractors fully implement the provisions of the EMPr.

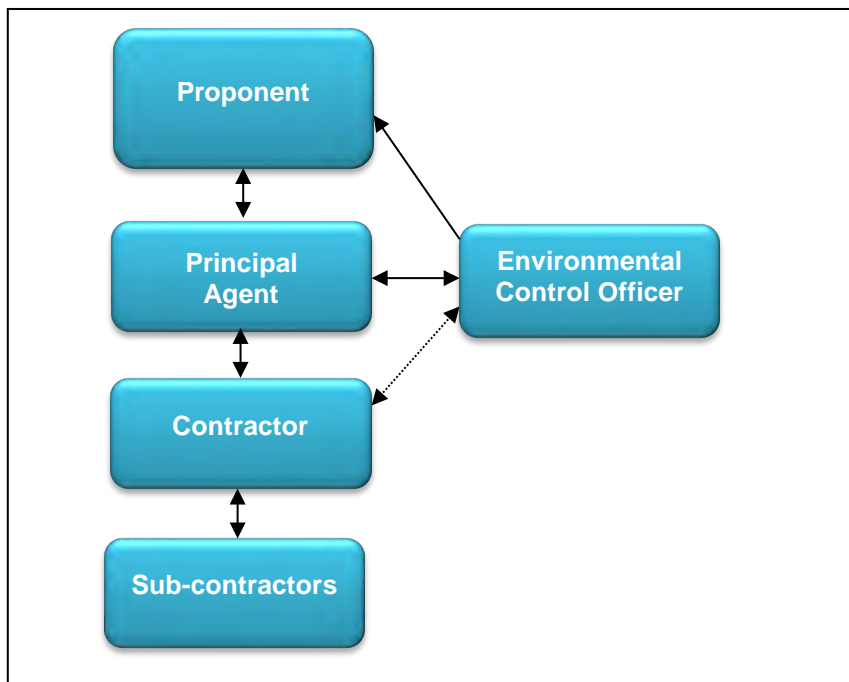


Figure 3-1: Construction Phase Reporting Structure

Key roles and responsibilities during the Construction Phase with respect to the implementation of the EMPr are outlined below.

LLPT:

LLPT has overall responsibility for management of the project. In terms of environmental management, the proponent will:

- Appoint suitably experienced engineers who will be responsible for the overall management of activities on site during the Construction Phase;
- Appoint an independent ECO with experience in freshwater ecology to monitor compliance with the EMPr for the duration of the Construction Phase;
- Ensure that the engineers are aware of the requirements of the EMPr, implement the EMPr and monitor Contractors' activities on site;
- Ensure that Contractors are aware of, and contractually bound to, the provisions of this EMPr by including the relevant environmental management requirements in the tender and contract documents, as appropriate;
- Ensure that Contractors remedy environmental problems timeously, and to the satisfaction of the ECO and authorities (when necessary); and
- Notify the authorities should problems not be remedied timeously.

Principal Agent:

LLPT will appoint a suitable PA who will be responsible for overseeing activities of Contractors during the Construction Phase. The PA shall:

- Ensure that the Contractor is duly informed of the EMPr and associated responsibilities and implications of this EMPr prior to commencement of construction;
- Monitor Contractors' activities (together with the ECO) with regard to the requirements outlined in the EMPr;
- Relay all instructions from the ECO to Contractors and ensure that these are fully understood and implemented;
- Report any environmental emergencies/concerns to the ECO immediately;
- Act as a point of contact for local residents and community members; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the relevant authorities.

Contractors:

Each Contractor will be required to appoint or designate a Contractor's Environmental Representative (CR) who will assume responsibility for the Contractor's environmental management on site, and be the point of contact between the Contractor and the ECO. Each CR shall:

- Ensure that all activities on site are undertaken in accordance with the EMPr;
- Monitor Contractor's activities (together with the ECO) with regard to the requirements outlined in the EMPr;
- Ensure that all employees and sub-Contractors comply with the EMPr;
- Immediately notify the ECO of any non-compliance with the EMPr, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the ECO.

The Contractor has a duty to demonstrate respect and care for the environment. The Contractor will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the EMPr, environmental regulations and relevant legislation.

Sub-contractors:

All sub-contractors will be required to:

- Ensure that all employees are duly informed of the EMPr and associated responsibilities and implications of this EMPr prior to commencement of construction / site establishment;
- Ensure that all activities on site are undertaken in accordance with the EMPr;
- Monitor employees' activities (together with the ECO) with regard to the requirements outlined in the EMPr;
- Immediately notify the ECO of any non-compliance with the EMPr, or any other issues of environmental concern; and
- Ensure that non-compliance is remedied timeously and to the satisfaction of the ECO.

Sub-contractor have a duty to demonstrate respect and care for the environment. Sub-contractors will be responsible for the cost of rehabilitation of any environmental damage that may result from non-compliance with the EMPr, environmental regulations and relevant legislation, resulting from their presence on site.

Environmental Control Officer:

The ECO shall be environmental professional with experience in freshwater ecology, appointed by the proponent, for the duration of the Construction Phases. The ECO shall:

- Request Method Statements from the Contractors prior to the start of relevant construction activities, where required, and approve these (as appropriate) without causing undue delay;
- Monitor, review and verify compliance with the EMPr by Contractors, as well as any sub-contractors and specialist Contractors;
- Undertake site inspections weekly when works are taking place in watercourses, and at least twice a month at all other times to determine compliance with the EMPr;
- Identify areas of non-compliance and recommend corrective actions (measures) to rectify them in consultation with the LLPT, the PA and Contractors, as required;
- Compile a checklist highlighting areas of non-compliance following each ECO inspection;
- Ensure follow-up and resolution of all non-compliances;
- Provide feedback for continual improvement in environmental performance;
- Respond to changes in project implementation or unanticipated site activities which are not addressed in the EMPr, and which could potentially have environmental impacts, and advise LLPT, the PA and Contractor as required; and
- Undertake a site closure inspection, which may result in recommendations for additional clean-up and rehabilitation measures.

3.2 Compliance and Monitoring

3.2.1 Method Statements

A Method Statement is a document setting out specific details regarding the plant, materials, labour and method a Contractor proposes using to carry out certain activities, usually activities that may have a detrimental effect on the environment. It is submitted by the Contractor to the ECO.

The purpose of a Method Statement is for the Contractor to provide additional details regarding the proposed methodology for certain activities, and for the ECO to confirm that these meet the requirements of the EMPr and acceptable environmental practice. This allows the EMPr to be less prescriptive and affords the Contractor a certain amount of flexibility, or to amend stipulations in the EMPr, if approved by the ECO. It also provides a reference point to detect deviations from the agreed approach to an activity.

Each Method Statement will address environmental management aspects relevant to the activity and will typically provide detailed descriptions of items including, but not necessarily limited to:

- Nature, timing and location of activities;
- Procedural requirements and steps;
- Management responsibilities;

- Material and equipment requirements;
- Transportation of equipment to and from site;
- Method for moving equipment/material while on site;
- How and where material will be stored;
- Emergency response approaches, particularly related to spill containment and clean-up;
- Response to compliance/non-conformance with the requirements of the EMPr; and
- Any other information deemed necessary by the ECO.

The following list provides examples of Method Statements that may be requested from the Contractor:

- Environmental awareness course preparation;
- Civil works in watercourses;
- Flow diversions;
- River bank slope profiling;
- Material and equipment storage and delivery;
- Fuel storage, dispensing and fuel spills;
- Waste management;
- Management of contaminated water;
- Erosion and stormwater control;
- Cement batching; and
- Any others requested by the ECO.

