Environmental Management Programme

Proposed Development Framework for the Stikland South Hospital Site, Erf 6300, Bellville

DEA&DP REF: TBC

PREPARED IN COMPLIANCE WITH THE REQUIREMENTS OF THE EIA REGULATIONS, GN 326 OF 2017 AND THE NATIONAL ENVIRONMENTAL MANAGEMENT ACT, ACT NO. 107 OF 1998

VERSION: DRAFT
DATE: September 2025

APPLICANT
WCG: Department of Infrastructure

Western Cape Government
FOR YOU

ENVIRONMENTAL ASSESSMENT PRACTITIONER

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REPORT DETAILS

PROPOSED DEVELOPMENT FRAMEWORK FOR THE STIKLAND SOUTH HOSPITAL SITE, ERF 6300, BELLVILLE: ENVIRONMENTAL MANAGEMENT PROGRAMME

APPLICANT

WCG: Department of Infrastructure
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Report purpose

This Environmental Management Programme is prepared as part of a Basic Assessment in terms of the Environmental Impact Assessment Regulations, 2014 (as amended). It prescribes control methods to mitigate and manage negative environmental impacts and enhance positive impacts associated with the construction and operation of the development, and provides a programme for monitoring the performance of personnel in applying such methods.

VERSION HISTORY

Date	Version
September 2025	Draft (this report)

Title: Proposed Development Framework for the Stikland South Hospital Site, Erf 6300, Bellville: Environmental Management Programme
Date: **09 September 2025**

DECLARATION OF EAP'S INDEPENDENCE

I, Tarryn Solomon, appointed by the WCG: Department of Infrastructureas the Environmental Assessment Practitioner for the Proposed Development Framework for the Stikland South Hospital Site, Erf 6300, Bellville, hereby declare that the information provided in this report and supporting documentation is complete and correct to the best of my knowledge; that other than fair remuneration for work performed in terms of this application I have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; that I have disclosed, to the Applicant, the specialist(s), the Competent Authority and registered interested and affected parties all material information that have or may have the potential to influence the decision of the Competent Authority; that I have ensured that information in respect of the application was distributed or was made available to registered interested and affected parties and that participation will be facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments; and that I am aware that a false declaration is an offence in terms of Regulation 48 of the NEMA EIA Regulations.

Tarryn Solomon BSc, Reg. E.A.P. 2019/1671
Infinity Environmental (Pty) Ltd: Director & Principal EAP, 18+ years' experience in environmental management

RECORD OF REVISIONS

Rev. No.	Reason for Revision	Section Revised	Revised By	Effective Date
00	First Draft for public comment	All	Infinity Environmental	Sep 2025

EMPr OVERVIEW

Chapter 1	**INTRODUCTION**
Chapter 2	**APPROACH AND STRUCTURE**
Chapter 3	**PROJECT ROLES AND ORGANISATIONAL STRUCTURE**
Chapter 4	**IMPLEMENTATION PHASE ENVIRONMENTAL MANAGEMENT PLAN**
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APPENDIX A	**ENVIRONMENTAL ASSESSMENT PRACTITIONER CV**

1 INTRODUCTION

This Environmental Management Programme (EMPr) has been prepared for the proposed mixed-use development at the Stikland South Hospital site, in Stikland, located within the City of Cape Town's Tygerberg District. The preparation of an EMPr is a requirement of the National Environmental Management Act (107 of 1998 as amended, NEMA) and the Environmental Impact Assessment Regulations, 2014 (as amended). This EMPr will be submitted to the Western Cape provincial Department of Environmental Affairs and Development Planning (DEA&DP) as part of an application for environmental authorisation for the proposed development referred to above. The project applicant is the Western Cape Government: Department of Infrastructure.

The project also required authorisation of the water uses listed in Section 21 of the National Water Act, namely Sections (c) and (i). A General Authorisation has been obtained.

Following a decision on the application for environmental authorisation, this EMPr is intended as a "living" document and should continue to be updated regularly, as needed. Importantly, the management actions can and should be reviewed regularly to ensure that the management outcomes defined in the BAR are still being effectively met by these actions.

The purpose of an EMPr is defined in the Integrated Environmental Management (IEM) Guideline Series (Department of Environmental Affairs and Development Planning, 2005) as "an environmental management tool used to ensure that undue or reasonably avoidable adverse impacts of the construction, operation and decommissioning of a project are prevented; and that the positive benefits of the projects are enhanced".

1.1 Objective

The overarching objective, from which the detail contained in this EMPr flows, is to construct and operate the project in a manner that –

» Reduces the risk of pollution or damage to ground and surface water, ecosystems, soils and air;
» Minimises nuisance and disruption to people residing in, working in or commuting through the area;
» Adheres to all relevant environmental legislation.

The objectives of this EMPr are therefore:
» to prescribe the best practicable control methods to mitigate and manage negative environmental
» impacts and enhance positive impacts associated with the construction and operation of the development; and
» to provide a programme for monitoring the performance of personnel in applying such methods.

1.2 Project Description

The proponent, the Western Cape Government: Department of Infrastructure, as the custodian of Erf 6300 – commonly referred toas the Stikland Hospital estate- is proposing to redevelop portions of this precinct. In 2020, the Western Cape Government approved the mandate for the Regeneration Programme, which includes the Stikland Hospital estate as one of its strategic focus areas. This project is currently managed by the Special Projects Directorate within the Department of Infrastructure, with the aim of maximising the social value of publicly owned land through sustainable, inclusive redevelopment.

Erf 6300 is a brownfield site with a longstanding history of institutional and community-based land use. Stikland North and South are both part of Erf 6300, separated by Old Paarl Road. The Stikland Psychiatric Hospital, located in Stikland South, and the housing in Stikland North were historically part of the broader hospital estate. Currently, the infrastructure, particularly in Stikland North, is underutilised, with large areas of land in both Stikland North and South precincts remaining vacant. Given this context, both Stikland South and North precincts have been identified as strategic areas offering opportunities for potential mixed-use development, aligning with the goals of the Regeneration Programme to unlock the full value and functionality of the Stikland Hospital estate. This report focuses on the proposal for the development of Stikland South.

Stikland South is located on Erf 6300 in Stikland, Bellville. It is situated along the Provincial Main Road R101 (Old Paarl Road) to the north, De La Haye Avenue to the west, Midmar Road to the east and the railway line to the south. The property extent is approximately 114 hectares (ha), of which approximately 60 ha are vacant. The remaining ha includes the Stikland Psychiatric Hospital, Stikland Hospital Pharmacy, and Western Cape College of Nursing Metro East Campus. Figure 1-1presents the locality of the proposed development.

Stikland South Development Framework

The proposed development of Stikland South aims to optimise the use of available vacant land through a mixed-use, environmentally sensitive urban expansion. The development framework promotes sustainable land use while preserving ecological features and enhancing public health infrastructure. Key features of the development framework include the integration of botanical and wetland open spaces along Old Paarl Road (north of the site) and De La Haye Road (west of the site), with the eastern portion of the site along Midmar Road to remain undeveloped.
The development will include:

- Four-storey mixed-use buildings along Old Paarl Road, comprising affordable, social, and open market housing, commercial spaces and supported by a school and community facilities.
- The western edge is being considered for a Community Clinic and a new Main Entrance to Stikland Hospital.

Three new accesses to the site will be provided along Old Paarl Road opposite existing intersections, i.e., opposite Stikland North (i.e., on the Remainder of Erf 6300, north of Old Paarl Road), St. Harrod Drive and Meerlust Street. The two new intersections opposite St. Harrod Drive and Meerlust Street will need to be signalised, indicating access into the site along its northern boundary. An additional three access points will be provided to the site along its western boundary, i.e., along De la Haye Avenue. Again, access to the site will be established at or opposite existing intersections – with new access points created opposite Frans Hals Street and Wenning Park. The existing access to the Western Cape

College of Nursing ('Nursing College') will be retained. Whereas the existing access to the Stikland Hospital will be closed and relocated to the shared access opposite Frans Hal Street.

Conservation Areas

Three areas important for biodiversity, both terrestrial and aquatic, have been avoided and will be conserved and enhanced within the proposed development framework. This includes two wetlands, one along De La Haye Road and one in the southernmost corner of the site, as well as a portion of Medium-High sensitivity terrestrial vegetation in the northern section of the site. All other terrestrial and aquatic biodiversity areas are proposed to be conserved separately from the development framework within the proposed new boundary for the Stikland Hospital.

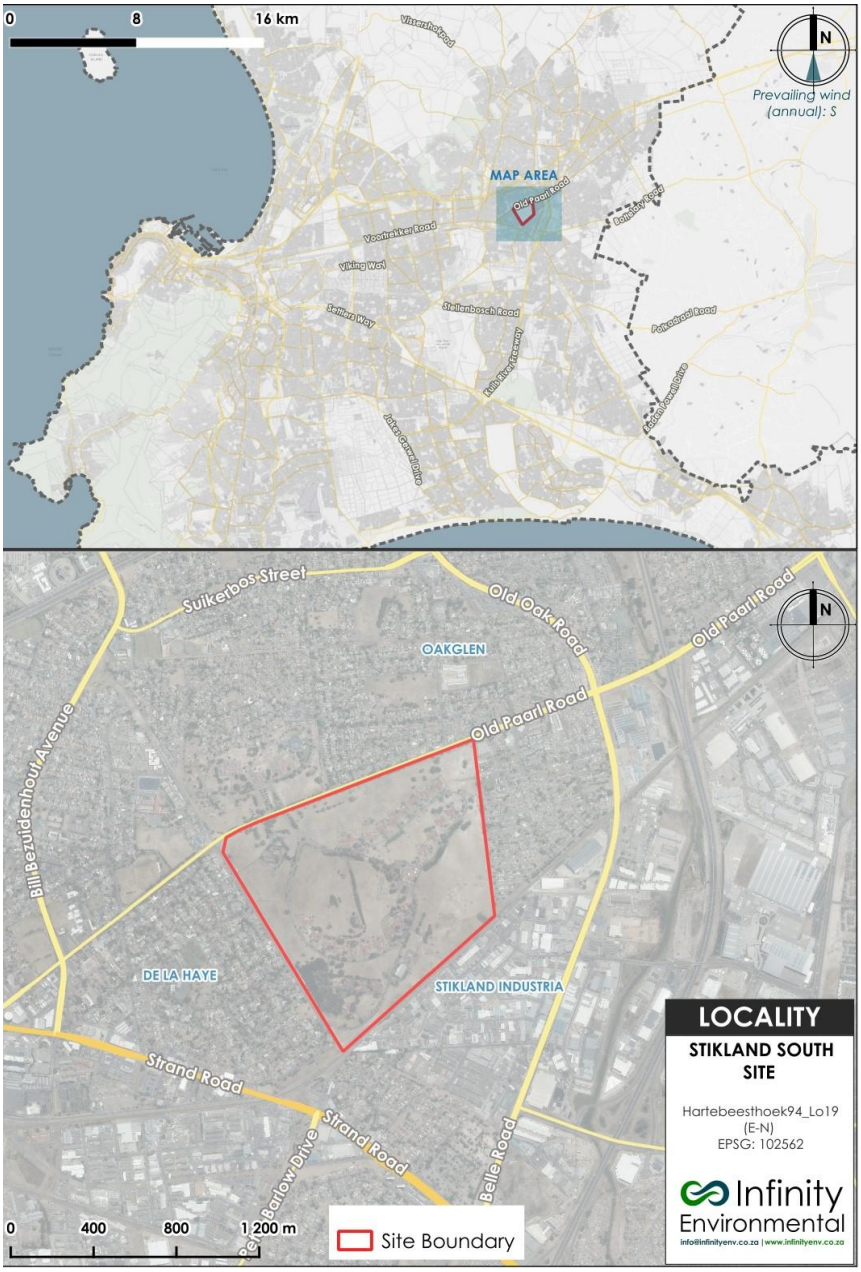

Figure 1-1 Locality

1.3 Environmental Sensitivities

The proposed site is situated on erf 6300 in Stikland, the property is currently occupied by the Stikland Psychiatric hospital and a larger extent remains underutilised and maintained by mowing vegetation. Historically, the site was used for agriculture before the hospital was built, this is evidence of sequential transformations of land on this property. The site is surrounded to the North by a portion of the hospital estate (Stikland North) which accommodates mental health NGO's, residential areas to the west and east and industrial area and railway to the south. The site was confirmed by specialists to have high sensitivity for Aquatic Biodiversity theme and Terrestrial Biodiversity theme.

