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WATERCOURSE REHABILITATION AND MANAGEMENT PLAN FOR THE PROPOSED MOUNT VIEW RESIDENTIAL DEVELOPMENT ON THE REMAINDER OF FARM 869, FARM 1262, REMAINDER OF FARM 866, REMAINDER OF FARM 1054, PORTIONS 2 AND 3 OF FARM 1054 AND PORTION 2 OF FARM 870, SIR LOWRY'S PASS, WESTERN CAPE

Prepared for

Guillaume Nel Environmental Consultants

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GLOSSARY OF TERMS

Alien Invasive plant species:	Plants that do not occur naturally within the area but have been introduced either intentionally or unintentionally. Vegetation species that originate from outside of the borders of the biome -usually international in origin.
Biodiversity:	The number and variety of living organisms on earth, the millions of plants, animans and micro-organisms, the genes they contain, the evolutionary history and potential they encompass and the ecosystems, ecological processes and landscape of which they are integral parts.
Buffer:	A strip of land surrounding a wetland or riparian area in which activities are controlled or restricted, to reduce the impact of adjacent land uses on the wetland or riparian area.
Catchment:	The area where water is collected by the natural landscape, where all rain and run-off water ultimately flows into a river, wetland, lake, and ocean or contributes to the groundwater system.
Ecoregion:	An ecoregion is a "recurring pattern of ecosystems associated with characteristic combinations of soil and landform that characterise that region".
Facultative species:	Species usually found in wetlands (76%-99% of occurrences) but occasionally found in non-wetland areas
Groundwater:	Subsurface water in the saturated zone below the water table.
Hydrology:	The study of the occurrence, distribution and movement of water over, on and under the land surface.
Indigenous vegetation:	Vegetation occurring naturally within a defined area.
Mottles:	Soil with variegated colour patterns are described as being mottled, with the "background colour" referred to as the matrix and the spots or blotches of colour referred to as mottles.
Obligate species:	Species almost always found in wetlands (>99% of occurrences).
Perennial:	Flows all year round.
RAMSAR:	The Ramsar Convention (The Convention on Wetlands of International Importance, especially as Waterfowl Habitat) is an international treaty for the conservation and sustainable utilisation of wetlands, i.e., to stem the progressive encroachment on and loss of wetlands now and in the future, recognising the fundamental ecological functions of wetlands and their economic, cultural, scientific, and recreational value. It is named after the city of Ramsar in Iran, where the Convention was signed in 1971.
RDL (Red Data listed) species:	Organisms that fall into the Extinct in the Wild (EW), critically endangered (CR), Endangered (EN), Vulnerable (VU) categories of ecological status
Seasonal zone of wetness:	The zone of a wetland that lies between the Temporary and Permanent zones and is characterised by saturation from three to ten months of the year, within 50cm of the surface
Temporary zone of wetness:	the outer zone of a wetland characterised by saturation within 50cm of the surface for less than three months of the year
Watercourse:	In terms of the definition contained within the National Water Act, a watercourse means: • A river or spring; • A natural channel which water flows regularly or intermittently; • A wetland, dam or lake into which, or from which, water flows; and • Any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse; • and a reference to a watercourse includes, where relevant, its bed and banks
Wetland Delineation	To determine the boundary of a wetland based on soil characteristics, vegetation and hydrological indicators.
Wetland Vegetation (WetVeg) type:	Broad groupings of wetland vegetation, reflecting differences in regional context, such as geology, climate, and soil, which may, in turn, have an influence on the ecological characteristics and functioning of wetlands.

LIST OF ABBREVIATIONS

AIP	Alien and Invasive Plant
CAS	Conventional Activated Sludge
CBA	Critical Biodiversity Area
CVB	Channelled Valley Bottom
DEA	Department of Environmental Affairs
DEA&DP	Department of Environmental Affairs and Development Planning
DWS	Department of Water and Sanitation
ECO	Environmental Control Officer
EDRR	Early Detection and Rapid Response
EIS	Ecological Importance and Sensitivity
GA	General Authorisation
GN	Government Notice
MEA	Millennium Ecosystem Assessment
NEMA	The National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Areas
NRCS	Natural Resources Conservation Service
NWA	The National Water Act, 1998 (Act No. 36 of 1998)
PES	Present Ecological State
RMO	Recommended Management Objective
RoD	Record of Decision
SACNASP	South African Council for Natural Scientific Professions
SAS	Scientific Aquatic Services
SDP	Site Development Plan
WetVeg Groups	Wetland Vegetation Groups
WMA	Water Management Areas
WRMP	Watercourse Rehabilitation and Management Plan
WWTP	Waste Water Treatment Plant

1 INTRODUCTION

Freshwater Ecologist Network (FEN) Consulting (Pty) Ltd was appointed to compile a Watercourse Rehabilitation and Management Plan (WRMP) in terms of the Section 21 (c) and (i) water uses as per the National Water Act, 1998 (Act No. 36 of 1998) and Appendix 6 of Government Notice (GN) 326 of 2017 as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998) to provide technical specialist input for the proposed Mount View mixed-use development on Farms 866, 867, 868, Portion 2 of Farm 870, and the remaining portion of Farms 869 and 1054, located in Sir Lowry's Pass, Western Cape Province, hereafter referred to as the "study area" (Figure 1 and 2).

A 500 m "zone of investigation" was implemented around the study area, in accordance with Government Notice (GN) 509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) (NWA), in order to assess possible sensitivities of the receiving freshwater environment (Figures 1 and 2). This report serves to provide mitigation measures within the rehabilitation process for the proposed activities associated with the unnamed tributary of the Sir Lowrys Pass River and associated channelled valley bottom (CVB) wetlands as depicted in Figure 3 below and identified in the freshwater ecological assessment undertaken by FEN (2021).