The Method Statements will be submitted by the Contractor to the ECO not less than 7 days prior to the intended date of commencement of an activity. The ECO shall approve / reject the Method Statement within 2 business days. An activity for which a Method Statement has been requested shall not commence until the ECO has approved of such method and once approved, the Contractor shall abide by the relevant Method Statement. A pro forma Method Statement is attached in Appendix A, although a suitable Method Statement format can be agreed between the ECO and Contractor.

3.2.2 Environmental Records and Reports

Environmental records and reports required during the Construction Phase are listed in Table 3-1.

Table 3-1: Reports required during Construction

Report	Frequency	From	To
Environmental Checklist	Weekly	CR	ECO
Environmental Compliance Reports	Weekly / twice monthly	ECO	LLPT
Site Closure Audit	End of Contract	ECO	LLPT

Environmental Checklist

CRs will undertake weekly site inspections to check on the implementation of the EMPr by Contractors and complete a brief report / checklist after the inspection. The completed checklists shall be submitted to the ECO at the end of each inspection. This checklist should be discussed between CRs and the ECO during the initial site inspection, and agreement reached on the preferred format and content.

Environmental Compliance Report

The ECO will prepare monthly Environmental Compliance Reports, detailing any environmental issues, non-compliance and actions to be implemented. These reports will be based on the ECO's observations and the weekly Environmental Checklists. Environmental Compliance Reports will be submitted to the LLPT and a full record will be kept by the ECO, for submission to the Local Authority and / or DEA&DP on request.

When more frequent site visits are undertaken by the ECO, the frequency of progress reports will increase accordingly to allow for timely reporting of environmental issues and actions required.

Photographic Records

If the ECO identifies any areas of concern, the ECO will request photographic records, which must be submitted by the Contractor for record purposes.

Construction Site Closure Audit

The ECO will undertake a final site closure audit on completion of the Construction Phase. The purpose of this is to confirm compliance with all site closure requirements identified by the ECO, and that the site has been left in an environmentally suitable condition. If outstanding environmental requirements are observed during this inspection, a further inspection must be carried out to confirm compliance. The Site Closure Audit report will be submitted to LLPT for record purposes, and to DEA&DP if requested.

3.2.3 Corrective Action

Corrective action is a critical component of the implementation–review–corrective action–implementation (or plan-do-check-act) cycle and it is through corrective action that continuous improvement can be achieved. Where repeated non-compliance is recorded, procedures may need to be altered accordingly to avoid the need for repeated corrective action.

If environmental compliance monitoring by the CR and ECO indicates non-conformance with the EMPr or approved Method Statements, the PA will formally notify the Contractor through a Corrective Action Request. The Corrective Action Request documents:

- The nature of the non-conformance/environmental damage;
- The actions or outcomes required to correct the situation; and
- The date by which each corrective or preventive action must be completed.

Upon receipt of the Corrective Action Request, the Contractor will be required to produce a Corrective Action Plan (or similar plan), which will detail how the required actions will be implemented. The Corrective Action Plan must be submitted to the ECO for approval prior to implementation. Once it has been approved, the corrective action must be carried out within the time limits stipulated in the Corrective Action Request. Additional monitoring by the CR and ECO will then be required to confirm the success or failure of the corrective action.

3.3 Environmental Management Measures

The environmental management and mitigation measures that must be implemented during the Construction Phase, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are laid out in Table 3-2 below.

Table 3-2: Environmental management and mitigation measures that must be implemented during the Construction Phase

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
Construction Schedule	1.	Landscape the main east-west recreational buffer area in the first summer after the start of construction in direct consultation with a faunal specialist	• LLPT and Contractors	• First summer of construction	• Visual inspection	• Construction phasing implemented as stipulated
	2.	Commence rehabilitation of the canal in the first summer after commencement and ensure landscaping is completed in March of the following year				
	3.	Fence off active construction areas to prevent faunal movements into these areas until it can be demonstrated that the rehabilitated canal is functioning as an ecological corridor		• During construction		
	4.	Conduct bulk earthworks in freshwater systems in the dry season (between December and May or in direct consultation with a faunal specialist)		• During summer		
	5.	Commence the construction of the northern-eastern development portion only after the completion of canal rehabilitation and infilling and landscaping of the original course of the Liesbeek		• After the completion of canal rehabilitation and infilling and landscaping of the original course of the Liesbeek		
	6.	Landscape the ecological corridors on the northern and southern property boundaries once the respective development platforms are in place only		• Once development platforms are in place		
Environmental Awareness Training	7.	Provide environmental awareness training to all personnel on site at the start of their employment. Training should include discussion of: <ul style="list-style-type: none"> • Potential impact of construction waste and activities on the environment; • Suitable disposal of construction waste and litter; • Key measures in the EMPr relevant to workers' activities; • How incidents and suggestions for improvement can be reported. • Ensure that all attendees remain for the duration of the training and on completion sign an attendance register that clearly indicates participants' names. 	• Contractors	<ul style="list-style-type: none"> • Before workers start working on-site • Before new activities are undertaken 	<ul style="list-style-type: none"> • Check training attendance register. • Observe whether activities are executed in line with EMPr requirements. 	<ul style="list-style-type: none"> • Proportion of workers that completed environmental training. • Compliance of workers with EMPr.

² Unless otherwise indicated, monitoring will be undertaken by the ECO, supported by the authorities where the requirement is specifically stipulated in a licence or permit.

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
Complaints Register / Grievance Mechanism	8.	Maintain and disclose a complaints register. The register must record: <ul style="list-style-type: none"> • Complainant name and contact details; • Date complaint was lodged; • Person who recorded the complaint; • Nature of the complaint; • Actions taken to investigate the complaint and outcome of the investigation; • Action taken to remedy the situation; and • Date on which feedback was provided to complainant. 	• Contractors	• Duration of construction activities	• Check complaints register	<ul style="list-style-type: none"> • Register on site • Complaints recorded • Complaints followed up and closed out
Site Camp	9.	Submit a Method Statement for Site Camp establishment for approval by the ECO at least one weeks prior to the start of construction activities.	• Contractors	• Start of construction	<ul style="list-style-type: none"> • Visual inspections • Method statement 	<ul style="list-style-type: none"> • Approved method statement • Site boundaries demarcated • Signage in place
	10.	Establish a suitably fenced Site Camp at the start of the contract, which will allow for site offices, vehicle, equipment, material and waste storage areas to be consolidated as much as possible. Locate the Site Camp at a position approved by the ECO. Provide water and washing facilities at the Site Camp for personnel.				
	11.	Demarcate construction site boundaries upon establishment. Control security and access to the site. Fence off site boundaries to the satisfaction of the ECO and ensure that plant, labour and materials remain within site boundaries.				
	12.	Designate the area beyond the boundary of the site as "No-Go" areas for all personnel on site. No vehicles, machinery, materials or people shall be permitted in the "No-Go" area at any time without the express permission of the PA in consultation with the ECO.				
Safety and Security	13.	Ensure that emergency procedures (in relation to fire, spills, contamination of the ground, accidents to employees, use of hazardous substances, etc.) are established prior to commencing construction.	• Contractors	• Prior to the commencement of construction	<ul style="list-style-type: none"> • Approval by CR and ECO. • Visual inspection 	• Emergency procedures in place and available.
	14.	Make all emergency procedures available, including responsible personnel, contact details of emergency services, etc. to all the relevant personnel. Clearly demarcate emergency procedures at the relevant locations around the site.				
	15.	Secure the Site Camp, particularly to restrict access unauthorized to fuels and any other hazardous substances.	• Contractors	• Throughout construction	• Visual inspection / incident reporting.	• Number of safety/emergency incidents.