1.3.1 Aquatic Biodiversity

The site contains five wetlands delineated through geotechnical survey which confirmed that perching of the water table was a key hydrological driver of the wetlands on the site and delineation of wetlands was based on the hydropedological study. Three of the identified wetlands are depressional wetlands and two are Hillslope seep wetlands. The Hilslope seep wetlands are assigned Category C (moderately modified) in terms of their present ecological state which implies a moderate change in ecosystem processes and loss of natural habitats have taken place, but the natural habitat remains predominantly intact. Two of the Depression wetlands (4&5) are assigned Category E (severely modified) implying the change in ecosystem processes, loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable. Wetland1 (depression) was assigned Category D (Largely modified) which indicates a large change in ecosystem processes, loss of natural habitat and biota has occurred. All the wetlands have low ecological importance and sensitivity and will be retained with a mitigation of 20-metre buffer. Impacts associated with both construction phase and operational phase are assessed to be low.

A freshwater impact Assessment was compiled by EnviroSwift Western Cape. The assessment included a site visit by the freshwater specialist to verify the presence of watercourses on site. Due to the history of disturbance on site, having been cultivated since the mid-1900s, and due to ongoing, regular mowing of the vacant areas, the freshwater specialist recommended that a geotechnical survey be performed to ultimately confirm the freshwater specialist's delineations of on-site wetlands. Towards this end, GEOSS was commissioned to undertake instead a hydropedological study, which confirmed that perching of the water table was a key hydrological driver of the wetlands and the 5 wetlands identified by the freshwater specialist were indeed present on-site. The specialist recommended planting of suitable wetland plants and the establishment of a 20 m wide buffer surrounding each wetland be undertaken, along with implementation of all other mitigation measures detailed in section 5. A risk assessment matrix was used to determine the level of risk posed by the proposed development. Negative impacts were found to be of a low risk class. Based on this assessment, the aquatic specialist supports the proposed development on the condition that the recommended mitigation measures are implemented.

At the time of the freshwater specialist's assessment, it was proposed that Wetland 5, located in the southern-most corner of the site, be fully infilled for development, which was accounted for in the risk assessment rating of low risk. Since then, the development framework has been revised, and Wetland 5 is now largely being retained on site. While some disturbance and partial infilling will occur to install a stormwater swale and pedestrian pathway—aligned with the Landscape Framework—this is considered less consequential than the original proposal to completely infill the wetland. As such,

the updated development framework represents an improvement in wetland conservation, reducing the extent of infilling of Wetland 5. The freshwater specialist assessed the original, more intensive proposal as the worst-case scenario for the wetlands on site, and still found the proposed development to pose a low risk. The Department of Water and Sanitation (DWS) has approved a General Authorisation for the proposed activities (WU37034) based on this worst-case scenario.

1.3.2 Terrestrial Biodiversity

A botanical impact assessment was prepared by Nick Helme Botanical Surveys. The assessment found that the site supports notable remnants of two Critically Endangered vegetation types, i.e. Cape Flats Sand Fynbos and Swartland Shale Renosterveld, with at least five plant Species of Conservation Concern (SoCC). The majority of the study area is of Low botanical sensitivity, and these areas do not support any of the recorded SoCC. There are four patches of Very High sensitivity within the site, one of which is a seasonal wetland, and the other three all support the five recorded plant SoCC. Surrounding and linking these are two patches of Medium-High sensitivity. In the south-east section of the site are three patches of Medium sensitivity that support none of the SoCC except the annual *Phyllopodium capillare*.

The revision of the development framework includes a portion of Medium-High sensitivity vegetation retained as an open space within the development framework, while approximately 0.40 ha of Medium-High sensitivity vegetation is anticipated to be lost to accommodate development of roads. The rest of the botanically sensitive spaces are retained within the proposed new Stikland Hospital boundary. The botanical specialist assessed the impact of the revised framework to be low negative during the construction phase, and a low positive rating after mitigation during the operational phase.

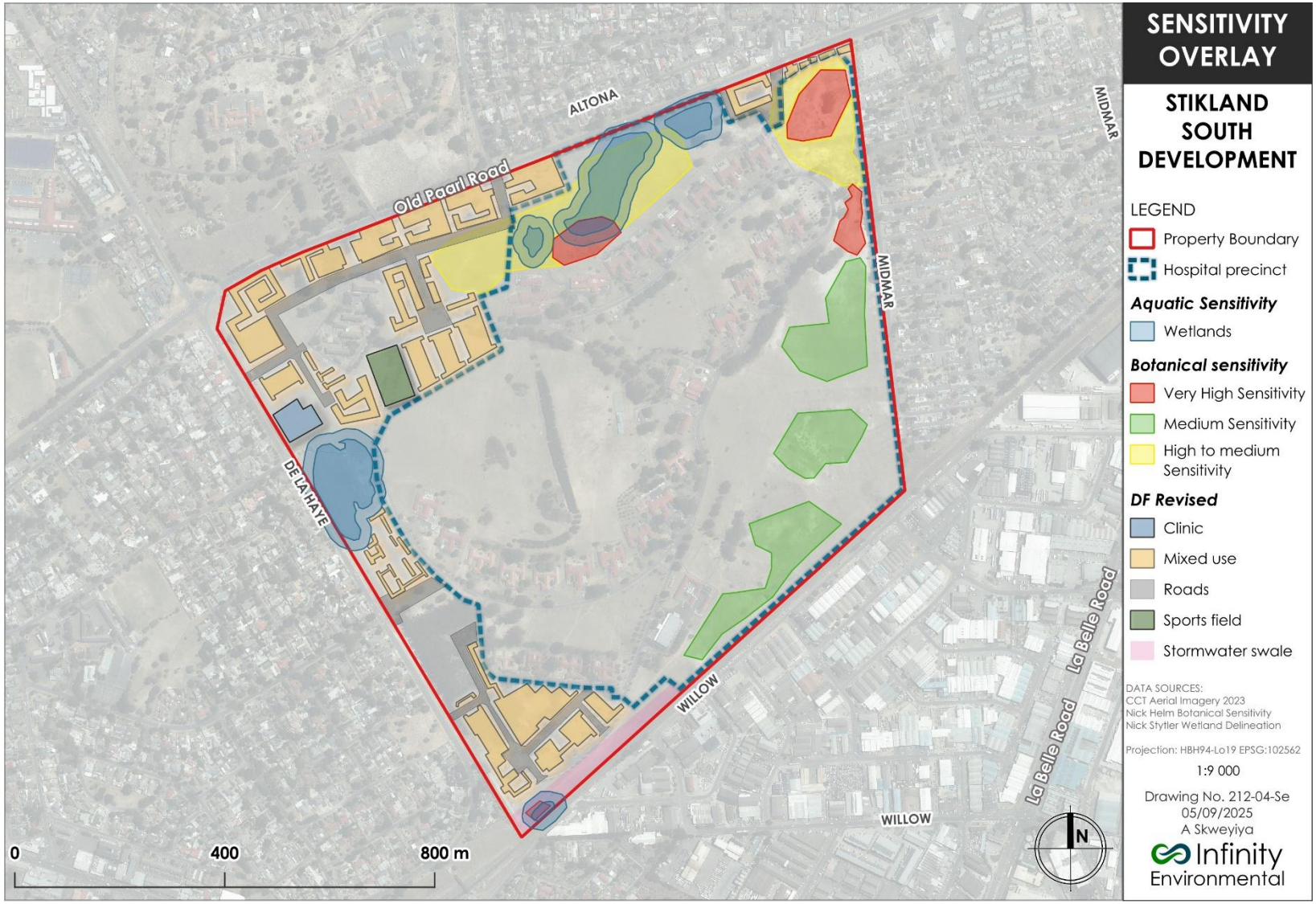

Figure 1-2 Site layout and sensitivity

1.4 Impacts

Based on the specialist studies, the impacts indicated in **Error! Reference source not found.** and **Error! Reference source not found.** have been identified and assessed. Appropriate management and mitigation measures are included within the EMPr (where required) as per the recommendations made in the specialist studies to ensure the potential impacts are adequately mitigated and managed during all phases of the project. The studies conducted to inform this impact assessment include specialist assessments of the impacts on freshwater systems (by Nick Steytler), indigenous vegetation (by Nick Helme), Socio-economic impacts (by UrbanEcon) as well as impacts on transport networks (HHO Consulting Engineers). All impacts identified and assessed, as well as the proposed mitigation measures and management actions are set out in Chapter 4 and 5. All mitigation and management measures proposed by the specialists, including those additional impacts and management measures identified by the EAP have also been incorporated into this Environmental Management Programme which will be used during implementation of the proposed development to manage impacts and monitor compliance.

The proposed development will have some impacts on its surroundings - residential and commercial land uses - during the construction phase. These impacts, which include temporary degradation and loss of habitat, changes to stormwater runoff, noise, vibration, dust, traffic and visual nuisance, are typical of construction and can be mitigated and managed as set out in the construction environmental management programme. Temporary employment is anticipated to be created during the construction phase of the development.

The **no-go option**, which must always be considered in an environmental assessment, implies that no development would occur on the site and status quo of regularly mowing of vegetation will persist. While this alternative would limit the negative impacts of development on wetlands and the remnants of Cape Flats Sand Fynbos and Swartland Shale Renosterveld, this minor benefit is outweighed by the opportunity and socio-economic costs of not developing affordable housing and maximising the social value of state-owned land and formal conservation of environmentally sensitive areas during operational phase . **The No-go Alternative is not preferred**.