This report serves to provide management measures that must be implemented and monitoring requirements for the watercourses within the study area and associated conservation buffer during the construction and operation of the proposed Mount View mixed-use (see Section 3: Project Description).

This WRMP further advocates the use of several environmental management tools and mitigatory measures that are appropriate for the proposed Mount View mixed-use development. The management and rehabilitation plan is a system that seeks to achieve a required end state and describes how activities that have, or could have, a negative impact on the environment will be controlled and monitored and also identifies the responsible parties and relevant timeframes (where applicable) which will be tasked with implementing these measures.

This WRMP is seen as a critical component of the project and should be implemented by the proponent as soon as it has been approved by the relevant authorities and once the proposed Mount View mixed-use development has reached a stage where all rehabilitation activities become viable.

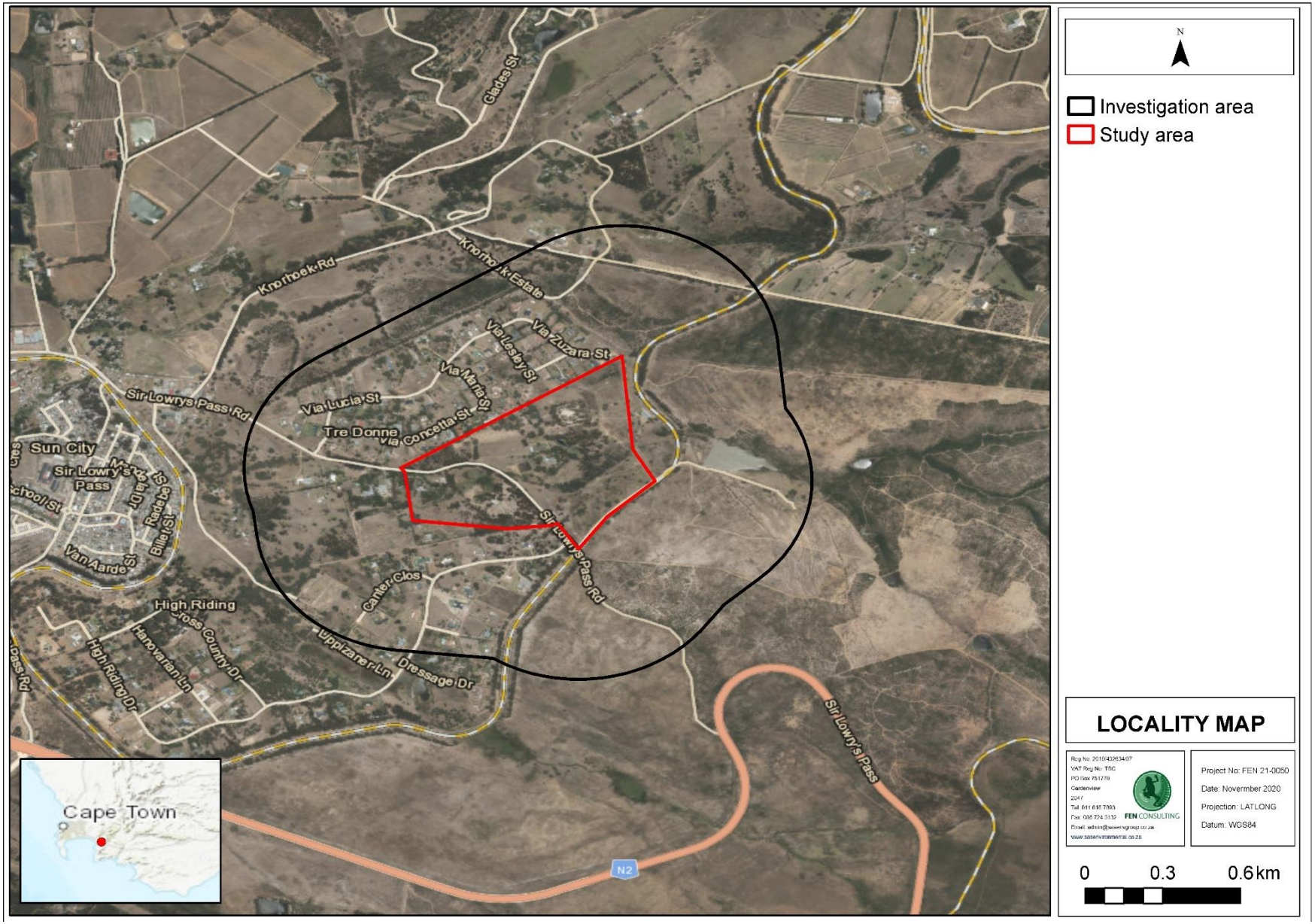


Figure 1: Digital satellite image depicting the study and investigation areas in relation to the surrounding areas.