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	16.	Store all construction material and equipment in locked containers within the Site Camp. Employ 24 hour security for the Site Camp.				
	17.	Provide suitable emergency and safety signage on site, and demarcate any areas which may pose a safety risk (including hazardous substances, deep excavations etc.).				
	18.	Advise the ECO of any emergencies on site, together with a record of action taken				
Fire Management	19.	Ensure that sufficient fire-fighting equipment is available on site.	• Contractors	• Throughout construction	• Visual inspection	• Equipment available
	20.	Equip all fuel stores and waste storage areas with fire extinguishers.			• Visual inspection	• Equipment available
	21.	Ensure that all personnel on site are aware of the location of firefighting equipment on the site and how the equipment is operated.			• Review training register	• Percentage of employees that have undergone appropriate training
	22.	Suitably maintain firefighting equipment.			• Review of service records	• Firefighting equipment maintained
Ablutions	23.	Provide ablation facilities (i.e. chemical toilets) at construction camps and active work areas for staff at a ratio of at least 1 toilet per 25 workers.	• Contractors	• Throughout construction	• Visual inspection	<ul style="list-style-type: none"> • Facilities provided at the correct ratio. • Facilities located further than 100 m from all watercourses. • Facilities secured. • Toilets maintained. • Evidence of contamination at abluitions.
	24.	Locate ablation facilities at least 30 m from the edge of any watercourse.				
	25.	Secure all temporary / portable toilets to the ground to prevent them toppling due to wind or any other cause.				
	26.	Maintain toilets in a hygienic state (i.e. provide toilet dispensers, clean toilets and service regularly).				
	27.	Empty toilets before long weekends and builders' holidays.				
	28.	Prevent spillages when the toilets are cleaned or emptied.				
Hazardous Materials Management	29.	Design and construct impermeable hazardous material storage facilities with a minimum bund containment capacity equal to 110% of the largest container.	• Contractors	• Prior to the start of construction	• Visual inspection of hazardous materials handling and storage areas	• Storage areas in place
	30.	Locate hazardous material storage facilities as far as practically possible from watercourses (no closer than 30 m).				
	31.	Place potential contaminants (including cement) on impervious surfaces.	• Contractors	• Throughout construction	• Visual inspection of hazardous materials	• Number of incidents of non-compliance with

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	32.	Develop (or adapt and implement) procedures for the safe transport, handling and storage of potential pollutants.			handling and storage areas <ul style="list-style-type: none"> • Visual inspection of leaks and spills • Incident reports 	safety procedures concerning hazardous materials, including waste materials. <ul style="list-style-type: none"> • Number of spills of hazardous materials, including waste materials. • Evidence of contamination and leaks.
	33.	Implement procedures for the safe transport, handling and storage of potential pollutants.				
	34.	Avoid unnecessary use and transport of hazardous substances.				
	35.	Keep Material Safety Data Sheets (MSDS) for all hazardous materials on site and ensure that they are available for reference by staff responsible for handling and storage of materials.				
	36.	Maintain vehicles and machinery to prevent leaks of hydrocarbon materials.				
Refuelling and Maintenance	37.	Establish dedicated impermeable areas for vehicle refuelling and maintenance at construction camps at least 30m from any watercourse.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Prior to the commencement of construction • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Dedicated refuelling and maintenance areas established. • Number of spills of hazardous materials, including waste materials. • Drip trays in use • Evidence of contamination and leaks.
	38.	Repair minor leaks to vehicles and equipment immediately as these are identified.				
	39.	Favour refuelling and maintenance of vehicles and equipment in dedicated areas.				
	40.	Use appropriately sized drip trays for all refuelling and/or repairs done on machinery – ensure these are strategically placed to capture any spillage of fuel, oil, etc.				
	41.	Conduct on-site refuelling and emergency repairs if absolutely essential with appropriate impermeable ground cover (e.g. use drip trays) further than 50m from any watercourse.				
Response to Environmental Pollution	42.	Immediately stop any activity causing environmental pollution, e.g. leaks and spillages.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • No leaking equipment in use • Bioremediation and spill containment / clean up products available on site • Spills cleaned up / remediated.
	43.	Clean up any spills immediately, through containment and removal of free product and appropriate disposal as hazardous waste / remediation of contaminated soils.				
	44.	Provide appropriate quantities of bioremediation products to address spills that do occur.				
	45.	Provide spill containment and clean-up equipment in all areas where refuelling and / or maintenance activities will take place.				
	46.	Repair faulty equipment as soon as possible.				
	47.	Implement mitigation to prevent reoccurrences of environmental pollution (e.g. additional bunding).				

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	48.	Notify DEA&DP within one day of a major environmental pollution event.			<ul style="list-style-type: none"> Review records and reports 	<ul style="list-style-type: none"> Major spills recorded and reported to DEA&DP
Waste Management	49.	Submit a Method Statement for waste management (including hazardous waste)	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Prior to the commencement of construction Throughout construction 	<ul style="list-style-type: none"> Review method statement 	<ul style="list-style-type: none"> Approved Method Statement in place
	50.	Aim to minimise waste through reducing and re-using (packaging) material.			<ul style="list-style-type: none"> Review waste / recycling receipts 	<ul style="list-style-type: none"> Recyclable waste is sent to recycling Contractors.
	51.	Store recyclable waste separately and deliver to suitable facilities or arrange for collection.				
	52.	Dispose waste regularly to appropriate licensed waste disposal facilities.			<ul style="list-style-type: none"> Waste is sent to recycling Contractors. 	
	53.	Establish separate weather and vermin proof stores for a) general and b) hazardous waste at construction camps and mark these clearly.			<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> Separate bins available and clearly marked. Waste stores banded. Spills cleaned up / remediated. No litter on site. No waste buried or burnt on site.
	54.	Bund hazardous waste stores.				
	55.	Clean-up and dispose of any material spilled from trucks during transport to or from the site.				
	56.	Prevent littering by construction staff at work sites and construction camps.				
57.	Do not allow any burning or burying of waste on site.					
Effluent Management	58.	Prevent discharge of any pollutants, such as cements, concrete, lime, chemicals, and other contaminated waste water and fuels into any watercourses and the stormwater system.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Review of complaints register Visual inspection 	<ul style="list-style-type: none"> No complaints relating to the discharge of pollutants into fresh or storm water systems. No pollutants discharged into fresh or storm water systems.
	59.	Install appropriate pollution control facilities to prevent discharge of water containing polluting matter or suspended materials into watercourses or water bodies (e.g. the installation of silt fences).			<ul style="list-style-type: none"> Visual inspection 	
	60.	Install temporary sediment settling ponds on flow pathways on the development platform				
	61.	Clean vehicles and equipment in dedicated impermeable areas only.			<ul style="list-style-type: none"> Vehicles cleaned in designated areas 	
	62.	Collect effluent from refuelling, and vehicle and equipment cleaning areas.			<ul style="list-style-type: none"> Visual inspection Waste receipts 	<ul style="list-style-type: none"> Effluent contained.