Operational phase impacts include positive socioeconomic impacts associated with the enablement of development, and specifically affordable housing opportunities, close to employment and public transport. The proposed development is in keeping with spatial planning imperatives to maximise the underutilised land parcel within the urban inner core, particularly where it is in public ownership, and with a need to improve access to affordable housing close to employment opportunities. The environmental sensitive areas (i.e wetlands and indigenous vegetation) will be managed in perpetuity by a suitable conservation partner which is positive from an ecological perspective.

The tables overleaf summarise the overall significance of the impacts assessed, following the implementation of the recommended mitigation and management measures for each alternative.

CONSTRUCTION PHASE

Table 1: Summary of impact significance for the construction phase

Impact	Impact Significance		
	No-Go Alternative	Preferred Alternative	
		Without mitigation	With mitigation
Construction Phase Impacts			
Loss of wetland habitat	None	Low (negative)	Low (negative)
Alteration of flow regime	None	Low (negative)	Very Low (negative)
Increased erosion and sedimentation	None	Low (negative)	Very Low (Negative)
Water quality impairment	None	Low (negative)	Very Low (negative)
Loss of biota	Low (negative)	Medium (negative)	Low (negative)
Botanical impacts	Neutral	Medium (negative)	Low (negative)
Dust, noise, and vibration impacts	None	Medium (negative)	Very Low (negative)
Visual impacts	None	Low (negative)	Very low (negative)
Waste generation	None	Medium (negative)	Low (negative)
Contaminated stormwater	None	Medium (negative)	Low (negative)
Traffic congestion	None	Medium (negative)	Low(negative)
Temporary increase in production and gross domestic product	None	Medium (positive)	Medium (positive)
Creation of temporary employment	None	Medium (positive)	Medium to High (positive)
Temporary increase in household income	None	Medium (positive)	Medium to High (positive)
Temporary increase in social conflicts due to an influx of people during construction	None	Medium (negative)	Medium (negative)
Demolition of buildings older than 60 years	None	Low (negative)	Low (negative)
Negative impacts on trees to be retained in the development	None	Medium to High (negative)	Low (negative)

Operational Phase

Table 2:Summary of impact significance for the operational phase

Impact	Impact Significance		
	No-Go Alternative	Preferred Alternative	
		Without mitigation	With mitigation
Operational Phase Impacts			
Biota gains	Low (negative)	Low (positive)	Medium (positive)
Disturbance of wetland habitat	None	Low (negative)	Very low (negative)
Alteration of flow regime	None	Medium (negative)	Very low (negative)
Botanical impacts	Neutral	Low (negative)	Low positive
Water quality impairment	None	Medium (negative)	Very low (negative)
Sustainable increase in production and GDP in national and local economy	None	Medium to High (positive)	Medium to High (positive)
Sustainable impact on employment	None	Medium (positive)	Medium to High (positive)
Sustainable increase in household income	None	Medium (positive)	High (positive)
Sustainable impact on urban regeneration	None	Medium (positive)	Medium to High (positive)
Provision of affordable and social housing	None	Medium to High (positive)	High (positive)
Sense of place	None	Medium (negative)	Low (negative)
Traffic impacts	None	Medium (negative)	Low (negative)
Negative impacts upon trees to be retained	None	Medium to High (negative)	Low (negative)

1.4.1 Mitigation of impacts

This EMPr gives effect to the mitigation measures prescribed in the environmental impact assessment. Recommended mitigation measures prescribed by the Aquatic and Botanical specialist are set out below.

1.4.1.1. Freshwater mitigation measures

Construction phase

Alteration of Flow Regime

- Avoid the impact as far as is practically possible by undertaking site preparation (vegetation clearing and levelling through excavations and/or infilling) during the dry summer season, where possible.
- If site preparation cannot be undertaken prior to the onset of the winter rainy season, then the Environmental Control Officer (ECO) must advise on measures to ensure that run-off from cleared areas is contained and encouraged to infiltrate rather than discharge directly into the receiving wetlands.
- Prior to site preparation designate the outer buffer boundary (20m from the outer wetland edge) with a suitable boundary marker and declare the area as a No-Go area for the duration of the construction phase.
- Timeously revegetate areas cleared by construction activities that will remain undeveloped (i.e. open spaces) with suitable indigenous plants.

Increased erosion and sedimentation

- Avoid the impact as far as is practically possible by undertaking the construction phase during the dry summer season, where possible.
- For all construction activities that take place during the winter rainy season, the ECO must advise on measures to ensure that run-off from cleared areas and stockpiles located upslope of the wetlands is contained and encouraged to infiltrate rather than discharge directly into the receiving wetlands.
- Formulate and implement a Development/Construction phase EMP which includes the following specifications:
    - No stockpiles may be located within 30m of any wetland
    - The ECO shall designate the site for stockpiling (note this should preferably take place at the Construction Camp but alternative sites can be identified but no closer than 30m from any wetland, in consultation with the ECO)
    - Protect soil stockpiles during the winter rainy season from erosion using a tarp or erosion blankets
    - Implement erosion control measures in order to prevent erosion and sedimentation of the receiving wetlands as required by the ECO. For example. strategically place straw bales or sediment fences/traps, to divert stormwater away from areas susceptible to erosion etc.)
    - Any sediment contaminated runoff should be contained and allowed to settle before being discharged. The settled-out sediment collected in this manner should be cleared manually as needed and removed from site.

- The ECO shall, for the duration of the winter rainy season, check erosion control measures weekly to ensure these are still intact (and cleared of sediment in accordance with the recommendations above) as needed.
- The ECO shall check the site for erosion damage and sedimentation after heavy rainfall events. Should erosion or sedimentation be noted, immediate corrective measures must be undertaken.
- Ensure that any area within the wetlands and associated buffer areas that is damaged as a result of construction activities is suitably and timeously rehabilitated to the satisfaction of the ECO. The ECO may, at their discretion, consult the services of a freshwater specialist with prior experience in wetland rehabilitation. The costs for the consultation of the specialist shall be borne by the Contractor.

» Timeously revegetate areas cleared by construction activities that will remain undeveloped (i.e. open spaces) with suitable indigenous plants.

<u>Water quality impairment</u>

» Where cement is mixed in a cement mixer ensure that the cement mixer operates at all times within a bunded area with an impermeable base.
» Where cement is mixed by hand, ensure that the cement is mixed at all times in impermeable containers or in a bunded area with an impermeable base.
» All wet and dry cement deposits outside the contained areas are to be removed at the end of each day and disposed of off-site as rubble.
» Store fuel, chemicals and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded floors to limit pilferage, spillage into the environment, flooding or storm damage and to be located at least 100m from any wetland.
» Inspect all storage facilities and vehicles daily for the early detection of deterioration or leaks
» Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately.
» Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site. Disposal of any of these waste materials into any wetland and associated buffer is strictly prohibited.
» Dispose of concrete and cement-related mortars in an environmental sensitive manner (as this can be toxic to aquatic life). Washout may not be discharged into any wetland and associated buffer.
» Provide an adequate number of portable toilets where work is being undertaken. These toilets must be located at least 30m from the watercourse and must be serviced regularly in order to prevent leakage/spillage.
» All contaminated soil removed from the site by excavator or hand is to be immediately placed in a skip (i.e. no stockpiling of contaminated soil on-site).
» All skips containing waste shall be immediately transported to landfill for disposal when the skip becomes full.
» Any skips containing solid waste at the end of the day shall be covered to prevent wind from blowing the waste away.
» Receipts for the safe disposal of solid waste shall be kept on record by the Contractor.

<u>Loss of Biota</u>

- » Clearly demarcate the outer edge of the wetland buffer zones prior to commencement of the construction phase and declare the area a No-Go area for the duration of the construction phase.
- » Any activities within the wetland No-Go areas must be authorised by the ECO (e.g. for the planting of vegetation and/or repair of damaged areas).
- » Construction material stockpiles should be kept at least 30m from the outer wetland edge.

Operational phase

Disturbance of Wetland Habitat

- » Establish and maintain a 20m buffer around each of the retained wetlands;
- » Prohibit human and pet access to the retained wetlands. This can be achieved through signage in the wetland areas and in the set of rules stipulated in the Home Owner's Manual;
- » Prohibit the dumping of any form of waste into the retained wetland areas. This can be achieved through signage in the wetland areas and in the set of rules stipulated in the Home Owner's Manual;
- » Orientate the buildings so that they front onto the retained wetland areas;
- » Inspect the retained wetland areas and associated buffers for the presence of litter and invasive alien plants and remove with immediate effect. For effective best practise methods for invasive alien vegetation removal consult Martens *et al.* (2021).

Alteration of flow regime

- » Compile a Stormwater Management Plan for the proposed development that complies with the CCT Policy (2009) for managing urban stormwater impacts.
- » Ensure that all pipelines upslope and within the regulated area for wetlands (500m) are lined with an internal Kevlar or similar sleave.
- » Inspect the water supply and sewerage pipelines upslope and within the regulated area for wetlands (500m) annually and repair / address leaks timeously.

Water Quality Impairment

- » Ensure that all new sewerage pipelines within the 1:50 year floodline are lined with an internal Kevlar or similar sleave.
- » Inspect all sewerage infrastructure within the 1:50 year floodline annually and repair / address leaks timeously.

Biota gains

- » Ensure that in future no part of the retained wetland areas and their associated buffer zones is mowed.
- » The only cutting-back that may be undertaken is the periodic cutting-back of Typha capensis (bullrush) which is known to inhabit wetlands with longer hydroperiods and proliferate to such an extent that they outcompete sensitive endemic species.
- » Prepare a Landscaping Plan for the retained wetlands and their associated buffers that proposes the planting of suitable indigenous plants.

» Monitor the retained wetlands and their associated buffers for alien invasive plants and remove any identified plants in accordance with accepted best-practise methods with immediate effect.

1.4.1.2. Botanical mitigation measures

Construction phase

» All conservation areas must be surveyed and fenced off prior to any site development to prevent inadvertent or deliberate damage during the site redevelopment phase. The fencing should be durable and permanent (such as Clearvue fencing), and should allow for controlled access by the approved conservation partner.
» Search and Rescue of all translocatable indigenous seeds, bulbs and whole plants in the development areas (even though these are of lower sensitivity) must be undertaken over a full year prior to any site development, to allow for the seasonal requirements of this type of project. The work should be undertaken by conservation partner. The rescued material should ideally be used within the conservation areas on site.
» During the construction and redevelopment phase there must not be any disturbance within the conservation areas, and this included no dumping, no spilling of fill across the fence line.
» To keep soil moisture regimes similar it is recommended that soil surface levels be essentially the same as they area now – i.e. the development areas should not be above or below the adjacent conservation area surface levels, and stormwater should not be channelled into these areas.
» The applicant must ensure that adequate funding is made available to the chosen partner for all ongoing ecological management requirements on this site, including any Search and Rescue prior to development.