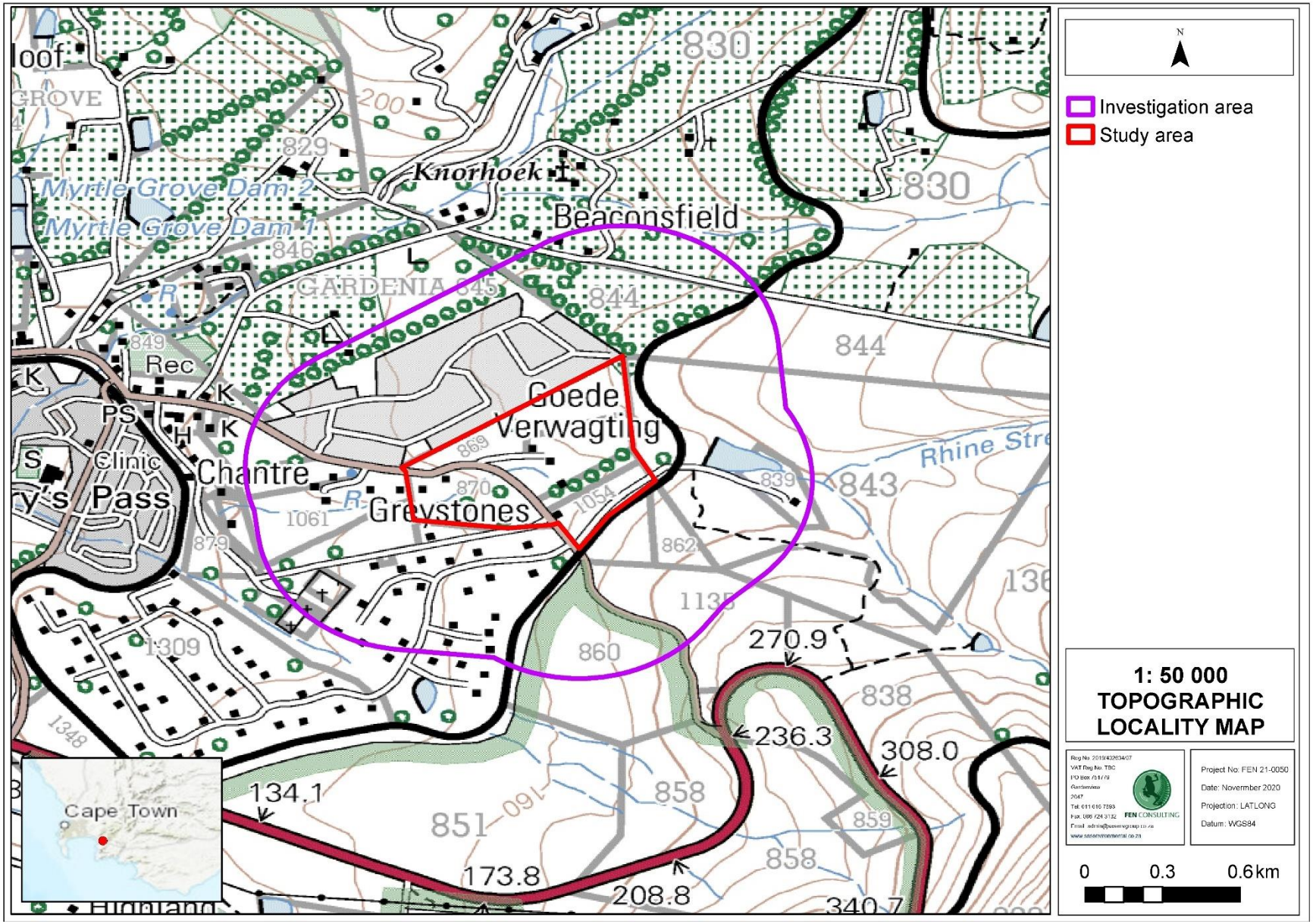


Figure 2: Location of the study and investigation areas depicted on a 1:50 000 topographical map in relation to surrounding areas.