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	63.	Collect and strictly control runoff from the concrete batching areas.				<ul style="list-style-type: none"> • Effluent removed / received by suitable waste Contractor
	64.	Dispose of effluent from bunded, refuelling, cleaning and cement batching areas off-site at licensed disposal facilities.				
	65.	Dispose of contaminated stormwater (e.g. from bunded areas) at licensed disposal facilities.				
Stormwater Management	66.	Install cut-off trenches with silt traps around work areas within 50 m of any watercourse.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Cut-off trenches installed • Stormwater prevented from entering site excavations as far as possible. • Measures to encourage stormwater infiltration implemented at construction site • Uncontaminated runoff directed to natural drainage areas.
	67.	Use berms and stormwater drainage systems to prevent surface run-off from entering site excavations.				
	68.	Implement measures to maximise the infiltration of stormwater on site.				
	69.	Divert (uncontaminated) runoff into natural drainage lines and provide erosion control in these areas.				
Erosion Control	70.	Ensure that all roads and tracks used for construction have the appropriate water diversion / erosion control structures.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Erosion control installed on roads and tracks used for construction. • Exposed slopes stabilised. • Erosion gullies closed and rehabilitated. • Silt fences and erosion prevention measures installed in areas sensitive to erosion.
	71.	Stabilize exposed slopes within 30 m of any watercourse as soon as these are created (e.g. at stockpiles and cut and fill areas) to prevent sedimentation.				
	72.	Close and rehabilitate erosion gullies as they form.				
	73.	Install silt fences and erosion prevention measures in areas sensitive to erosion.				
	74.	Avoid clearing of vegetation until absolutely necessary.				
Concrete/Cement Work	75.	Use Ready-Mix concrete rather than batching where possible.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Ready-Mix used where possible / practical. • No evidence of cement chutes cleaned on site. • Cement batching areas bunded and located in development footprint. • Cement not mixed directly on the ground. • No evidence of cement batching activities.
	76.	Ensure that no cement truck delivery chutes are cleaned on site. Cleaning operations are to take place off site at a location where wastewater can be disposed of in the correct manner. If this is not possible a suitable washing facility is to be developed on site in consultation with the ECO				
	77.	Batch cement in a bunded area within the boundaries of the development footprint only (where unavoidable)				

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	78.	Ensure that cement is mixed on mortar boards and not directly on the ground (where unavoidable).				<ul style="list-style-type: none"> • Cement bags placed in bins.
	79.	Physically remove any remains of concrete, either solid, or liquid, immediately and dispose of as waste.				
	80.	Place cement bags in bins and dispose of bags as waste to a licensed waste disposal facility.				
Water Conservation	81.	Minimise the use of potable water as far as practically possible.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Alternative water sources utilised. • Water recycled / reused.
	82.	Reuse and recycle water wherever possible.				
Dust Management	83.	Avoid clearing of vegetation until absolutely necessary (i.e. just before excavations).	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection • Review complaints register 	<ul style="list-style-type: none"> • Vegetation not cleared until necessary. • Exposed surfaces stabilised. • Wind barriers in place. • Visibility of dust coming off construction site • Dust mitigation measures in place • Number of days that dust plumes are visible • Number of registered complaints • Size of disturbed areas
	84.	Apply wet suppression methods (watering) to prevent dust generation from all disturbed and exposed areas and main site roads.				
	85.	Minimise material handling and the frequency of disturbance of stockpiles to minimise wind erosion				
	86.	Minimise dust generated off stockpiles: <ul style="list-style-type: none"> • Locate piles in sheltered areas where possible; • Place the stockpile lengthwise into the wind; • Minimise the slope of the stockpile (maximum slope of 2:1); • Limit stockpile sizes; • Install barriers on three sides of the stockpile (maximum 50% material porosity) if required; • Limit activity to the downwind side of the pile; • Use the last in – first out system of stockpile management; and Cover stockpiles when not in active use for some time and / or use an environmentally friendly chemical spray to bind soil.				
	87.	Regularly evaluate the effectiveness of all dust management measures. Amend how or which measures are used if necessary.				
	88.	Stabilise exposed surfaces as soon as is practically possible.				
	89.	Avoid excavation and handling and transport of materials which may generate dust under high wind conditions or when a visible dust plume is present.				

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	90.	Place wind barriers at right angles to prevailing wind currents as close to the work areas as possible. Vertical barriers should be at least 2 m high and screening material must have a porosity of 50% or less.				
	91.	Implement a speed limit of 30km/hr on all unpaved roads on site				
	92.	Minimise travel distances on site through appropriate construction site layout and design				
	93.	Cover trucks transporting loose material to or from site with tarpaulins, plastic or canvas.				
	94.	Ensure that any material spilled from trucks during transport to or from the site is cleaned up immediately.				
	95.	Pre-water material to be moved, if possible.				
	96.	Sweep roads leading from the site if wheel washing facilities do not effectively prevent mud being deposited on access roads.				
Noise Management	97.	Notify adjacent residents or business premises before particularly noisy construction activities will take place.	• LLPT	• Throughout construction	• Review stakeholder notifications	• Stakeholders notified of any particularly noisy work that is anticipated
	98.	Limit noisy construction activities to day-time from Monday to Friday or in accordance with relevant municipal bylaws.	• All Contractors operating machinery		• Random noise measurements • Review of complaints register • Visual inspection	• Results of random noise measurements • Number of registered complaints • Generators enclosed
	99.	Prohibit noisy construction activities at night				
	100.	Ensure that construction equipment is in good working order and properly maintained				
	101.	Control the use of radios, television sets and other such equipment used by workers to a level that does not disturb neighbouring residents/tenants.				
	102.	Enclose diesel generators used for power supply on site to reduce unnecessary noise.				
	103.	Investigate potential noise reduction measures, such as mufflers on equipment, if complaints regarding construction noise are received				
Protection of Sensitive Environments	104.	Reinstate the berm at the Raapenberg Wetland that was breached before construction commences at the Liesbeek Canal to allow low-flows to enter this feature	• LLPT	• Prior to the rehabilitation of the Liesbeek Canal	• Visual inspection	• Berm at Raapenberg wetland reinstated
	105.	Define the Raapenberg wetland as a No-Go area throughout construction	• Contractors	• Throughout construction	• Visual inspection	• No-Go areas fenced. • Fences maintained. • No evidence of access to No-Go areas
	106.	Fence buffers and corridors and restrict access to these areas by construction staff				

Construction Phase Measures							
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators	
	107.	Define the natural course of the Liesbeek River and the major east-west recreational buffer zone as No-Go areas, and fence these areas with mesh fencing or windbreak mesh, such that the corridors are safe (for small fauna), and so that the corridor is in place prior to the start of construction					
	108.	Fence No-Go areas and prevent access to these areas by construction staff					
	109.	Regularly maintain temporary fences at No-Go areas and site boundaries					
	110.	Fence the northern boundary of the site to prevent faunal movements from this area into the site					<ul style="list-style-type: none"> • Fences installed to restrict faunal movements • Liesbeek channel and Liesbeek Canal linked with east-west recreational buffer area • Access roads raised and pipe culverts installed.
	111.	Fence off access roads in buffer areas to create an access zone the excludes fauna					
	112.	Link the old Liesbeek channel and the canal corridor with the east-west recreational buffer zone					
	113.	Raise temporary access roads that cross No-Go areas with pipe culverts to facilitate faunal movements					
	114.	Extend pipe culverts by 15 m on each side of access roads through No-Go areas to protrude outside of fenced access zones					
	115.	Locate stockpiles at least 20m from any watercourse, ecological corridor, or recreational buffer area					<ul style="list-style-type: none"> • Stockpiles located further than 20m from any watercourse, ecological corridor, or recreational buffer area.
Protection of Fauna	116.	Appoint a faunal specialist to conduct a faunal search-and-rescue (focusing on WLTs) of construction areas prior to the start of each phase of construction	<ul style="list-style-type: none"> • LLPT 	<ul style="list-style-type: none"> • At the start of each phase of construction 	<ul style="list-style-type: none"> • Review appointment of faunal specialist. • Review records of faunal search and rescue. 	<ul style="list-style-type: none"> • Specialist appointed and records of faunal search and rescue on file. 	
	117.	Release "rescued" fauna into the undeveloped area to the north of the site during initial phases, and into the main east-west recreational buffer area following the establishment of this area					
	118.	Record the efficacy of all faunal search-and-rescue exercises					
	119.	Check pits and excavations regularly for animals that may have fallen in.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A 	
	120.	Safely remove and relocate any fauna that may be physically harmed by construction activities.		<ul style="list-style-type: none"> • 	<ul style="list-style-type: none"> • N/A 	<ul style="list-style-type: none"> • N/A 	