Operational phase

» The conservation areas will need to be intensively managed in perpetuity, due to their relatively small size, large edge effects, and partly degraded state. The Applicant is required to appoint ecological management partner with suitable expertise (such as Nature Connect) enter into a partnership with them to manage this area in the ecologically appropriate manner.
» Within 6 months of taking over management of the site, Conservation partner must draw up an ecological management plan for the conservation areas.
» Key ongoing tasks to address in the conservation areas will alien invasive plant management (including herbs and grasses) and selective reintroduction of suitable nursery grown or rescued plant species that are both locally indigenous (found within 10km of the site) and which should do well in the available habitats.

1.5. Author of the EMPr

This EMPr has been compiled by the Environmental Assessment Practitioner (EAP) based on the assessment reports provided by various specialists as well as standard environmental management requirements. Details of the author are as follows:

Table 3: Environmental Assessment Practitioner

EAP	Professional registration	Qualification	Years of experience
Anathi Skweyiya	Registered Cand E.A.P # 2022/4635	B. Tech Environmental Management	3
Tarryn Solomon Internal Reviewer	Reg E.A.P #2019/1671	BSc. Environmental and Water Science	18+

Table 4: Freshwater and Botanical Specialist

Specialist	Professional registration	Qualifications	Years of experience
Nick Helm	Reg Pr.Sci.Nat #400045/08	BSc (Honours) – Botany (Ecology & Systematics)	28+
Nick Steytler	Reg Pr. Sci. Nat #400029/02	MSc (Entomology)	25+

2. APPROACH AND STRUCTURE

2.4. Structure of EMPr

The EMPr is structured as a set of nested environmental management plans, as shown in Figure 2-1. Aspects of these will be supplemented by more detailed levels of planning as and when the proposed development is implemented, as indicated.

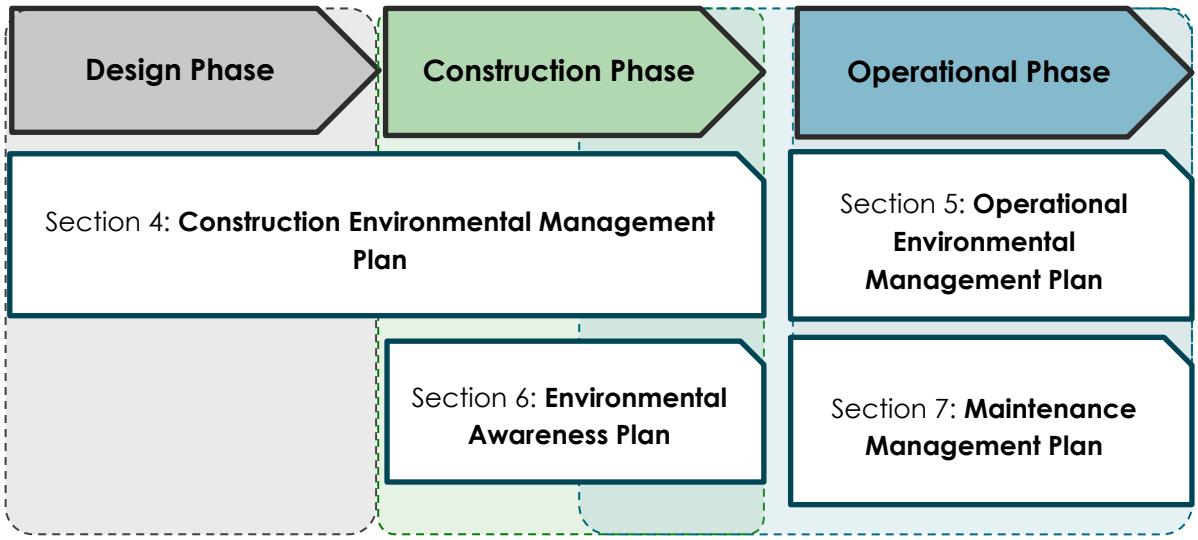

Figure 2-1. Schematic of EMPr content and structure

2.5. Legislative compliance

A key objective of the EMPr is to satisfy the requirements of Appendix 4 of the amended NEMA EIA Regulations published in Government Notice No. R 326 of 7 April 2017. These regulations prescribe the content of the EMPr and specify the type of supporting information that must accompany the submission of the report to the competent authority. An overview of where the requirements are addressed in this EMPr is presented in Table 2.1.

Table 2-1. Compliance with EIA Appendix 4 Requirements

Appendix 4 of EIA Regulations	EMPr section
1. An EMPr must comply with section 24N of the Act and include- (a) details of– (i) the EAP who prepared the EMPr; and (ii) the expertise of that EAP to prepare an EMPr, including a curriculum vitae;	Section 1.5
(b) a detailed description of the aspects of the activity that are covered by the EMPr as identified by the project description;	Section 1.4, Section 4 and 6: 1st column of the table
(c) a map at an appropriate scale which superimposes the proposed activity, its associated structures, and infrastructure on the environmental sensitivities of the preferred site, indicating any areas that should be avoided, including buffers;	**Error! Reference source not found.**
(d) a description of the impact management outcomes, including management statements, identifying the impacts and risks that need to be avoided, managed	Sections 4 and 6: 2nd column of table

	and mitigated as identified through the environmental impact assessment process for all phases of the development including— (i) planning and design; (ii) pre-construction activities; (iii) construction activities; (iv) rehabilitation of the environment after construction and where applicable post closure; and (v) where relevant, operation activities;	
(f)	a description of proposed impact management actions, identifying the manner in which the impact management outcomes contemplated in paragraph (d) will be achieved, and must, where applicable, include actions to (i) avoid, modify, remedy, control or stop any action, activity or process which causes pollution or environmental degradation; (ii) comply with any prescribed environmental management standards or practices; (iii) comply with any applicable provisions of the Act regarding closure, where applicable; and (iv) comply with any provisions of the Act regarding financial provision for rehabilitation, where applicable;	Sections 4 and 6: 3rd column of table
(g)	the method of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Sections 4 and 6: 4th column of table
(h)	the frequency of monitoring the implementation of the impact management actions contemplated in paragraph (f);	Sections 4 and 6: 5th column of table
(i)	an indication of the persons who will be responsible for the implementation of the impact management actions;	Section 3, Section 4 and 6: 6th column of the table
(j)	the time periods within which the impact management actions contemplated in paragraph (f) must be implemented;	Sections 4 and 6: 5th column of table
(k)	the mechanism for monitoring compliance with the impact management actions contemplated in paragraph (f);	Sections 4 and 6: 4th column of table
(l)	a program for reporting on compliance, taking into account the requirements as prescribed by the Regulations;	Sections 4 and 6, responsible parties noted in Section 0.
(m)	an environmental awareness plan describing the manner in which— (i) the applicant intends to inform his or her employees of any environmental risk which may result from their work; and (ii) risks must be dealt with in order to avoid pollution or the degradation of the environment; and	Section 6
(n)	any specific information that may be required by the competent authority	None requested to date

2.6. Content of the EMPr

Where applicable, each section of the EMPr is divided into three phases of the project life cycle, namely:

- The Design Phase, which will partly coincide with and follow the EIA;
- The Construction Phase, which begins with commencement of physical activities on site and ends when the development has been fully constructed; and
- The Operational Phase, which begins when the first component or phase of the development begins its normal operations, after construction.

There is likely to be overlap between the above phases. A decommissioning phase is not included, as it is not anticipated that the development will be decommissioned.

The EMPr includes the findings and recommendations of the Basic Assessment and specialist studies. The EMPr may be updated with additional information or actions during the design, construction, and operational phases if applicable. A standardised approach is followed, in which outcomes are set, followed by management actions aimed at achieving the objectives. Management actions are accompanied by monitoring requirements, responsibilities, and targets where applicable. A tabular format is used for ease of reference.

Key terms used in the EMPr include:

- **Impact or aspect**: The potential positive or negative impact of the development that needs to be enhanced, mitigated or eliminated (as appropriate) to a desired state
- **Impact management outcome**: The desired state after mitigation or management
- **Management Actions**: The actions needed to achieve the objectives of enhancing, mitigating or eliminating impacts; taking into consideration factors such as responsibility, methods, frequency, resources required and prioritisation
- **Monitoring**: The key monitoring actions required to check whether the outcomes are being achieved, taking into consideration methodology, frequency and responsibility.

2.7. Amendment of this EMPr

» Amendments shall be made as and when required to keep this EMPr up to date, and to provide for adaptive management in support of the management outcomes set out in the approved EMPr and the EIA.
» The EMPr may be amended due to:
  - Legislative changes;
  - Changes to the roles and organisational structure set out in chapter 3;
  - Amendments to the environmental authorisation;
  - Audits of the EMPr carried out in terms of the EIA Regulations;
  - Based on the annual reviews as set out below; or
  - Whenever deemed necessary by the competent authority.
» Amendments will be numbered sequentially (e.g. Amendment 001, Amendment 002, Amendment 003 etc.). The status of a particular page shall be reflected in the appropriate space of each page. Each amendment shall also have an effective date (the date on which the amendment was made).
» Amendments to the impact management actions may be effected immediately by the authorisation holder and must be reflected in the next environmental audit report submitted to the competent authority in terms of regulation 34 of the EIA Regulations. The record of revisions must be updated accordingly, and the revision number and status of a particular page shall be reflected in the appropriate space of each page.

2.8. Review of this EMPr

» The EMPr should be reviewed on an annual basis.
» The Authorisation Holder will keep a record of all dates of review, even if review did not necessitate an amendment to the EMPr.
» The review may take the form of an internal audit or may form part of the external audit conducted in terms of regulation 34 of the EIA Regulations.

» The main aims of a review of the EMPr for purposes of a revision will, among other things, be to determine the following:
    - Ability of the EMPr to sufficiently provide for the avoidance, management and mitigation of environmental impacts associated with the undertaking of the activity on an ongoing basis;
    - Conformity and adherence to the minimum legislative requirements;
    - Simplicity and clarity of the content and text; or
    - The incorporation of practical experience gained during implementation.

3. PROJECT ROLES AND STRUCTURE

The general roles to be defined are those of the:

- Authorisation holder
- Environmental Control Officer
- Ecologist
- Contractor(s) (Principal Contractor / Project Manager); and
- Environmental Auditor

The specific titles referred to may vary, but the intent of this section is to broadly define expectations and responsibilities for key role players in the implementation of the EMPr.

3.4. Authorisation holder

The applicant, the WCG: Department of Infrastructure will be the holder of the Environmental Authorisation should it be issued and will therefore be responsible for ensuring that the conditions of such authorisation are fully adhered to. The authorisation holder will appoint the Environmental Control Officer and Contractor during the implementation phase.

The authorisation holder remains ultimately responsible for the implementation of all environmental management actions, and shall implement such management systems and agreements as may be necessary to provide for oversight, and assurance of compliance during all phases of the development. Commonly, responsibilities borne by the Authorisation Holder are delegated to a project manager.