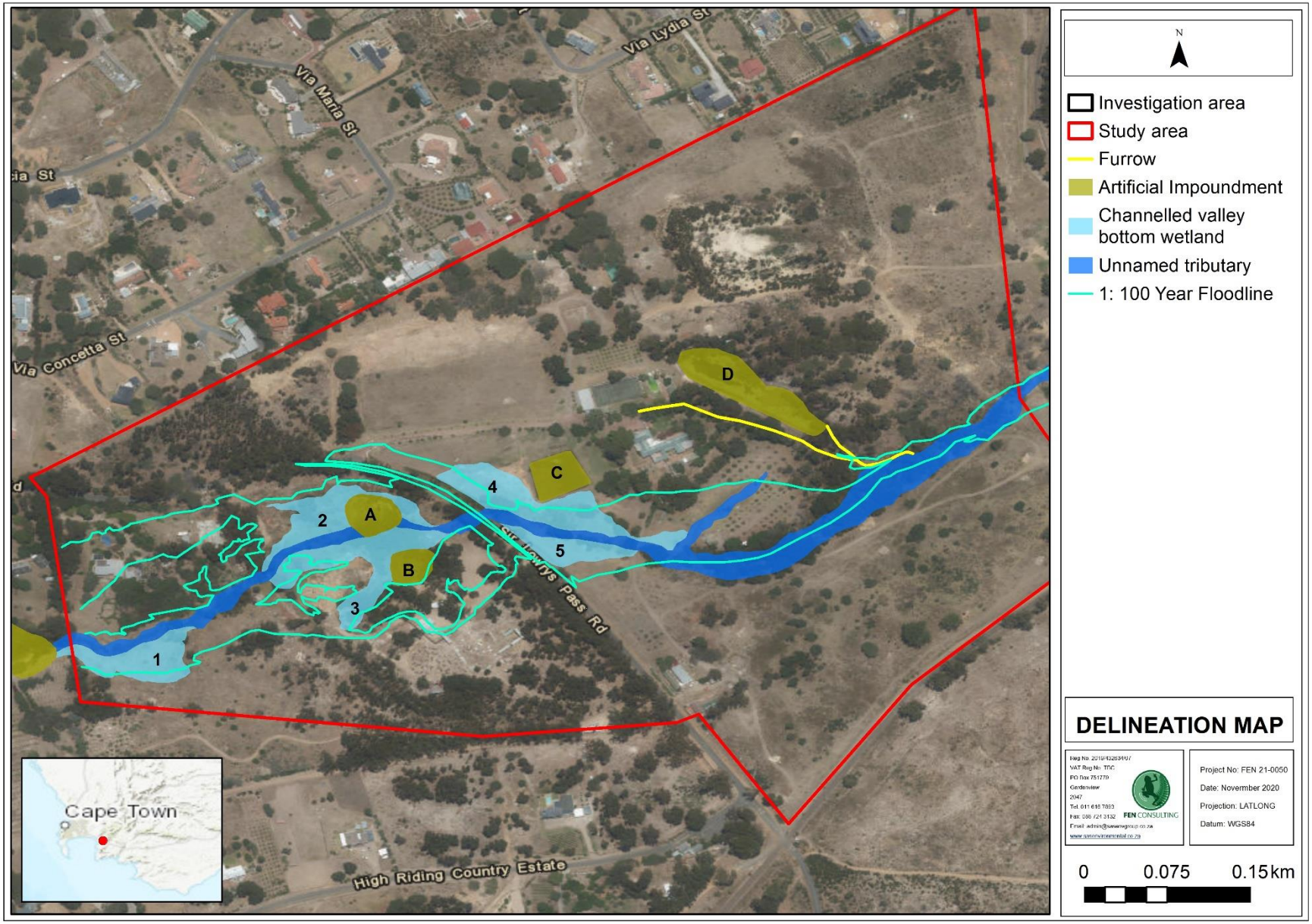


Figure 3: Map presenting the delineated watercourses associated with the study and investigation areas as defined by FEN (2021). The different CVB wetlands(1 through 5) and artificial impoundments (A – D) are numbered accordingly.

1.1 Structure of this report

This report investigates the need for rehabilitation and maintenance activities for the watercourses associated with the proposed Mount View mixed-use development, from a watercourse management perspective. The report has been structured in the following way:

Chapter 1: Introduction
Provides an introduction, the structure of this report as well as the principles and objectives of this WRMP.

Chapter 2: Legislative Framework and Key Objectives
Provides all relevant legislation that was considered as part of the compilation of this report as well as the key objectives of this WRMP.

Chapter 3: Project Description
Provides the location of the watercourses to be directly impacted by the proposed Mount View mixed-use development and the proposed development plan.

Chapter 4: Receiving Freshwater Environment
This section includes a summary of the site assessment findings undertaken by FEN Consulting during October 2020.

Chapter 5: Watercourse Rehabilitation and Management Plan
This section comprises site specific details pertaining to the construction mitigation and rehabilitation measures that must be implemented. A list of the roles and responsibilities of all individuals involved in the implementation of this WRMP is provided.

Chapter 6: Conclusion and Recommendations
This section summarises the key findings and recommendations based on the recommended rehabilitation and management actions listed and the overall requirements in order to ensure the best rehabilitation of the impacted watercourses as part of the proposed Mount View mixed-use development.

2 LEGISLATIVE FRAMEWORK AND KEY OBJECTIVES

The following legislative documents were considered and the aspects which are pertinent to watercourse management including the rehabilitation of disturbed areas, were utilised. Further details of each is provided in Annexure B.

- The Constitution of the Republic of South Africa Act, 1996[1] ;
- The National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA);
- The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA);
- The National Environmental Management: Biodiversity Act, 2014 (Alien and Invasive Species Regulations, 2014);
- The National Water Act, 1998 (Act No. 36 of 1998) (NWA);

[1] Since 1996, the Constitution has been amended by seventeen amendments acts. The Constitution is formally entitled the 'Constitution of the Republic of South Africa, 19996". It was previously also numbered as if it were an Act of Parliament – Act No. 108 of 1996 – but since the passage of the Citation of Constitutional Laws Act, neither it nor the acts amending it are allocated act numbers.

- Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998); and
- The City of Cape Town's (CoCT) Floodplain and River Corridor Management Policy (2009).

Section 21 of the National Water Act, 1998 (Act No. 36 of 1998) lists the following activities as water uses:

- Section 21 (c): impeding or diverting the flow of water in a watercourse; and
- Section 21 (i): altering the bed, banks, course or characteristics of a watercourse.

Accordingly, the definition and motivation for a regulated zone of activity for the protection of the assessed watercourses can be summarised as follows:

Table 1: Articles of Legislation and the relevant zones of regulation applicable to each article.

Regulatory authorisation required	Zone of applicability
Water Use License Application in terms of the National Water Act, 1998 (Act No. 36 of 1998).	**Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)** In accordance with GN509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998), a regulated area of a watercourse in terms of water uses as listed in Section 21c and 21i is defined as: • the **outer edge of the 1:100 year floodline and/or delineated riparian habitat, whichever is the greatest distance**, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; • in the absence of a determined 1:100 year floodline or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or • a **500 metre radius from the delineated boundary (extent) of any wetland** or pan in terms of this regulation.
Listed activities in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) EIA Regulations (2014), as amended.	**Activity 12** of Listing Notice 1 (GN 327) of the National Environmental Management Act, 1998 (Act No.107 of 1998) EIA regulations (2014), as amended states that: *The development of:* *(xii) Infrastructure or structures with a physical footprint of 100 square meters or more;* *Where such development occurs—* *a) Within a watercourse;* *b) In front of a development setback; or* *c) If no development setback has been adopted, within 32 meters of a watercourse, measured from the edge of a watercourse.* *Excluding where such development occurs within an urban area* **Activity 19** of Listing Notice 1 (GN 327) of the NEMA EIA regulations, 2014 (as amended) states "*The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse".*
City of Cape Town's Floodplain and River Corridor Management Policy (2009)	In accordance with the (CoCT) Floodplain and River corridor Management Policy, ecological buffers are recommended, with up to 75 m recommended for wetlands. A minimum buffer of 10 m is required for concrete canals.

2.1 Watercourse Rehabilitation and Management Plan Framework

Principles of this WRMP are provided in Annexure C below.