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	121.	Fence the eastern bank of the Liesbeek Canal prior to the start of construction to prevent movement of fauna into the canal zone / into construction sites	• LLPT and Contractors	• During rehabilitation of the canal	• Visual inspection	• Safe passage for faunal species ensured
	122.	Ensure safe passage for faunal species between the undeveloped area north of the site and the original course of the Liesbeek River during rehabilitation of the canal (so that WLT can access this area)				
	123.	Fence the upper end of the planted canal zone (i.e. the top of the 1:100 year floodline) after canal rehabilitation (defined by completion of initial planting at the end of the first summer after project implementation) to prevent movement of leopard toads and other fauna out of the canal zone / into construction sites;				
	124.	Reconnect the faunal refuge area with the rehabilitated canal and infilled landscaped original course of the Liesbeek River once these are complete.				
	125.	Apply no-fire policy on site.	• Contractors	• Throughout construction	• Visual inspection	• No evidence of fires. • No evidence of faunal mortalities on roads.
	126.	Do not harm, catch or kill birds or animals by any means, including poisoning, trapping, shooting or setting of snares.				
	127.	Avoid fauna when driving on site (especially toads / frogs).				
Vegetation Clearing and Topsoil Storage	128.	Limit the footprint area of the construction activity to what is absolutely essential.	• Contractors	• Throughout construction	• Visual inspection	• Offsite areas in-tact
	129.	Ensure that no vegetation is removed or disturbed outside the construction site boundary.				
	130.	Designate and demarcate areas to be used for topsoil stockpiling.				
	131.	Remove topsoil (up to a maximum of 30 cm depth)				
	132.	Stockpile topsoil prior to the commencement of construction activities (stockpile no higher than 2m) and conserve topsoil for landscaping and rehabilitation.				
	133.	Locate topsoil stockpiles in an area protected from the wind, and agreed to with the ECO.				
	134.	Replace harvested topsoil in areas that are to be rehabilitated as soon as sections of the works are completed (i.e. not only following the completion of all works)				
						• Area demarcated and topsoil stockpiled • Topsoil used for rehabilitation concurrently with construction

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
Protection of Cultural, Archaeological and Paleontological Resources	135.	Inform employees and Contractors that archaeological or paleontological artefacts might be exposed during excavation of the Liesbeek Canal.	• Contractors	• During excavation of the Liesbeek Canal	• Review correspondence with HWC • Review permits	• Finds reported to HWC (if applicable). • Permits obtained for the removal of artefacts (if applicable).
	136.	Empower staff to stop works on (chance) discovery of artefacts at the site.				
	137.	Report the presence of graves or human remains, structures, ornaments, fragments of fossil bone, ostrich egg and stone fragments to HWC.				
	138.	Obtain a permit for the removal of artefacts from the site if any are discovered during construction.				
	139.	Photograph all structures on site for archive creation	• LLPT	• Prior to the start of construction	• Review photographs	• Photographs on file.
Traffic Management	140.	Manage construction sites and activities so as to minimise impacts on road traffic as far as possible, e.g.: <ul style="list-style-type: none"> • Haul materials and equipment outside of peak traffic periods; • Attempt to arrange delivery of materials when it will least disrupt traffic; • Stagger deliveries if possible rather than concentrating them during "rush" hours; and • Keep construction materials and machinery at the construction site, where possible. 	• Contractors	• Throughout construction	• Review complaints register	• Number of incidences and complaints.
	141.	Implement appropriate traffic accommodation stages at M5 / Berkley Road and Link Road / Liesbeek Parkway intersections				
	142.	Use appropriate road signage, in accordance with the South African Traffic Safety Manual, providing flagmen, barriers etc. at the various access points when necessary.				
	143.	Ensure that large construction vehicles are suitably marked to be visible to other road users and pedestrians.				
	144.	Ensure that all safety measures are observed and that drivers comply with the rules of the road.				
	145.	Ensure that vehicle axle loads do not exceed the technical design capacity of roads utilised by the project.				
Visual Aspects	146.	Limit and phase vegetation clearance and the footprint of construction activities to what is absolutely essential	• Contractors	• Throughout construction	• Visual inspection	• Extent and timing of vegetation clearance. • Yard screened. • Construction areas demarcated. • Site neat and tidy.
	147.	Consolidate the footprint of the construction camp(s) to a functional minimum				
	148.	Screen the construction site camp with materials that blend into the surrounding area				

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	149.	Clearly demarcate construction areas and dedicated access points				
	150.	Limit outdoor security lighting and ensure that it is as unobtrusive as possible.				
	151.	Avoid excavation, handling and transport of materials which may generate dust under high wind conditions				
	152.	Attach signs to structures to avoid free standing signs in the landscape during the construction period as much as possible.				
	153.	Keep construction sites tidy and confine all activities, material and machinery to as small an area as possible				
Landscaping and Rehabilitation	154.	Implement the landscaping and rehabilitation plan	<ul style="list-style-type: none"> • LLPT • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Visual inspection 	<ul style="list-style-type: none"> • Landscaping and rehabilitation plan implemented
	155.	Workshop implementation of the landscaping and rehabilitation plan with the landscape architects, botanist, freshwater ecologist and faunal ecologist regularly during construction	<ul style="list-style-type: none"> • LLPT • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Review workshop minutes 	<ul style="list-style-type: none"> • Workshops held and minuted
	156.	Minute rehabilitation and landscaping workshops				
	157.	Facilitate frequent on-site inspection of rehabilitation performance by a freshwater ecologist (at least monthly during construction)	<ul style="list-style-type: none"> • LLPT • Contractors 	<ul style="list-style-type: none"> • Throughout construction 	<ul style="list-style-type: none"> • Review inspection reports • Visual inspection 	<ul style="list-style-type: none"> • Inspection reports on record.
	158.	Rehabilitate affected areas concurrently with construction, rather than undertaking all rehabilitation at the end of the contract period.	<ul style="list-style-type: none"> • Contractors 			<ul style="list-style-type: none"> • Concurrent rehabilitation underway. • Renosterveld vegetation integrated into landscaping
	159.	Establish good quality vegetation cover in rehabilitated freshwater systems (80% cover within one year of the commencement of each intervention)				
	160.	Use harvested topsoil for rehabilitation and landscaping.				
	161.	Use indigenous (preferably endemic) vegetation for landscaping and rehabilitation.				
	162.	Integrate Renosterveld habitat into ecological setbacks and corridors				
	163.	Re-establish Renosterveld vegetation in the swale, and link Renosterveld vegetation patches to create continuous ecological corridors as far as possible				
164.	Rehabilitate areas disturbed by excavation and services installation, to pre-disturbance levels or better					