Key responsibilities include ensuring that:

- The ECO is provided with the necessary information in order to adequately undertake their responsibilities;
- This EMPr is included in the contractual agreements with all contractors and subcontractors;
- Method Statements requested by the ECO are provided timeously;
- Corrective action is implemented as required;
- Appropriate records and information regarding compliance with the EMPr requirements are maintained and made available to the ECO;

3.5. Environmental Control Officer

An independent Environmental Control Officer (ECO) must be appointed at all times that construction is underway on the site to ensure compliance with the EMPr and conditions of the EA. The ECO's role also includes monitoring compliance with other environmental legislation, the monitoring of environmental impacts, and the keeping of accurate records.
The ECO shall update the EMPr when necessary, and shall compile a monitoring checklist or protocol based on the EMPr. The ECO's role includes the following aspects:

- Periodic environmental inspections during the implementation phase of the proposed project in order to monitor and record environmental impacts and nonconformances, and to monitor site activities to ensure adherence to the specifications contained in the EMPr, using a monitoring checklist. However, where works being undertaken have a higher risk of potentially having negative environmental pollution impacts, more frequent inspections should be undertaken. This should be determined by the ECO, in consultation with the engineers.

- Maintain a record of site visits and audits, a copy of the environmental authorisation (should it be granted) and other permits and licenses, a register of non-conformances, and a copy of previous environmental audits.
- Prior to construction commencement, the ECO must meet on site with the Contractor representative to confirm designated development and no-go areas and to confirm the method statements required.
- Request, review and approve Method Statements from the contractor and sub-contractors prior to the commencement of the activities concerned.
- Ensure that the contractors and sub-contractors and their employees have received the appropriate environmental awareness training.
- Meet with the contractors and subcontractors to discuss the implementation of this document.
- Identify appropriate corrective measures if transgressions occur.
- Keep a register of monitoring activities and results
- Assist in finding environmentally acceptable solutions to implementation problems.
- Identify and make amendments to the EMPr where appropriate.
- Conduct an environmental inspection on completion of the implementation period and prepare a close-out report.

The Contractor and individual contractors may designate Environmental Officers to liaise with the ECO on environmental matters.

3.6. Ecological Management Partner

Authorisation Holder shall also appoint an ecological management partner prior to commencement of construction phase and during the operational phase, whose role includes the following aspects:

- Implementation of the search and rescue programme.
- Prepare an ecological management plan for the conservation areas.
- Rehabilitation of wetlands and the associated buffers and disturbed areas with planting of suitable indigenous plants.
- On going maintenance including alien invasive plant management, reintroduction of suitable nursery grown or rescued plant species that are both locally indigenous which should do well in the available habitats and rehabilitate areas should be designed to link the priority habitat remnants with rehabilitated ecological corridor.

3.7. Contractor

The role of the Contractor is as follows:

- The Contractor shall ensure that all employees, contractors and sub-contractors are made aware of the EMPr and their responsibilities.
- Prior to dredging commencement, the Contractor must meet on site with the ECO representative to confirm designated development and no-go areas and to confirm the method statements required.
- Liaise with the ECO and Authorisation Holder (or representative) and ensure that works on site are conducted in an environmentally sensitive manner in accordance with this EMPr.
- Maintain on site a copy of this EMPr and all environmental authorisations and licenses pertinent to the development on site.

- Ensure that all appointed contractors and sub-contractors repair, at their own cost, any environmental damage as a result of a contravention of the specifications contained in the EMPr, to the satisfaction of the Project Owner's ECO;
- Ensure that all employees (permanent and temporary) and all sub-contractors that work on the site for longer than two days, receive environmental awareness training within one week of being on site.
- Designate an Environmental Officer (or employ a designated suitably qualified individual to fulfil the role of an Environmental Officer) to monitor and report on the daily activities on-site during the construction period.

3.8. Environmental Auditor

The environmental auditor is an independent environmental auditor appointed by the authorisation holder in compliance with Regulation 34 of the EIA Regulations at a frequency specified in the conditions of the environmental authorisation.

It is recommended that the auditing frequency be as follows:

- Three months after the commencement of activities;
- Every six months thereafter; and
- At the end of the implementation phase.

The auditor shall be independent from both the EAP and the ECO and shall not have any financial or other interest in the activities being audited, other than fair remuneration. The primary objective is to audit compliance with the environmental authorisation and associated EMPr. Key requirements for an audit report would typically include:

» Verifiable findings on the level of compliance with the authorisation conditions;
» Findings on the ability of the EMPr to provide for avoidance, management and mitigation of impacts; and
» Recommendations for corrective actions to rectify any shortcomings that may be identified.

The auditor shall:

» Review the environmental authorisation, EMPr, and assessment reports to obtain an understanding of potential impacts, assessed significance and proposed avoidance, management and mitigation measures. Prepare an audit checklist against which audit findings can be determined, based on the conditions of authorisation, the EMPr, and any other considerations relating to potential impacts.
» Conduct a site inspection to verify physical compliance during implementation.
» Audit construction-related documentation including Environmental Control Officer monitoring reports, dredging progress reports, the contractor's environmental site records and files, and photographic records to identify any non-compliances and/or shortcomings.
» Prepare an audit report in line with the requirements of Appendix 7 of the EIA Regulations and the specific requirements of the environmental authorisation.

4. PRE-CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

The outcomes, management measures, and monitoring requirements detailed in this section are applicable only to the pre-implementation phase of the proposed development, defined as including the phase of the project where sensitive areas are identified and demarcated and necessary activities before site establishment, the installation of temporary structure and the construction works commence.

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
4.1 Disturbance of aquatic habitat	Minimise impacts on aquatic habitat	4.1.1. Demarcate 20m buffer around each retained wetland with a suitable boundary marker with signage declaring the area as a No-Go area for the duration of the construction phase.	• Monitor the demarcation of buffer areas around the wetlands.	• Prior to establishing site camp	• Contractor & ECO
4.2 Loss and degradation of natural and partly natural vegetation in the development footprint on the site.	Clearing of indigenous vegetation is limited to the development footprint	4.2.1. Search and Rescue of all translocatable indigenous seeds, bulbs and whole plants in the development areas must be undertaken over a full year prior to any site development. The work should be undertaken by appointed conservation partner. The rescued material should ideally be used within the conservation areas on site. 4.2.2. Demarcation of all patches of very-high sensitive to medium sensitive vegetation outside of the development area with a suitable boundary marker with signage declaring the area as a No-Go area for the duration of the construction phase. 4.2.3. The conservation areas to be managed by the appointed conservation partner with suitable expertise. 4.2.4. The partnership must be signed and implemented within six months of any authorisation. 4.2.5. Within 6 months of taking over management of the site, the conservation partner must draw up an ecological	• Search and rescue overseen by a conservation partner. • Demarcation around the vegetation patches by Botanist/ conservation partner • Contract of partnership	• A full year prior to commencement of construction • Prior to site establishment • Within six months of authorisation	• Applicant & Conservation Partner

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		management plan for the conservation areas.			
4.3. Site establishment	To ensure that the site camp and laydown areas are situated at an appropriate location.	4.3.1. Site camps, laydown area and stockpiling must be placed beyond the 20m buffer of wetlands and must not infringe in the areas of sensitive vegetation. 4.3.2. Pre-commencement inspection to be undertaken by ECO to identify suitable areas for the site camp and laydown areas. 4.3.3. Environmental Awareness Training for Contactor's representatives to ensure that all the requirements of this EMPr are understood.	• Site establishment method statement and site layout plan to be prepared and approved by the ECO. • Monitor the placement of the site camp via visual inspections, and record and report any noncompliance.	• Prior to commencement of construction	• Contractor and ECO

5. CONSTRUCTION ENVIRONMENTAL MANAGEMENT PLAN

The outcomes, management measures, and monitoring requirements detailed in this section are applicable to the design and implementation phases of the proposed development.

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
5.1. Alteration of flow regime due clearance of vegetation and grass fields for construction phase	Minimise impacts associated with high flow velocity of stormwater into receiving wetlands.	5.1.1. Undertake site preparation (vegetation clearing and levelling through excavations and/or infilling) during the dry summer season, where possible. 5.1.2. If site preparation cannot be undertaken prior to the onset of the winter rainy season, then the Environmental Control Officer (ECO) must advise on measures to ensure that run-off from cleared areas is contained and encouraged to infiltrate rather than discharge directly into the receiving wetlands. 5.1.3. Prior to site preparation designate the outer buffer boundary (20m from the outer wetland	• Review construction programme to ensure the site preparation is within specified period, or any adjustments are approved in writing by ECO. • Monitor for activities and make adjustments as necessary.	• Once off Prior to commencement of construction. • During site establishment and throughout	• Contractor • Contractor and ECO

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		edge) with a suitable boundary marker and declare the area as a No-Go area for the duration of the construction phase. 5.1.4. Timeously revegetate areas cleared by construction activities that will remain undeveloped (i.e. open spaces) with suitable indigenous plants.	• Ensure the buffer is maintained intact and construction activities kept outside. • Post construction inspections	the construction phase. • As required during landscaping	• Contractor/ Conservation partner
5.2. Disturbance of aquatic habitat due to increased rate of erosion and sedimentation from exposed soils during site clearing/excavation and infilling immediately upslope of wetlands.	Prevent discharge of sediment-laden water into watercourses	5.2.1. A method statement for the control of erosion and sedimentation must be compiled by the Contractor for review by the ECO and approval by the Engineer. 5.2.2. Stockpiles must be placed at least 30m from the wetlands and associated buffer. 5.2.3. Perform periodic inspections and maintenance of soil erosion measures and stormwater control structures. 5.2.4. Ensure any sediment-laden water is not directly discharged into the stormwater system nor wetlands on site. 5.2.5. Protect soil stockpiles during the winter rainy season from erosion using a tarp or erosion blankets. 5.2.6. Implement erosion control measures in order to prevent erosion and sedimentation of the receiving wetlands like strategically placing straw bales or sediment fences/traps, to divert stormwater away from areas susceptible to erosion. 5.2.7. Any sediment contaminated runoff should be contained and allowed to settle before being discharged. The settled-out sediment collected in this manner should be cleared manually as needed and removed from site.	• Confirm a Method Statement for works near watercourses has been compiled by the Contractor, and it should effectively prevent erosion and sedimentation. • Monitor activities and record and report non-compliance.	• Prior to any works near wetlands and or associated buffer areas. • As required during the construction phase	• ECO • ECO