2.1.1 Objectives of this Watercourse Rehabilitation and Management Plan

The objectives of this WRMP are to:

- Meet the requirements of relevant local and regional authorities;
- Identify a range of mitigation measures which could reduce and mitigate the potential impacts on the receiving freshwater environment to minimal or acceptable levels;
- Manage activities to maintain and/ or improve the ecological integrity of the impacted watercourses associated with the proposed Mount View mixed-use development;
- Maximise the service provision of the impacted wetland through extensive rehabilitation;
- Re-introduce indigenous floral species;
- Provide improved and more suitable habitat for faunal species within an urban environment;
- Maximise the ecological functioning of the impacted watercourses;
- Detail specific actions deemed necessary to assist in mitigating the potential environmental impact on the impacted watercourses;
- Ensure as far as is practicable that the measures contained in the report are implemented; and
- Propose mechanisms for monitoring compliance with the WRMP and reporting thereon.

3 PROJECT DESCRIPTION

The proposed Mount View mixed-use development is situated on the Farms 866, 867, 868, Portion 2 of Farm 870, and the remaining portion of Farms 869 and 1054, within the Stellenbosch Farms district. Access to the study area is gained via the Old Sir Lowry's Pass Road which bisects the southern portion of the study area. An unnamed tributary of the Sir Lowry's Pass River bisects the central portion of the study area and crosses under the Old Sir Lowry's Pass Road.

Figure 4 below shows the site development plan (SDP) for the proposed Mount View mixed-use development in relation to the delineated watercourses. A conservation buffer in accordance with the (CoCT) Floodplain and River Corridor Management Policy was applied to the unnamed tributary of the Sir Lowry's Pass River and the associated CVB wetlands. Although the policy recommends a minimum conservation buffer of 10 m, a variable conservation buffer of varying width (minimum of 5 m from the delineated edge of the watercourses) was applied to accommodate the proposed development layout in some areas, with the provision that the buffer extent be increased in size to 15 m to compensate for the reduced buffer extent and to ensure that the conservation area extent is equal to the 10 m buffer and that the buffer area be suitably rehabilitated.

The proposed Mount View mixed-use development will consist of a residential development with single residential erven, with a portion of the development site allocated to open green space and a clubhouse facility with restaurants, commercial space, gymnasium, pool and a creche. As per the Civil Engineering Services Report prepared by KLS Consulting Engineers (2021), the proposed Mount View mixed-use development will consist of the lower and upper development as follows:

Mount View Lower (south of Old Sir Lowry's Pass Road)

- 77 single residential erven – (1.64ha @ 21 density per hectare (du/ha))
- Development area – 3.64 ha (site area - 8.00 ha)
- Private road – 0.62 ha
- Green spaces – 1.06 ha

Mount View Upper (north of Old Sir Lowry's Pass Road)

- 318 single residential erven – (6.8 ha @ 19 du/ha)
- Development area – 16.75 ha (site area – 23.24 ha)

- Public precincts – 0.74 ha
- Private road – 2.3 ha
- Green spaces – 5.57 ha

Listed below are the activities associated with the proposed Mount View mixed-use development located within the variable conservation buffer and within the vicinity of the identified watercourses. The focus of this report is on activities associated with the watercourses and the variable conservation buffer within the study area.

- As part of the Mount View Lower development, it is proposed that previously unauthorised infilled material below the floodline and within portions of CVB wetland 3 be removed to spoil on site (Figure 4), and the infilled area subsequently reshaped and rehabilitated;
- Alteration of the modelled pre-development 1:100 year floodline (Storey ENG, 2019) to reduce the extent of the floodable area south east of Old Sir Lowry's Pass Road to accommodate portions of the proposed Mount View mixed-used development. This will entail:
    - An open stormwater channel proposed upgradient of the Old Sir Lowry's Pass Road to channel flow to the existing culvert under the road within the unnamed tributary. The stormwater channel will be approximately 96 m in length (Figure 4);
    - Enlargement of the existing pipe culvert below Old Sir Lowry's Pass Road to a 2.4 m wide and 1 m high portal culvert;
    - A flood management berm is proposed just downstream of the culvert and extends parallel to the road in a south eastern direction. The berm will be 1 m high above the natural ground level and will extend for approximately 50 m (Figure 4); and
    - Landscaping of the adjusted floodline and culverts for erosion control.
- The boundary of three private erven associated with the proposed Mount View Lower and Upper mixed-use development are located within the conservation buffer of the watercourses;
- Portions of *in situ* compacted walkways are also located within the conservation buffer;
- An internal roadway is proposed to traverse the unnamed tributary along the eastern boundary of the study area as part of the Mount View Upper development and will require the installation of a rectangular portal culvert with 330 mm brick wing walls. This culvert will be sized to accommodate up to a 1:100 year flood event in the watercourse and have reno-mattresses at the inlet and outlet to reduce erosion including riprap below the culvert outlet to dissipate flow and further reduce erosion; and
- Installation of stormwater management systems including construction of three new stormwater attenuation facilities outside the watercourses and variable conservation buffer, and outlet structures which will discharge stormwater into an open stormwater channel network to convey stormwater run-off into the watercourses. Some of the stormwater channels and discharge points will be located within the variable conservation buffer and the delineated wetlands (i.e. stormwater outlets associated with CVB wetland 4).

Figure 4: The provisional Site Development Plan (SDP) for the proposed Mount View residential development as provided by Urban Studio (2021) in relation to the delineated watercourses (blue areas) and associated variable conservation buffer (dark blue dashed line). The stormwater attenuation facilities are numbered 1 to 4.

4 RECEIVING ENVIRONMENT

4.1 Desktop Assessment

The following information on the ecological characteristics of the study area are taken from FEN (2021) entitled: “Freshwater Ecological Assessment for the Proposed Mount View Mixed Use Development on Farms 866, 867, 868, Portion 2 Of Farm 870, and the Remaining Portion of Farms 869 and 1054, Sir Lowry’s Pass, Western Cape Province”, which also provides further information if required.