Construction Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods ²	Performance Indicators
	165.	Rehabilitate the banks of the Black River immediately following the completion of the Black River Bridge		<ul style="list-style-type: none"> Following completion of the Black River Bridge 		<ul style="list-style-type: none"> Banks of Black River rehabilitated.
Demobilisation	166.	Remove all construction equipment, vehicles, equipment, waste and surplus materials, site office facilities, temporary fencing and other items from the site.	<ul style="list-style-type: none"> Contractors 	<ul style="list-style-type: none"> At the completion of each phase of construction 	<ul style="list-style-type: none"> Visual inspection 	<ul style="list-style-type: none"> All equipment and waste removed. Site and surrounding areas rehabilitated / landscaped.
	167.	Clean up and remove any spills and contaminated soil in the appropriate manner.				
	168.	Do not bury discarded materials on site or on any other land not designated for this purpose.				
	169.	Rehabilitate affected areas on the site.				
	170.	Rehabilitate areas adjacent to the site (if disturbance is unavoidable) to at least the same condition as was present prior to construction.				
Employment	171.	Set targets for the use of local labour based on the availability of existing skills and people that are willing to undergo training.	<ul style="list-style-type: none"> LLPT and Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Check records 	<ul style="list-style-type: none"> Training undertaken Percentage of local staff Percentage of BEE staff
	172.	Utilise local labour and Contractors as much as possible				
	173.	Maximise opportunities for the training of unskilled and skilled workers from local communities and use local Sub-Contractors.				
	174.	Meet empowerment targets relevant to the construction sector where possible.				
	175.	Consider implementing labour-intensive rather than capital-intensive work methods wherever possible.				
	176.	Record the percentage of local labour and training				
Procurement	177.	Procure goods and services from local, provincial or South African suppliers as far as possible, with an emphasis on BEE suppliers	<ul style="list-style-type: none"> LLPT and Contractors 	<ul style="list-style-type: none"> Throughout construction 	<ul style="list-style-type: none"> Check records 	<ul style="list-style-type: none"> Percentage of local procurement Percentage of BEE procurement
	178.	Record the origin of material purchases				

4 Operational and Maintenance Programme

The objective of this section of the EMPr is to provide environmental management measures for the ongoing maintenance of the development.

Maintenance activities will include works within watercourses (including bridge maintenance), and will therefore trigger the following activity listed in NEMA:

1. Listing Notice 1, Activity 19: the infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from (i) a watercourse.

The LLPT can undertake this activity during maintenance without the need for EA in terms of this EMPr (once approved).

4.1 Roles and Responsibilities

The key role players during the Operational Phase of the project are:

- LLPT (the proponent); and
- Contractors responsible for maintenance.

Key roles and responsibilities during the operational phase with respect to the implementation of the EMPr are outlined below.

Development Manager (LLPT):

- Include the EMPr in all leases / property owner agreements;
- Ensure that all managers, tenants and / property owners are aware of the requirements of the EMPr;
- Ensure that copies of the EMPr are available on its website and on site;
- Review monthly reports on environmental performance of their operations;
- Implement and manage a programme of environmental inspection, monitoring and reporting;
- Implement a programme for follow-up and analysis of all environmental incidents or accidents; and
- Liaise with the authorities and other stakeholders regarding the River Club's environmental performance.

Contractors:

- Comply with the applicable environmental commitments, procedures, restrictions and guidance specified in the EMPr;
- Co-operate fully in implementing applicable environmental procedures;
- Ensure that copies of the EMPr are available on site;
- Ensure that all personnel on site, (including any sub-contractors and their staff) are familiar with and understand the requirements of the EMPr relevant to their activities; and
- Ensure that any problems and non-conformances are remedied in a timely manner, to the satisfaction of the relevant management personnel at LLPT.

4.2 Method Statements

If a Contractor is appointed to undertake maintenance, a Method Statement may be requested from the Contractor. The Method Statement will be submitted by the Contractor to LLPT not less than **7 days** prior to the intended date of commencement of maintenance. The LLPT shall approve / reject the Method Statement within **2 days**. An activity covered by a Method Statement shall not commence until LLPT has approved of such method and once approved, the Contractor shall abide by the relevant Method Statement. A pro forma Method Statement is attached in Appendix A, although a suitable Method Statement format can be agreed between LLPT and Contractors.

4.3 Environmental Management Measures

The environmental management and mitigation measures that must be implemented during the Operational Phase, as well as responsibilities and timelines for the implementation of these measures and monitoring thereof, are laid out in Table 4-1 below.

Table 4-1: Environmental management and mitigation measures that must be implemented during the *Operational and Maintenance Phase*

Operational and Maintenance Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance Indicators
General	1.	Update the Operational Phase EMPr with lessons learnt during operations in consultation with the DEA (if better practices are identified during this phase).	• LLPT	• Throughout operations	• Review EMPr	• EMPr updated to reflect lessons learnt.
No-Go Area	2.	Prevent uncontrolled access to the Raapenburg Wetland by the public.	• LLPT	• Throughout operations	• Visual inspections	• No evidence of disturbances to the Raapenburg Wetland.
Public Amenity and Access	3.	Allow public access to common areas of the development	• LLPT	• Throughout operations	• Visual inspections	• Public access facilitated.
	4.	Pursue opportunities to link urban development with ecological areas (e.g. through to provision of boardwalks and bird hides)				
Financial Provision	5.	Allocate adequate financial and human resources for the long-term management of open spaces including ecological corridors and recreational and ecological buffer areas	• LLPT	• Throughout operations	• Review funding arrangements for long term management	• Sufficient financial and human resources in place for management
Compliance Monitoring	6.	Audit compliance with the EMPr.	• LLPT	• Once every two years	• Check record of audit	• Audit undertaken
	7.	Record and retain the audit results.				
	8.	Appoint a suitably qualified LLPT staff member to periodically inspect and report on compliance with the EMPr during maintenance activities.		• At least once every six months	• Check compliance reports	• Inspections undertaken
	9.	Increase the frequency of compliance inspections if significant non-conformances are reported.		• Following non-conformances		
10.	Appoint a suitably qualified freshwater ecologist to report on the success of rehabilitation measures bi-annually, and to make recommendations, until it can be demonstrated that rehabilitated areas are stabilised and self-sustaining.	• Bi-annually	• Check ecologist reports	• Ecologist inspections undertaken and reports kept on file		
Community Complaints	11.	Address and respond to complaints that are made.	• LLPT	• Throughout operations	• Check record of correspondence	• Community complaints addressed and responded to.
Safety and Security	12.	Provide sufficient fire-fighting equipment to maintenance teams.	• LLPT	• During maintenance, throughout operations	• Check equipment is available	• Firefighting equipment available.
Environmental Awareness Training	13.	Provide environmental awareness training for maintenance staff.	• Contractors	• Prior to maintenance, throughout operations	• Check records of environmental awareness training provided	• Training provided.
	14.	Tailor environmental awareness training maintenance activities and impacts (e.g. no-go areas, potential impact on the environment, key and site specific EMPr measures, etc.).				
Hazardous Materials Management	15.	Place potential contaminants (including cement) on impervious surfaces.	• LLPT • Contractors	• Throughout operations	• Visual inspections	• Hazardous substances takes place on impermeable surfaces.
	16.	Implement procedures for the safe transport, handling and storage of potential pollutants.				