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
5.3. Water quality impairment	Minimise impacts on aquatic habitat	5.3.1. Ensure cement is mixed in a cement mixer at all times within a bunded area with an impermeable base. 5.3.2. All wet and dry cement deposits outside the contained areas are to be removed at the end of each day and disposed of off-site as rubble. 5.3.3. Dispose of concrete and cement-related mortars in an environmental sensitive manner. Washout may not be discharged into any wetland and associated buffer. 5.3.4. Store fuel, chemicals and other hazardous substances in suitable secure weather-proof containers with impermeable and bunded base to limit pilferage, spillage into the environment, flooding or storm damage and to be located at least 100m from any wetland. 5.3.5. Inspect all storage facilities and vehicles daily for the early detection of deterioration of leaks. 5.3.6. Clean up any spillages (e.g. concrete, oil, fuel), immediately. Remove contaminated soil and dispose of it appropriately. 5.3.7. Dispose of used oils, wash water from cement and other pollutants at an appropriate licensed landfill site. Disposal of any of these waste materials into any wetland and associated buffer is strictly prohibited. 5.3.8. All contaminated soil removed from the site by excavator or hand is to be immediately placed in a skip (i.e. no stockpiling of contaminated soil on-site) 5.3.9. Provide an adequate number of portable toilets where work is being undertaken. The toilets must be located at least 30m from the watercourse and must be serviced regularly in order to prevent leakage/spillage.	• Ensure Method statement for batching, handling and storing cement is in place and implemented throughout the construction phase. • Ensure Method Statement for handling and storage of hazardous material is in place and is implemented. • Ensure a spill response procedure is in place and implemented during a spill event. • Monitor the storage and handling of dangerous goods and hazardous material on via site audits and record non-compliance and incidents. Monitor if spillages have taken place and if they are removed correctly. • Monitor and ensure location of ablution facilities outside of sensitive areas.	• Once-off prior to construction and monitoring throughout the construction phase. • Once off prior to construction. • During a spill event • As required during construction phase	• ECO and Contractor

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
5.4. Waste impacts	Manage waste in accordance with legislation and best practice methods. Minimise the production of general waste Prevent pollution or contamination due to improper waste handling or storage on site.	5.4.1. Implement a waste management plan for the implementation phase, prepared by the contractor. 5.4.2. Designate a waste management area, which should be an area of hardstanding with a roof and sides, or consist of separate bins and skips. 5.4.3. Litter and construction waste should be collected on site by the end of each day and stored in bins, skips, or other suitable storage area. 5.4.4. Food waste must be stored in bins or skips that are covered and cannot be accessed by flies or rodents. 5.4.5. Waste should be separated into hazardous, general, and recyclable waste streams, with clearly designated bins and skips for each waste type. 5.4.6. Hazardous wastes, including materials contaminated with oils and hydrocarbons, must be removed from site by a suitably licensed contractor and manifests provided. 5.4.7. Other non-hazardous solid waste (e.g. refuse) to be disposed of at a licensed landfill 5.4.8. A suitable waste contractor must be appointed to collect waste from site on a regular basis for correct disposal. Proof of disposal (waybills or waste disposal slips) must be retained and kept on file for auditing purposes. 5.4.9. If the volumes of waste stored exceed 80m^3 for hazardous waste and/or 100m^3 for general waste the National Environmental Management: Waste Act (NEM:WA) National Norms and Standards for the Storage of Waste in terms of Government Notice (GN) No. 926 of 29 November 2013 must be adhered to.	• Waste removal and disposal to be monitored. Monitor via site audits and record noncompliance and incidents. • Monitor waste disposal slips and waybills via site audits and record non-compliance and incidents.	• During site inspections • Monthly	Contractor, ECO

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
5.5. Visual Impacts	Minimise visual disturbance during Construction	5.5.1. Screen site camps and laydown areas with shade cloth or similar, where possible and appropriate. 5.5.2. Manage stockpile and laydown areas for cleanliness and appearance. 5.5.3. Roof and screen waste areas. Avoid unnecessary signage or advertisement on site. 5.5.4. Avoid unnecessary signage or advertisement on site. 5.5.5. Restrict the activities and movement of construction workers and vehicles to the immediate construction site as much as possible; 5.5.6. Ensure that rubble, litter, and disused construction materials are removed regularly.	• Review method statement for site camp establishment for locational and visual management measures • Monitor by visual inspections.	•	
5.6. Noise and vibration	Noise disturbance is minimised or avoided.	The following actions to manage the noise and vibration impacts are: 5.6.1. Restriction of working hours in line with municipal and provincial requirements. 5.6.2. Use of services and well-maintained machinery in good working order. 5.6.3. All construction equipment utilised, and activities undertaken must be compliant with the Western Cape Noise Control Regulations. P.N. 200/2013. 5.6.4. Restrict construction activities generating noise outputs of 85 dB (A) or more to the hours of 08h00 to 17h00 Mondays to Fridays. Should the Contractor need to do this work outside of these hours, permission from the local authority must be obtained, and surrounding civic institutions and businesses must be informed prior to the work taking place. 5.6.5. No amplified music shall be allowed on Site. The Contractor shall not use sound amplification equipment on site, unless in emergency situations.	• Monitor activities and record and report non-compliance with the management actions. • Maintain complaints register on site. It two or more noise complaints are received; the Contractor must indicate whether the noise generated on the site exceeds thresholds outlined in the Western Cape Noise Control Regulations.	• Noise complaint register updated as needed. Inspection by ECO monthly or as needed (whichever is more frequent)	Contractor, ECO

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		5.6.6. If excessive noise is expected on the boundary of the site, neighbouring properties must be informed in writing and in advance of when the high noise levels will occur and for how long they will occur 5.6.7. The Contractor must post signage indicating contact details of the Contractor and ECO on the site to allow for reporting of complaints as well as having complaints register available.			
5.7. Traffic Related Impacts	Prevent increased traffic congestion particularly along Old Paarl Road and De La Haye Avenue where construction vehicles will take access site during peak hours.	5.7.1. Adherence to Traffic Management Plan to minimise traffic congestion in the area. 5.7.2. Use of flag person to direct traffic when construction vehicles are moving. 5.7.3. Traffic calming measures (raised intersection or change in surface texture) are recommended to increase visibility and SSD, as well as reduced speed, if required during the construction phase.	• Review Traffic Management Plan • Observe traffic congestion and monitor complaints register during construction.	• Once-off prior to construction • During monthly inspections by ECO and daily by Contractor	ECO and Contractor
5.8. Dust	Minimise dust impacts on surrounding area. Comply with the City of Cape Town's Air Quality Management By-law's provisions related to dust emissions.	5.8.1. Dust generated from all activities related to the proposed construction activities must comply with the National Dust Control Regulations (GN No. R827 of 1 November 2013), promulgated in terms of the National Environmental Management: Air Quality Act, 2004 (Act No. 39 of 2004) by ensuring that construction activity does not produce dust more than stipulated thresholds to the detriment of the environment and human health. 5.8.2. The movement of site personnel and machinery over exposed soil should be minimised particularly in proximity to high-use roads. 5.8.3. Exposed surfaces should be stabilised immediately. Area left bare for longer than two weeks must be covered to reduce windblown dust.	• Ensure dust suppression measures are implemented as and when required . • Monitor activities and record and report non-compliance. • Ensure a method statement for the management of dust during construction is place and implemented throughout the construction phase	• Throughout construction activity • Once -off prior to bulk works	Contractor and ECO

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		5.8.4. Works should be staged to minimise the area of disturbed ground at any given time, before working on other areas. 5.8.5. Screening and/or temporary fencing to control the movement of sand on the site should be installed if necessary. 5.8.6. Non portable water should be used for short-term dust stabilisation. 5.8.7. Excavation, handling, and transportation of erodible materials must be avoided under high wind conditions. 5.8.8. Stockpiles of sand and stone must be effectively stabilised and must be covered or sealed if dust generation is apparent. 5.8.9. All vehicles transporting sand and spoil must have tarpaulins covering their loads to reduce spillage and windblown dust. 5.8.10. Off-road vehicle and plant movements within the site must be avoided as far as possible, and strict speed limits must be enforced to reduce dust generation. 5.8.11. Dust fallout monitoring in terms of the National Dust Regulations, should be undertaken should it become evident that the dust mitigation measures are not effectively and efficiently managed and controlled during all phases of the proposed project. 5.8.12. Should the need arise; the City's Air Quality Officer will call for the implementation of a Dustfall Monitoring Programme, which will require the holder of the Environmental Authorisation to submit monitoring reports at his discretion. The dustfall rates must prove compliance with the prescribed dustfall rates. Should dustfall results show dustfall rates to be above permissible standards, the Dust Management Plan may need to be amended and submitted to the City's Air Quality Officer for review, approval and authorisation.			

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
		5.8.13. Site screening methods, if deemed necessary, may be implemented to minimise potential dust nuisances.			
5.9. Heritage	Preservation of heritage resources	5.9.1. Should any heritage resources, including evidence of graves and human burials, archaeological material and paleontological material be discovered during the execution of the activities above, all works must be stopped immediately, and Heritage Western Cape must be notified without delay.	• Ensure that the discovered material is not altered. • Cease activities and contact HWC	• During discovery of heritage resources	• Contractor, ECO

6. OPERATIONAL ENVIRONMENTAL MANAGEMENT PLAN

The outcomes, management measures, and monitoring requirements detailed in this section are applicable only to the operational phase of the proposed development. This section of the Environmental Management Programme addresses the operational phase and maintenance aspects of the works.

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
6.1. Disturbance of wetland habitat	Minimise impact on aquatic habitat during the operational phase	6.1.1. Maintain a 20m buffer around each of the wetlands 6.1.2. Prohibit human and pet access to the retained wetlands through signage in the wetland areas and in the set of rules stipulated in the Home Owner's Manual 6.1.3. Prohibit the dumping of any form of waste into the wetland areas. 6.1.4. Orientate the buildings so that they front onto the wetland areas, where possible 6.1.5. Inspect the wetland areas and associated buffers for the presence of litter and invasive alien plants and remove with immediate effect.	• Develop a homeowner's manual that specifies management actions of this EMPr. • Monitor during maintenance sensitive aresa	As occupation takes place	Authorisation holder/ Developer
6.2. Alteration of flow regime and Water quality impairment	Minimise impact on aquatic habitat during the operational phase	6.2.1. Compile a Stormwater Management Plan for the proposed development that complies with the CCT Policy (2009) for managing urban stormwater impacts. 6.2.2. Ensure that all pipelines upslope and within the regulated area for wetlands (500m) are lined with an internal Kevlar or similar sleave 6.2.3. Inspect the water supply and sewerage pipelines upslope and within the regulated area for wetlands (500m) annually and repair / address leaks timeously.	• Implement the plan throughout operational phase • Review as built information to ensure lining completed • Visually inspect for leak and ensure repairs are completed as soon as possible.	Throughout the operational phase	Authorisation holder/ Developer

Environmental aspect or impact	Impact Management Outcomes	Impact Management Actions	Monitoring Actions		
			Method	Frequency	Responsibility
6.3. Landscaping and Maintenance of wetlands	Ensure periodic maintenance to prevent invasion by alien invasive species and disturbance of the habitat	6.3.1. Ensure that in future no part of the retained wetland areas and their associated buffer zones is mowed. 6.3.2. The only cutting-back that may be undertaken is the periodic cutting-back of Typha capensis (bullrush) which is known to inhabit wetlands with longer hydroperiods and proliferate to such an extent that they outcompete sensitive endemic species. 6.3.3. Prepare a Landscaping Plan for the wetlands and their associated buffers that requires planting of suitable indigenous plants. 6.3.4. Monitor the wetlands and their associated buffers for alien invasive plants and remove any identified plants in accordance with accepted best-practise methods with immediate effect.	• Ensure landscape plan specifies cessation of mowing within the wetlands and associated buffer. • Follow maintenance management plan for all the required maintenance within the watercourses.	Once-off As maintenance is required	Authorisation holder/ Developer
6.4. Management of Conservation areas	Minimise and or prevent degradation of conservation areas	6.4.1. ongoing tasks will include alien invasive plant management (including herbs and grasses) and selective reintroduction of suitable nursery grown or rescued plant species that are both locally indigenous (found within 10km of the site) and which should do well in the available habitats, and these rehabilitate areas should be designed to link the priority habitat remnants with rehabilitated ecological corridors. 6.4.2. Maintenance of conservation areas with adherence to the ecological management plan.	• Maintain a record of periodic maintenance activities and annual reports	As maintenance is required	Conservation partner.