The National Freshwater Ecosystem Priority Areas (NFEPA, 2011) database, and the City of Cape Town Wetlands database (2017) indicated the following applicable important background information:

- The study area falls within quaternary catchment G22K;
- The study area falls within the Berg Water Management Area (WMA) and the sub-Water Management Area (sub-WMA) is the Greater Cape Town;
- The study area falls within the Southern Folded Mountains ecoregion;
- The study area is located within the Southwest Granite Fynbos wetland vegetation type, which is considered to be Critically Endangered (Mbona *et al*, 2015); and
- According to the City of Cape Town Biodiversity Network (2019) the majority of the study area falls within areas classified “Other Natural Areas”. Until the Biodiversity Network is secured elsewhere, Other Natural Areas may become important if required as biodiversity offset sites.

4.2 Watercourse Ecological Assessment

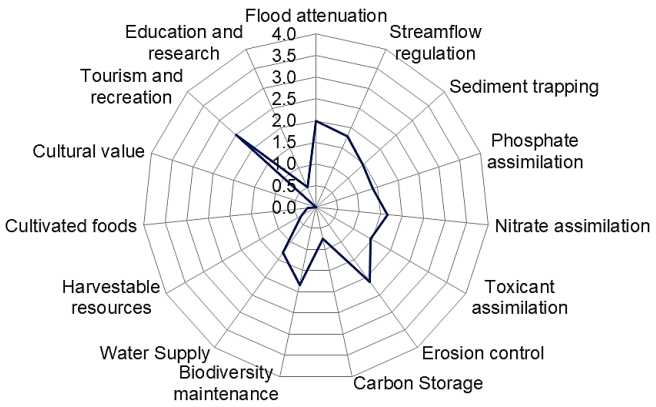
During the site assessment undertaken by FEN in October 2020, a riparian watercourse, the unnamed tributary of the Sir Lowrys Pass River was identified bisecting the study area in an east to westly direction. Five channelled valley bottom (CVB) wetlands were also identified to be associated with the unnamed tributary within the study area. Due to the fragmentated nature of the CVB wetlands, and altered habitat conditions of these wetland systems as observed within the study area, CVB wetland 1 presented a different and more intact habitat and vegetation cover compared to the CVB wetlands 2 to 5 (Figure 3 above) – as such the Present Ecological State (PES) for the CVB wetland within the southern extent of the study area was assessed separately to the other CVB wetlands, although the ecoservices and EIS remained the same for all.

The study area is invaded by alien and invasive plant (AIP) species including *Casuarina cunninghamiana*, *Eucalyptus camaldulensis*, *Ricinus communis*, *Paraserianthes lophantha*, *Acacia melanoxylon*, *Acacia saligna, Ligustrum lucidum*, *Pennisetum clandestinum*, *Salix babylonica*, *Solanum mauritianum* and *Quercus robur*. The eastern portions of the study area, i.e. north of Old Sir Lowry’s Pass Road, are highly grazed by livestock and several instream and off stream artificial impoundments as well as flow diversion furrows were noted within the study area. Some areas of the northern reach of the tributary were noted to be poorly vegetated with eroded embankments.

Table 2 and 3 below summarises the findings of the watercourse assessment regarding relevant aspects (hydrology, geomorphology and vegetation components) for the unnamed tributary and associated CVB wetlands, respectively.

Table 2: A summary of the ecological assessment of the unnamed tributary of the Sir Lowry's Pass River associated with the proposed Mount View mixed-used Development as per FEN (2021).

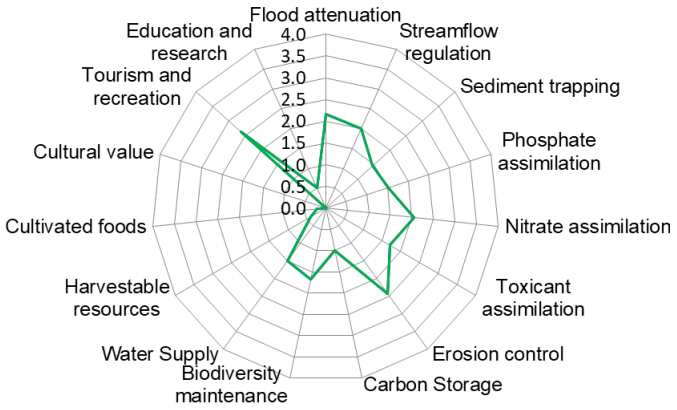
Unnamed Tributary of the Sir Lowry's Pass River.	
 Figure 5: (Top left) Vegetation clearing of the riparian habitat along the upstream reach of the unnamed tributary; (Top right): Poorly vegetated areas with eroded embankments noted along the northern reach of the tributary; (Bottom left): Weir in northern extent of tributary, from where the irrigation furrow is diverting water to an artificial impoundment; (Bottom right): Downstream reach of tributary, with *Colocasia esculenta* in the foreground and riparian trees in the background in the marginal area of the tributary.	
IHI discussion	**IHI Category D (Largely Modified)** As per the watercourse assessment (FEN, 2021), The riparian habitat of the unnamed tributary is considered to be largely modified, primarily as a result of the loss of the natural vegetation and the subsequent alien vegetation encroachment including species such as *Acacia saligna*, *Phytolacca octandra*, *Eucalyptus camaldulensis*, *Populus x canescens* and *Salix babylonica*. Some areas of the northern reach of the tributary were noted to be poorly vegetated with eroded embankments, however, the majority of the riparian zone was considered well vegetated, albeit with invasive tree species. The instream habitat of the unnamed tributary has been modified through alterations of the natural flow and channel characteristics, specifically as a result of the instream impoundments, weirs and furrows diverting water from the tributary into off stream artificial impoundments.