Operational and Maintenance Phase Measures								
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance Indicators		
	17.	Avoid unnecessary use and transport of hazardous substances.				<ul style="list-style-type: none"> • Procedures for the safe transport, handling and storage of potential pollutants implemented. • MSDS available for all hazardous substances on site. • No evidence of leaks. • No faulty equipment on site. 		
	18.	Keep Material Safety Data Sheets (MSDS) for all hazardous materials on site.						
	19.	Maintain vehicles and machinery to prevent leaks of hydrocarbon materials.						
	20.	Remove faulty equipment (leaking) from site immediately.						
Refuelling and Maintenance	21.	Conduct on-site refuelling and emergency repairs (if absolutely essential) with appropriate impermeable ground cover (e.g. use drip trays) further than 50m from any watercourse.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • During maintenance, throughout operations 	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • Refuelling and emergency repairs take place more than 50 m from any watercourse. • No evidence of leaks. 		
Cement Work Management	22.	Batch cement (if unavoidable) in impermeable bunded areas outside of any watercourses	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • During maintenance, throughout operations 	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • Cement batched on impervious surfaces. • Runoff from cement batching collected and disposed of appropriately. 		
	23.	Collect and strictly control runoff from the concrete batching areas.						
	24.	Physically remove any remains of concrete, either solid, or liquid, immediately after batching activities and dispose at licensed disposal facilities.						
	25.	Place empty cement bags in bins and dispose at licensed disposal facilities.						
Response to Environmental Pollution	26.	Immediately stop any activity causing environmental pollution, e.g. leaks and spillages.	<ul style="list-style-type: none"> • LLPT • Contractors 	<ul style="list-style-type: none"> • Throughout operations 	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • No activities cause environmental pollution on site. • No evidence of leaks. • Spills have been addressed as specified 		
	27.	Take corrective action to prevent recurrence						
	28.	Clean up any spills immediately, through containment and removal of free product and appropriate disposal as hazardous waste / remediation of contaminated soils.						
	29.	Notify LLPT and the relevant authorities (DEA&DP) within one day of a major environmental pollution event.						
Waste Management	30.	Separate recyclable waste at source.	<ul style="list-style-type: none"> • LLPT • Contractors 	<ul style="list-style-type: none"> • Throughout operations 	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • Recycling separated at source. 		
	31.	Provide central recycling storage and collection areas where possible	<ul style="list-style-type: none"> • LLPT 					
	32.	Appoint an appropriate Contractor to collect recycling from the development.	<ul style="list-style-type: none"> • LLPT 				<ul style="list-style-type: none"> • Review appointment 	<ul style="list-style-type: none"> • Recycling Contractor appointed.
	33.	Provide sufficient general waste bins in public areas.	<ul style="list-style-type: none"> • LLPT 				<ul style="list-style-type: none"> • Visual inspections 	

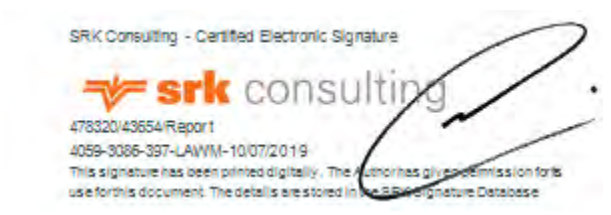
Operational and Maintenance Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance Indicators
	34.	Collect and remove litter from the site regularly.	<ul style="list-style-type: none"> • LLPT 			<ul style="list-style-type: none"> • General waste bins available in public areas and well maintained. • Site free of litter.
	35.	Provide separate weather and vermin proof bins for a) general and b) hazardous waste at active maintenance work areas and mark these clearly.	<ul style="list-style-type: none"> • Contractors 	<ul style="list-style-type: none"> • During maintenance, throughout operations 	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • Site litter free. • No evidence of waste burning on site. • Bins available in active work areas.
	36.	Prevent littering by staff.				
	37.	Do not allow any burning or burying of waste on site.				
Sewage, Effluent and Wastewater Management	38.	Direct discharges from swimming pools into the sewerage system	<ul style="list-style-type: none"> • LLPT 	<ul style="list-style-type: none"> • Throughout operations 	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • Discharges from pools directed to sewerage system. • Grease traps installed. • No sewage discharging to rehabilitation or open space areas. • Stormwater and sewerage systems maintained.
	39.	Route all domestic waste water to the sewerage system.				
	40.	Ensure that retail tenants (including restaurants) install grease traps at drains and sinks.				
	41.	Keep outside areas and stormwater systems clean to minimise the potential of polluting stormwater.				
	42.	Maintain the sewerage systems.				
	43.	Place sewage tankers on standby in the case of stand-by pump failure		<ul style="list-style-type: none"> • In the event of sewage stand-by pump failure 	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • Sewage contained within sewerage system in the event of pump failure or power failure.
	44.	Collect sewage in tankers and remove from site once backup storage is depleted				
	45.	Activate the sewerage generator in the case of power failure		<ul style="list-style-type: none"> • In the event of a power failure 		
	46.	Put a mobile generator on stand-by in the case of power failure				
	47.	Put sewage tankers on stand-by in the case of mobile generator failure				
48.	Collect sewage in tankers and remove from site once backup storage is depleted					
Water Conservation	49.	Minimise the use of potable water as far as practically possible.	<ul style="list-style-type: none"> • LLPT • Contractors 	<ul style="list-style-type: none"> • Throughout operations 	<ul style="list-style-type: none"> • Review records of water use 	<ul style="list-style-type: none"> • Water use within CoCT water use restrictions.
	50.	Reuse and recycle water wherever possible.				
Protection of Fauna	51.	Educate staff, tenants and visitors around the life cycle and conservation status of WLTs, and the rationale behind the protection methods being employed on the site (e.g. through the use of signs and informative posters).	<ul style="list-style-type: none"> • LLPT • Contractors 	<ul style="list-style-type: none"> • Throughout operations 	<ul style="list-style-type: none"> • Visual inspections 	<ul style="list-style-type: none"> • No / minimal faunal mortalities.

Operational and Maintenance Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance Indicators
	52.	Do not harm, catch or kill birds or animals by any means, including poisoning, trapping, shooting or setting of snares.				<ul style="list-style-type: none"> Faunal corridors maintained to ensure connectivity.
	53.	Avoid fauna when driving on site (especially toads / frogs).				
	54.	Maintain (clear) faunal culverts regularly.	<ul style="list-style-type: none"> LLPT 			
Protection of Flora and Rehabilitated Areas	55.	Establish management guidelines for buffer areas and corridors, including requirements for ecological connectivity and indigenous planting templates	<ul style="list-style-type: none"> LLPT 	<ul style="list-style-type: none"> Prior to the start of operations 	<ul style="list-style-type: none"> Review guidelines and rules 	<ul style="list-style-type: none"> Guidelines and rules in place. Guidelines and rules adhered to.
	56.	Establish rules for the use and management of buffer areas and corridors				
	57.	Ensure guidelines and rules for the management and use of open space areas are updated regularly and complied with.				
	58.	Do not use grey water / treated effluent for irrigation in recreational buffer areas or ecological corridors.	<ul style="list-style-type: none"> LLPT 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspections 	<ul style="list-style-type: none"> Grey water / treated effluent not used for irrigation in recreational buffer areas or ecological corridors
	59.	Record the extent of recreational buffer areas and ecological corridors.	<ul style="list-style-type: none"> LLPT 	<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Review record 	<ul style="list-style-type: none"> Extent of recreational buffer areas and ecological corridors recorded.
	60.	Maintain recreational buffer areas and ecological corridors to retain their extent and achieve ecological functioning.			<ul style="list-style-type: none"> Visual inspections 	<ul style="list-style-type: none"> Recreational buffer areas and ecological corridors maintained
	61.	Establish guidelines for the removal of invasive alien plant species.	<ul style="list-style-type: none"> LLPT 	<ul style="list-style-type: none"> Within the first year of operations 	<ul style="list-style-type: none"> Review guidelines 	<ul style="list-style-type: none"> Guidelines in place.
	62.	Remove invasive alien plant species from the site regularly.		<ul style="list-style-type: none"> Throughout operations 	<ul style="list-style-type: none"> Visual inspections 	<ul style="list-style-type: none"> Invasive alien plant species removed from the site.
Maintenance in Watercourses	63.	Limit maintenance footprints to what are absolutely essential.	<ul style="list-style-type: none"> LLPT Contractors 	<ul style="list-style-type: none"> During maintenance, throughout operations 	<ul style="list-style-type: none"> Review correspondence with freshwater ecologist. Visual inspections 	<ul style="list-style-type: none"> Evidence of consultations with a freshwater ecologist prior to maintenance in watercourses. Maintenance footprints as small as possible. Maintenance work undertaken in dry season. Drift fences and silt fences installed where required. Reeds cut by hand and removed.
	64.	Do not infill conservation areas, ecological corridors or the Liesbeek Canal				
	65.	Maintain watercourse during the dry season unless absolutely unavoidable.				
	66.	For activities disturbing the river bank, temporarily install drift fences from hessian sheets at erodible areas near the watercourse to minimise erosion.				
	67.	Provide silt traps to remove sand / silt particles from runoff.				
	68.	Cut reeds manually (by hand) just above the water level in late summer, and in consultation with a freshwater ecologist				