7. ENVIRONMENTAL AWARENESS TRAINING PLAN

This section outlines the training by which the authorisation holder (via its appointed contractor) will inform its employees of environmental risks and the manner in which risks must be dealt with to avoid pollution or degradation of the environment. It may be adapted as needed to suit the circumstances in which it is implemented

Course	Required attendees	Presented by	Course content	Timing	Records to be kept
6.5. Implementation phase Environmental Awareness Training for managers	6.5.1. Project Manager appointed by the authorisation holder 6.5.2. Principal contractor's contract manager, site agents, and assistant site agents (as applicable) 6.5.3. Contractor's designated environmental officer or SHE representative	ECO	7.1.1.1. Overview of environmental authorisations and permits granted 7.1.1.2. Basic environmental law 7.1.1.3. Roles of the ECO, authorisation holder, project manager, and contractor 7.1.1.4. Purpose and content of method statements 7.1.1.5. Site sensitivities, including sensitive species – amphibians, African Marsh Harrier, etc. 7.1.1.6. Management actions and measures for the implementation phase as detailed in this EMPr 7.1.1.7. Record keeping requirements 7.1.1.8. Emergency procedures 7.1.1.9. Reporting and compliance monitoring	Prior to commencement of construction	Declaration of adherence to Implementation phase EMPr, signed by Contractor's representative Register of attendance
7.2. Environmental Awareness Training for site personnel	7.2.1. All site staff and personnel, including temporary staff and visitors to site 7.2.2. Maximum of 20 attendees at any one session	Contractor's designated environmental officer	Environmental do's and don'ts, including: 7.2.1.1. Access to work areas, location and identification of no-go areas 7.2.1.2. Smoking and fires 7.2.1.3. Storing and handling fuels and oils 7.2.1.4. Storing and handling chemicals 7.2.1.5. Management of cement, cement bags, slurry, and wash water 7.2.1.6. Dust and noise 7.2.1.7. Water wastage 7.2.1.8. Waste management and litter 7.2.1.9. Waste site management 7.2.1.10. Ablution facilities 7.2.1.11. Plant and machinery maintenance and load management 7.2.1.12. Accident and incident reporting 7.2.1.13. Birds, frogs, other fauna, and sensitive areas	Before any staff member begins work on site	Register of attendance, identifying all attendees by name and ID number, the topics covered, the presenter, and the date and time.

8. MAINTENANCE MANAGEMENT PLAN

8.4. BACKGROUND AND INTRODUCTION

The proponent, the Western Cape Government: Department of Infrastructure, is the custodian of Erf 6300, also known as the Stikland Hospital estate, and proposes to redevelop portions of this precinct. The opportunity to develop Stikland South was considered due to the needs of the broader area and the amount of vacant land available. The proposed Stikland South development is envisaged to create medium-density, mixed use, urban development opportunities that optimise the inherent potential of the site and portions thereof, while integrating respectfully within the surrounding urban fabric and on-site psychiatric functions, to provide maximum inclusivity, economic benefit and spatial transformation within the overall Cape Town socio-economic context. The current proposal also takes into account the environmentally sensitive areas identified by the freshwater and botanical specialist. These sensitive areas will largely be conserved and enhanced during the proposed development. Please see section 1.2 of the EMPr for a summarised description of the proposed development. The operational phase will involve maintenance activities that may include activities listed in terms of the National Environmental Management Act, 1998 and the Environmental Impact Assessment Regulations, 2014 (as amended).

A Basic Assessment process in terms of the National Environmental Management Act (107 of 1998), a Water Use Application (confirmed to fall within the ambit of the General Authorisation by DWS) in terms of the National Water Act (36 of 1998) and aquatic specialist assessment have been undertaken for the proposed development. This Maintenance Management Plan (MMP) forms part of the Environmental Management Programme for the development and should be implemented during the operational phase of the development. Maintenance activities within the site boundary will be implemented by Western Cape: Department of Infrastructure or its successor in title.

8.4.1. Scope

This Maintenance Management Plan (MMP) is intended to govern the implementation of maintenance activities in and around watercourses in such a way as to prevent, minimise or mitigate negative impacts and risks. Maintenance activities are, as defined in the EIA Regulations of 2014 (as amended), *actions performed to keep a structure or system functioning or in service on the same location, capacity and footprint*. This MMP is applicable to the maintenance activities of the wetlands and remnants of indigenous vegetation.

These activities are anticipated to include:

- Removal of vegetation (nuisance reeds and alien invasive species) and rehabilitation with locally indigenous species;
- Maintenance of open spaces and infrastructure

Maintenance activities as listed above may constitute a listed activity identified in terms of the NEMA EIA Regulations, 2014 (as amended), namely

» Activity 19, Listing Notice 1: The infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving- (a) will occur behind a development

setback; (b) is for maintenance purposes undertaken in accordance with a maintenance management plan

» Activity 12, Listing Notice 3: The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan.
i. Western Cape
i. Within any critically endangered or endangered ecosystem listed in terms of section 52 of the NEMBA or prior to the publication of such a list, within an area that has been identified as critically endangered in the National Spatial Biodiversity Assessment 2004;

This MMP has been prepared principally in compliance with the required content for the Maintenance Management Plans provided by the Western Cape Government Department of Environmental Affairs and Development Planning (dated April 2024). The purpose of the MMP is to maintain infrastructure in a manner that either improves the current state of, and/or reduces negative impacts to ensure that ecosystem services are preserved/improved and to prevent further deterioration of the watercourse.

8.4.2. Author

Author	Professional registration	Qualification	Years of experience
Tarryn Solomon	Registered E.A.P. # 2019/1671	B.Sc. Environmental and Water Science	16+
Anathi Skweyiya	Registered Cand E.A.P # 2022/4635	B. Tech Environmental Management	3

8.4.3. Legal status

This MMP forms part of the Environmental Management Programme compiled for the EIA (Basic Assessment) and should be read in conjunction with the remainder of the Environmental Management Programme. The MMP may also be defined or adopted by the competent authority in terms of the EIA Regulations. Any other applicable statutory requirement must also be complied with, including any obligations under the National Water Act, 1998 (Act 36 of 1998).

8.5. TERMS AND ACRONYMS

CCT	City of Cape Town
EAP	Environmental Assessment Practitioner
ECO	Environmental Control Officer
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMPr	Environmental Management Programme
DEA&DP	Department of Forestry Fisheries and the Environment
DWS	Department of Water and Sanitation
MMP	Maintenance Management Plan

NEMA National Environmental Management Act, (Act No. 107 of 1998), as amended

8.6. SITE LOCATION AND DESCRIPTION

Stikland South is located on erf 6300 in Stikland, Bellville. It is situated along the Provincial Main Road R101 (Old Paarl Road) to the north, De La Hay Avenue to the west, Midmar Road to the east and railway line to the South. See **Error! Reference source not found.** for locality map.

8.7. AQUATIC FEATURES

An aquatic ecosystem impact assessment was undertaken by SACNASP registered aquatic specialist Nick Steytler. The site contains five wetlands delineated through geotechnical survey which confirmed that perching of the water table was a key hydrological driver of the wetlands on the site and delineation of wetlands was based on the hydropedological study. Three of the identified wetlands are depressional wetlands and two are Hillslope seep wetlands. The Hilslope seep wetlands are assigned Category C (moderately modified) in terms of their present ecological state which implies a moderate change in ecosystem processes and loss of natural habitats have taken place, but the natural habitat remains predominantly intact. Two of the Depression wetlands (4&5) are assigned Category E (severely modified) implying the change in ecosystem processes, loss of natural habitat and biota is great but some remaining natural habitat features are still recognisable. Wetland1 (depression) was assigned Category D (Largely modified) which indicates a large change in ecosystem processes, loss of natural habitat and biota has occurred. All the wetlands have low ecological importance and sensitivity and will be retained with a mitigation of 20-metre buffer. Impacts associated with both construction phase and operational phase are assessed to be low.

8.8. TERRESTRIAL BIODIVERSITY

The site supports notable remnants of two Critically Endangered vegetation types i.e. Cape Flats Sand Fynbos and Swartland Shale Renosterveld, with at least five plant Species of Conservation Concern. At least 8ha of mostly indigenous vegetation remains in the area. The majority of the study area is of Low botanical sensitivity, and these areas do not support any of the recorded Species of Conservation Concern (SoCC). There are four patches of Very High sensitivity one of which is a seasonal wetland, and the other three all support the five recorded plant Species of Conservation Concern. Surrounding and linking these are two patches of medium to high sensitivity. In the southeast are three patches of medium sensitivity that support none of the SoCC except the annual *Phyllopodium capillare*.

8.9. OBJECTIVES AND TERMS OF REFERENCE

The terms of reference for this MMP are as follows:

- Describe the site sensitivities based on the specialist assessments
- Identify the environmental risks associated with the maintenance activities;
- Identify the measures that can be implemented to avoid or reduce the impacts of maintenance activities on watercourses; and
- Compile a MMP which meets the requirements of the DEA&DP Maintenance Management Plan.

8.10. DESCRIPTION OF MAINTENANCE ACTIVITIES

- Management and removal of alien invasive or nuisance vegetation.

- » Rehabilitation and restoration works
- » Sediment, debris and litter removal

8.11. ROLES AND RESPONSIBILITIES

The **Authorisation Holder** (or its successor in title) will be responsible for the maintenance work. It will in turn will employ the ECO. The Authorisation Holder will also ensure, as a signatory to the MMP, that the Contractors fulfil their obligations in terms of this MMP.

An independent **Environmental Control Officer (ECO)** must be appointed prior to commencement of any maintenance activities. The ECO will advise the Authorisation Holder and Contractor of any environmentally related issues during the maintenance phase of the development. The responsibilities of the ECO will include monitoring of compliance with the MMP by the Contractor.