Ecoservice provision	**Ecoservice: Intermediate** The system is considered of intermediate importance for the provision of indirect benefits such as flood attenuation, sediment trapping, phosphate, nitrate and toxicant assimilation, biodiversity maintenance, erosion control and water supply (through the presence of artificial impoundments). The vegetation cover of the riparian habitat plays an important role in provision of these indirect benefits. The unnamed tributary also lends a high aesthetic value to the property residents and due to its location within an open space area, the tourism and recreational value is considered moderately high.	
EIS discussion	**EIS Category: Moderate** The unnamed tributary is considered of moderate ecological importance on a landscape scale, mainly as a result of the Southwest Granite Fynbos wetland vegetation type within which this system is located (according to NFEPA, 2011) which is considered to be critically endangered and well protected (Mbona *et al.* 2015). It is noted, however, that no remaining representative areas of this vegetation type were observed during the site visit. The unnamed tributary also occurs in a subWMA considered to be a fish support area that is important for migration of the threatened fish species *Galaxias mollus,* although none were identified at the time of the site visit. However, based on the ecological characteristics of the tributary as observed on site, it is the opinion of the freshwater ecologist that the EIS of the tributary can best be described as 'Moderate'.	
REC Category and RMO	**REC: Category D** **BAS: Category: D** **RMO: Maintain** Since this riparian system is of moderate Ecological Importance and Sensitivity, and has been largely modified, the Recommended Management Objective (RMO) is to maintain the ecological state of the riparian habitat. Nevertheless, rehabilitation activities such as Alien and Invasive Vegetation (AIP) control and reinstatement of indigenous riparian vegetation are recommended. Development of the surrounding area will decrease surface roughness of the local catchment and increase surface stormwater run-off. The implementation of Sustainable Drainage Systems (SuDS) is recommended. Careful planning of the stormwater management plan is imperative to ensure the hydraulic regime is retained.	

IHI= Index of Habitat Integrity; EIS = Ecological Importance and Sensitivity, RMO = Recommended Management Objective, BAS = Best Attainable State; RMO = Recommended Management Objective.

Table 3: A summary of the ecological assessment of the CVB wetlands associated with the proposed Mount View mixed-used Development as per FEN (2021).

<table>
<tr><th colspan="4">CHANNELLED VALLEY BOTTOM WETLANDS</th></tr>
<tr><td colspan="4"> 
Figure 6: Photograph representative of the channelled valley bottom wetlands associated with the unnamed tributary of Sir Lowry's Pass River. (Top left): the CVB wetland (1) associated with the southern extent of the unnamed tributary dominated by Watsonia borbonica; (Top right): CVB wetland (5) within the northern portion of the unnamed tributary receiving surface flow from tributary – no distinct vegetation present due to grazing activities; (Bottom left and right): CVB wetlands at the existing Old Sir Lowry's Pass road crossing.</td></tr>
<tr><td rowspan="3">PES discussion</td><td colspan="3">CVB wetland 1: Category C (Moderately Modified)
CVB wetlands 2 to 5: Category D Largely Modified)
As per the watercourse assessment (FEN, 2021), The CVB wetland on the southern extent of the study area (CVB wetland 1) is considered moderately modified while the rest of the CVB wetlands (CVB 2 to 5) are considered largely modified. Under natural conditions the CVB wetlands would have been associated with the entire tributary reach and contained a much greater diversity of habitat and plant species. The wetlands have been largely transformed by woody alien invasive vegetation along the tributary and wetland system. Surrounding land-uses, including mowing and grazing have contributed to the reduced surface roughness of the CVB wetlands and impoundments affecting water distribution and retention patterns within the wetland by concentrating and impeding flow, particularly the CVB wetlands 2 to 5, has also resulted in modification to the wetlands.</td></tr>
<tr><td>Hydrology</td><td>Geomorphology</td><td>Vegetation</td></tr>
<tr><td>Category E - Severely Modified
Impact score: 6.1</td><td>Category B - Largely Natural
Impact score: 1.7</td><td>Category E – Largely Modified
Impact score: 6.1</td></tr>
</table>

Ecoservice provision	**Ecoservice: Intermediate** The CVB wetlands are considered of intermediate importance for the provision of indirect benefits such as flood attenuation (though to a certain extent given the fragmented nature of the system), stream flow regulation, sediment trapping, nitrate and toxicant assimilation, and erosion control. The CVB wetlands are also considered important for phosphate assimilation and biodiversity maintenance. Due to their location within an open space area, the tourism and recreational value is considered moderately high as residents walk around the system.	
EIS discussion	**EIS Category: Moderate** All of the CVB wetlands identified within the study area are considered of moderate ecological importance on a landscape scale, mainly as a result of the Southwest Granite Fynbos wetland vegetation type within which this system is located (according to NFEPA, 2011) which is considered to be critically endangered and well protected (Mbona et al. 2015). It is noted, however, that no remaining representative areas of this vegetation type within the wetlands were observed during the site visit. The hydro-functional importance of the system is considered to be moderate while the direct human benefits are considered to be low.	
REC Category and RMO	**REC: Category C/D** **BAS: Category: C** **RMO: Improve and Maintain** Since the CVB wetlands 2 to 5 have been largely modified, the Recommended Management Objective (RMO) is to improve the ecological state of these CVB wetlands through Alien and Invasive Vegetation (AIP) control and reinstatement of indigenous wetland vegetation. Although the determined RMO is to maintain the PES of CVB wetland 1 since it is considered moderately modified, it is recommended that no further degradation to the wetland should be permitted as a result of the proposed Mount View mixed-use development. Development of the surrounding area will decrease surface roughness of the local catchment and increase surface stormwater run-off, thus rehabilitation (including revegetation with indigenous species) of these systems is necessary to maintain and/or improve their present ecological state.	