Operational and Maintenance Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance Indicators
	69.	Cut reeds across the bank-fill width of watercourses (and not longitudinally)				<ul style="list-style-type: none"> • Sediment removed mechanically. • Design profile of channel maintained. • Disturbed areas repaired. • No sediment build up at bridges and culverts. • No evidence of contamination or litter.
	70.	Remove cut reeds from watercourses				
	71.	Remove sediment mechanically in consultation with a freshwater ecologist to restore channel capacity only when necessary, and not more frequently than once every five years				
	72.	Restore the design profile of the rehabilitated Liesbeek Canal channel when necessary				
	73.	Revegetate areas that are disturbed / cleared during maintenance with local indigenous vegetation and in consultation with a freshwater ecologist				
	74.	Remove sediment and other debris from bridges, culverts and access roads periodically.				
	75.	Implement mechanisms to capture any materials / spills resulting from maintenance works before they enter the watercourse.				
	76.	Treat any contaminated soil with appropriate product.				
	77.	Remove all waste and other material used in maintenance works from the area upon completion of maintenance activities.				
Historical Commemoration	78.	Educate tenants and the public accessing the site of the historical significance of the surrounding area (e.g. by erecting information boards at various locations at the site).	• LLPT	• Throughout operations	• Visual inspections	•
Erosion Control	79.	Inspect watercourses annually (at the end of the rainy season and after any storm/flood events) and report on evidence of erosion at bridges, culverts and other areas.	• LLPT	• Once a year	• Visual inspections	<ul style="list-style-type: none"> • Evidence of erosion gullies. • Erosion gullies are closed and rehabilitated.
	80.	Respond to reports of erosion by closing gullies and reshaping and revegetating watercourses.		• Throughout operations		
	81.	Maintain erosion control and stormwater structures regularly.				
Visual Aspects	82.	Use vegetation to break up large expanses of hard surface.	• LLPT	• Throughout operations	• Visual inspections	<ul style="list-style-type: none"> • Site not cluttered visually. • Appropriate lighting installed.
	83.	Plant trees to reduce the perceived heights of buildings.				
	84.	Minimise commercial signage.				
	85.	Fix signs to walls or buildings rather than be free-standing.				
	86.	Utilise low signs as they are less visually intrusive.				
	87.	Situate utilities (pipelines, cables) underground.				
	88.	Limit lighting only to essential activities and facilities				

Operational and Maintenance Phase Measures						
Aspect	ID	Mitigation measure / Procedure	Responsible	Implementation Timeframe	Monitoring Methods	Performance Indicators
	89.	Direct lighting inwards and downwards to avoid light spillage and trespass				
	90.	Fit external lights with reflectors ("full cut-off" luminaires) to direct illumination downward and inward to the specific illuminated areas				
Traffic management	91.	Investigate and respond to complaints about traffic.	<ul style="list-style-type: none"> • LLPT 	<ul style="list-style-type: none"> • Throughout operations 	<ul style="list-style-type: none"> • Review complaints register 	<ul style="list-style-type: none"> • Number of incidences and complaints
Employment and Procurement	92.	Utilise local labour as much as possible.	<ul style="list-style-type: none"> • LLPT 	<ul style="list-style-type: none"> • Throughout operations 	<ul style="list-style-type: none"> • Review employment and training records 	<ul style="list-style-type: none"> • Percentage of local staff • Percentage of goods procured locally
	93.	Implement a training programme to upskill local labour.				
	94.	Record staff origin, and training activities.				
	95.	Consider implementing labour-intensive rather than capital-intensive work methods wherever possible.				
	96.	Consider purchasing resources from local sources wherever possible.				
Development Rules and Guidelines	97.	Establish development rules and guidelines for tenants / property owners.	<ul style="list-style-type: none"> • LLPT 	<ul style="list-style-type: none"> • Prior to the start of operations 	<ul style="list-style-type: none"> • Review rules and guidelines 	<ul style="list-style-type: none"> • Rules and guidelines in place and incorporate environmental aspects
	98.	Incorporate rules for the use and management of buffer areas and corridors in tenant / property owner rules and guidelines.				
	99.	Incorporate the following into rules and guidelines: <ul style="list-style-type: none"> • Do not harm, catch or kill birds or animals by any means, including poisoning, trapping, shooting or setting of snares. • Avoid fauna when driving on site (especially toads / frogs). • Minimise the use of potable water as far as practically possible. • Reuse and recycle water wherever possible. • Direct discharges from swimming pools into the sewerage system. • Separate recyclable waste at source. • Comply with rules for the use and management of buffer areas and corridors. • Immediately stop any activity causing environmental pollution, e.g. leaks and spillages. 				
	100.	Monitor compliance with development rules and guidelines.				
				<ul style="list-style-type: none"> • Throughout operations 	<ul style="list-style-type: none"> • Review records of compliance monitoring. 	<ul style="list-style-type: none"> • Compliance monitoring takes place.

Prepared by



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Appendix A:

Method Statement Pro Forma

METHOD STATEMENT PRO FORMA

CONTRACT:.....

DATE:.....

PROPOSED ACTIVITY (give title of method statement):

WHAT WORK IS TO BE UNDERTAKEN (give a brief description of the works):

WHERE ARE THE WORKS TO BE UNDERTAKEN (where possible, provide an annotated plan and a full description of the extent of the works):

--

START AND END DATE OF WORKS FOR WHICH METHOD STATEMENT IS REQUIRED:

Start Date:

End Date:

--

HOW ARE THE WORKS TO BE UNDERTAKEN (provide as much detail as possible, including annotated maps and plans where possible):

Note: please attach extra pages if more space is required

Appendix B:

Declaration by Parties

[Proponent]

I, _____, representing [Proponent], record as follows:

I/we have read and understood this Environmental Management Programme.

I am aware of [Proponent's] responsibilities in terms of complying with, enforcing and implementing the provisions of the Environmental Management Programme and all of its constituent documents.

I undertake to comply with those requirements of the applicable environmental laws, approvals and obligations arising out of the Environmental Management Programme in the discharging of my obligations.

Signed: _____ Name: _____

Position: _____ Date: _____

[Contractor]

I/we, _____ record as follows:

I/ we, the undersigned, do hereby declare that I/ we am/ are aware of the requirement by [Proponent] that construction activities will be carried out with due regard to their impact on the environment.

In view of this requirement, I/ we will, in addition to complying with the letter of the terms of the Contract dealing with protection of the environment, also take into consideration the spirit of such requirements and will, in selecting appropriate sub-Contractors, employees, plant, materials and methods of construction, in-so-far as I/ we have the choice, include in the analysis not only the technical and economic (both financial and with regard to time) aspects but also the impact on the environment of the options. In this regard, I/ we recognise and accept the need to abide by the "precautionary principle" which aims to ensure the protection of the environment by the adoption of the most environmentally sensitive construction approach in the face of uncertainty with regard to the environmental implications of construction.

I/we have signed the Declaration of Understanding with respect to the Environmental Management Programme.

Signed: _____ Date: _____

[Contractor]