The Contractor will adhere to the conditions of this MMP and ensure that all of its subcontractors, employees, suppliers, agents and so forth, for whom the Contractor is fully responsible for their actions on site, are fully aware of this MMP, its requirements and the consequences of any breach of the requirements of this MMP. The Contractor is fully responsible for implementing the MMP. The Contractor will ensure that works on site are conducted in an environmentally responsible manner and in accordance with the requirements of this MMP.

8.12. ENVIRONMENTAL AWARENESS

Before work is done in accordance with this MMP, persons who will be conducting the work must undergo environmental awareness training as outlined in section 5 of the EMPr. Attention should be focused on the following areas of sensitivity:

- » Removal/disturbance of riparian vegetation;
- » Aquatic habitat disturbance;
- » Soil erosion and sedimentation; and
- » Water quality degradation due to siltation and debris

8.13. GENERAL BEST MANAGEMENT PRACTICES

The following general management practices mitigation measures should be implemented where required during the maintenance management activities:

8.13.1. Site boundaries and no-go areas

The Contractor must demarcate the boundaries of the site or area scheduled for maintenance during maintenance management activities as required. The minimum area scheduled for the maintenance activities should be demarcated. Access to the site during maintenance activities must be restricted to ensure to only the required personnel in order to gain access via the designated, controlled access points. Sensitive areas must be demarcated in conjunction with the ECO prior to any maintenance work starting on site. Where at all possible, existing access routes should be used. In cases where none exist, a route should be created through the most degraded area avoiding sensitive/indigenous vegetation areas.

8.13.2. Timing of works in watercourses

Repairs and maintenance should be undertaken within the dry season (except for emergency maintenance works or rehabilitation works within riparian areas).

8.13.3. Machinery and chemical management

Handling and storage of any pollutants may not take place near the watercourse.

When machinery is used in maintenance works, ensure effective operation with no leaking parts and refuel at a safe distance from the watercourse to manage any accidental spillages and pose no threat of pollution.

8.13.4. Flow and habitat maintenance

At no time should the flow of the watercourse be blocked (temporary diversions may be allowed) nor should the movement of aquatic and riparian biota (noting breeding periods) be prevented during maintenance actions.

8.13.5. Top soil and rehabilitation

In circumstances which require the removal of any top soil, this must be sufficiently restored through sustainable measures and practices.

Concerted effort must be made to actively rehabilitate repaired or reshaped banks with indigenous local vegetation.

The build-up of debris/sediment removed from a maintenance site may:

- be utilised for the purpose of in-filling or other related maintenance actions related to managing erosion, which form part of an adopted MMP;
- not be deposited anywhere within the watercourse where such action is not part of the proposed maintenance activities. Material that cannot be used for maintenance purposes must be removed out of the riparian area to a suitable stockpile location or disposal site.
- The use of foreign material, such as concrete, rubble, woody debris and/or dry land based soil, is strictly prohibited in maintenance actions, unless for the specific purpose of repairs to existing infrastructure, coupled with appropriate mitigation measures.
- On completion of the maintenance action, the condition of the site in terms of relative topography should be similar to the natural state.

8.14. MONITORING AND REPORTING

It is recommended that an independent environmental control officer be appointed to monitor the maintenance activities to be implemented according to the prescribed method statements.

The ECO will be responsible for:

- monitoring, reviewing and verifying compliance by the Contractor with the environmental specifications of this MMP.
- Provide environmental induction training to contractors on site prior to commencing of maintenance/repair work;
- Monitor compliance with this MMP;
- Keep Record of all activities on site, problems identified, transgressions noted, and a task schedule of tasks undertaken by the ECO;

- » Guidance will be given to the implementing agent as required with regards to implementing the MMP; and
- » Photographs of the maintenance management activity must be taken as a record of the correct undertaking of the specific maintenance management activity

8.15. METHOD STATEMENTS DESCRIBING PROPOSED MAINTENANCE ACTIVITIES

The following sections are generic method statements for the types of maintenance activities anticipated to occur in and around the watercourse during the operational phase of the proposed development. The method statements are applicable to the wetlands situated on erf 6003. It is anticipated that the ECO for a given maintenance activity will provide guidance to the Contractor on the mitigation of specific impacts.

8.15.1. Inspections and monitoring of watercourses

Description of maintenance activity	Site inspection of the wetlands for visual inspections and water quality monitoring if required
Applicable sites	Erf 6003
Responsible person	Authorisation holder and ECO
Management Actions	Undertake regular visual inspections to ensure that: – Flows are not blocked by sediment buildup, debris, alien invasive vegetation, or indigenous nuisance vegetation. – Erosion of the banks and surrounding area has not occurred. – Litter and waste have not built up in the watercourse. – Undertake water quality monitoring in accordance with the management plan and EMPr.
Environmental impacts	Minimal disturbance to vegetation during the inspection
Significance of impacts	Negligible with mitigation
Mitigation measures	Access to the wetlands should cause minimal disturbance to the vegetated areas and use of existing disturbed areas access to site is preferable
Period	Regularly throughout the maintenance period

8.15.2. Clearing of alien invasive vegetation

Description of maintenance activity	Control of alien and invasive vegetation on site
Applicable sites	Erf 6003
Responsible person	Authorisation holder and/or Invasive clearing implementation agencies
Actions	– Identify alien plants to be removed. Please contact the CapeNature for assistance – Clear felled alien vegetation from the wetland area – Herbaceous invasive species within wetlands should be treated with an appropriate herbicide.

	– Spraying may occur only when surface water levels are low, and may not occur if plants are under stress, such as on very hot days or in very dry or dusty conditions. – Surfactants may not be used in the watercourse. – Where necessary revegetate cleared areas with suitable indigenous vegetation.
Environmental impacts	– Alien invasive vegetation clearance is a positive impact – Minor disturbance to the local indigenous vegetation within the aquatic habitats as a result of removal of alien invasive plants
Significance of impacts	– Low with implementation of mitigation measures
Mitigation measures	– Ongoing monitoring and clearing of regrowth alien plants within these areas will be required. This will ensure that the plants are removed while still young saplings that can easily be removed (usually puling of seedling by hand is possible when the soil is wet). This prevents the spread of the alien plants once seeds have been produced.
Period	Ensure that the cleared site is revisited on a regular basis, 6 monthly at a minimum.

8.15.3. Management of indigenous species categorized as nuisance vegetation, to improve hydrological flow and reduce associated flooding impacts

Description of maintenance activity	Periodic removal of *Typha capensis* (bulrush) and *Phragmites australis* (common reed)
Applicable sites	Erf 6003
Responsible person	Authorisation holder
Actions	*Phragmites* removal – Removal of indigenous instream indigenous vegetation should be limited to nuisance growth of reeds and bulrushes. – The removal of indigenous riparian vegetation should where possible be conducted by hand-cutting and should avoid the large-scale disturbance of soil and removal of vegetated material on the banks. – Digging or hand pulling of the reeds is ineffective due to the plant's extensive root system and simply contributes to the expansion of *Phragmites* while causing turbidity in the water column. – If machinery is utilized to remove the reeds and the associated sediment, the works in the wetlands should not impact on the structural integrity of the watercourse.

	– Reed clearing and removal may be undertaken with a machine, provided there is access for such, either from upstream or down the side slopes without resulting in severe disturbance. *Typha* (bulrush) removal – Cutting and/or burning should take place at the end of autumn when water levels are low but when the cut area will be submerged in at least 10 cm of water when water levels rise again. – Two subsequent cuttings of the bulrush will be required within the end of the growing season to suppress the regrowth prior to the inundation. – Pulling of bulrush can work where the plants are small seedlings.
Environmental impacts	– Minor disturbance to indigenous vegetation as a result of accessing the site. – Disturbance of the watercourse due to removal of sediment, debris and nuisance plant growth.
Significance of impact	Very low with implementation of mitigation measures
Mitigation measures	– The disturbance of aquatic habitats associated with the maintenance works should be limited (both temporal and spatial extents) as far as possible. – Removal of indigenous indigenous vegetation should be limited to nuisance growth of reeds and bulrushes. – The reeds should be cut below the lowest leaf and the remaining stump should not be lower than 15 cm. If a brush cutter is used, mowing should not be lower 12 cm from the ground to minimise impacts to small animals and indigenous plants. – The remaining indigenous riparian vegetation should not be cleared. The disturbance of the riparian zone when undertaking clearing activities should also be limited as far as possible, using existing access points. – If mowers are used, care should be taken that they do not damage banks or other indigenous vegetation such as sedges and rushes. – Nuisance plant growth removed from riparian area should not be dumped within the immediate areas surrounding the aquatic habitats or any indigenous vegetation removed from the site. – Clearing of reeds for maintenance should avoid and/or minimise any unnecessary impact on bird life which is dependent on these reed bed habitats and must occur outside of nesting season.
Period	– The maintenance management activity should be undertaken as required and in particular prior to the onset of the winter rainfall period. The maintenance management activity will last for approximately 1-2 days.

	– Mechanical clearing of reeds should be less frequent than annually and should be limited in extent. – Cutting should take place at the end of autumn when water levels are low but when the cut area will be submerged in at least 10 cm of water when water levels rise again.

8.15.4. Sediment, debris and litter removal

Description of maintenance activity	Removal of sediment build up or debris from the wetlands
Applicable sites	Erf 6003
Responsible person	Authorisation holder
Actions	Excessive buildup of debris or sediment in the watercourses should be removed by hand.
Environmental impacts	Minor disturbance to the local indigenous vegetation as a result of accessing the site Disturbance to the riparian area
Significance of impact	Very low if all mitigation measures are implemented
Mitigation measures	• The disturbance of aquatic habitats associated with the sediment and debris removal should be limited in both temporal and spatial extents as far as possible • Care should be taken to minimize the sedimentation that would be caused downstream of the works • Work should preferably be undertaken by hand with no machinery driven into aquatic habitats • Activities associated with the maintenance work should be undertaken during the low flow period before the onset of the winter high flows • Soil, debris and nuisance plant growth removed from the wetlands should not be dumped within the immediate areas surrounding the aquatic habitats or any indigenous vegetation removed from the site. Removed soil could be used to fill eroded area.
Period	The maintenance management activity should be undertaken on a regular basis (six monthly) and in particular prior to the onset of the winter rainfall period. The maintenance management activity will last for approximately 1-2 days.

8.15.5. Rehabilitation of riparian zones through planting of locally indigenous species

Description of maintenance activity	Planting of riparian area with locally indigenous plants
Applicable sites	Erf 6003
Responsible person	Authorisation holder

Actions	– Any disturbance to the watercourses and other landscaped areas caused during maintenance must be rectified, if necessary, by shaping and re-planting to design specifications – Replanting of disturbed areas within the riparian area with indigenous plants suitable for riparian – Avoid using machinery in the riparian area while planting and placing top soil – Replant any large, exposed areas adjacent to the watercourse by hydroseeding with a mixture of indigenous grasses.
Environmental impacts	Rehabilitation of disturbed riparian area is a positive impact
Significance of impact	Low positive
Mitigation measures	Not applicable
Period	As required