PES = Present Ecological State; EIS = Ecological Importance and Sensitivity, RMO = Recommended Management Objective, BAS = Best Attainable State; RMO = Recommended Management Objective.

Since the unnamed tributary of the Sir Lowry's Pass River and CVB wetlands will be directly impacted by some of the activities associated with the proposed Mount View mixed-use development, for example, installation of a new and upgrading of an existing culvert within the unnamed tributary, removal of unauthorised infilled material and location of stormwater outlet structures within the delineated CVB wetland extent, the overall **Recommended Management Objective (RMO) is to maintain the IHI and PES of the unnamed tributary and CVB wetlands**, respectively. However, the RMO can be improved through rehabilitation and reinstatement of wetland habitat through the implementation of various remediation activities and rehabilitation interventions. Section 5 of this report provides a breakdown of how this will be achieved, with Section 6 providing the projected environmental conditions for the watercourses post rehabilitation.

4.2.1 Assumptions and Limitations

- The ground-truthing and delineation of the watercourse boundaries and the assessment thereof are confined to two site visits undertaken in October 2020 (Western Cape spring season) and January 2021 (Western Cape summer season) of the study area. During the field assessment in January 2021, the wetlands associated with the proposed mixed-use development were field delineated using land surveying principles to ensure accuracy. All watercourses identified within the investigation area were delineated in fulfilment of Government Notice 509 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998) using various desktop methods including the use of topographic maps, historical and current digital satellite imagery and aerial photographs. These resources (i.e. those within 500m of the study area) were not ground-truthed, however, the general surroundings were considered during the desktop assessment;
- Most areas surrounding the study area have undergone anthropogenic changes as a result of the surrounding agricultural activities, linear infrastructure development and urbanisation. The watercourse delineation as presented in this report is therefore regarded as a best estimate of the boundaries based on the site conditions present, as observed during the site assessment. The results obtained are, however, considered sufficiently accurate to allow informed planning and decision making to take place;
- Watercourses and terrestrial zones create transitional areas where an ecotone is formed as vegetation species change from terrestrial to obligate/facultative species. Within this transition zone, some variation of opinion on the watercourse boundaries may occur. However, if the DWAF (2008) method is followed, all assessors should get largely similar results; and
- With ecology being dynamic and complex, certain aspects (some of which may be important) may have been overlooked. However, it is expected that the watercourse has been accurately assessed and considered, based on the field observations and the consideration of existing studies and wetland ecology.

5 WATERCOURSE REHABILITATION AND MANAGEMENT PLAN

This implementation of this WRMP is based on four (4) key actions illustrated in Figure 7 and discussed in detail in Section 5.1.1 – Section 5.1.11.

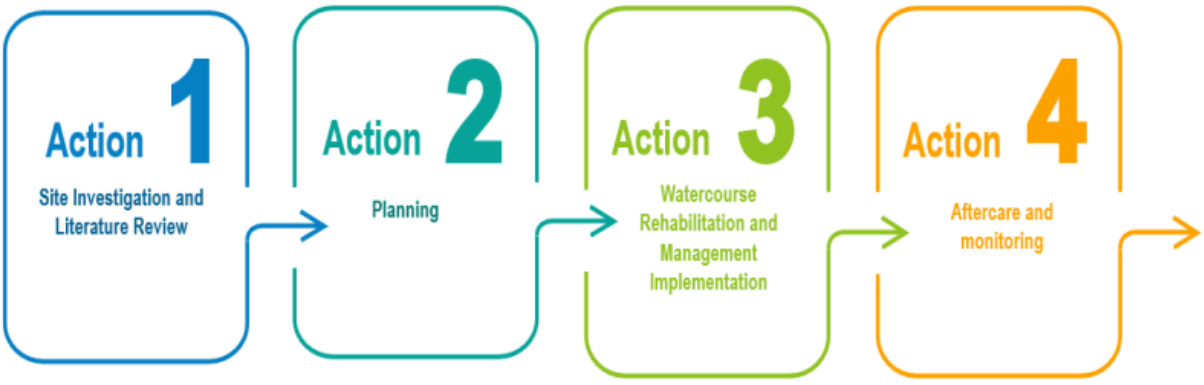


Figure 7: The four (4) key actions of the WRMP implementation.

5.1 Action 1: Site Investigation and Literature Review

A site investigation of the proposed Mount View mixed-use development was undertaken to determine site limitations and rehabilitation requirements. Available literature and scientific assessments referenced in Section 8 were also reviewed to further gain background and support the determination of the required rehabilitation activities and future monitoring needs. Table 4 provides a summary of the existing risks identified to the CVB wetland associated with the study area.

Table 4: Existing and historical risks to the unnamed tributary of the Sir Lowry's Pass River and associated CVB wetlands.

On review of the historical photograph dating back to 1938, a watercourse, the unnamed tributary of Sir Lowry's Pass River, can be identified bisecting the study area (Figure 8). When comparing the historical photograph with the available digital satellite imagery obtained for 2020 (Figure 9), the study area has remained relatively unchanged over the last few decades, being that the surrounding landscape had already been transformed for agricultural land-use purposes in 1938, remains agricultural but increasingly becoming a peri-urban environment in recent years. The riparian vegetation associated with the unnamed tributary of the Sir Lowry's Pass River appears to be quite dense in the central portion of the study area when considering the historical photograph but reduced in density and cover, specifically associated with the watercourse reach in the eastern portion of the study area on comparison with the recent digital satellite imagery. Homesteads and artificial impoundments have been established in the study area (Figure 9).

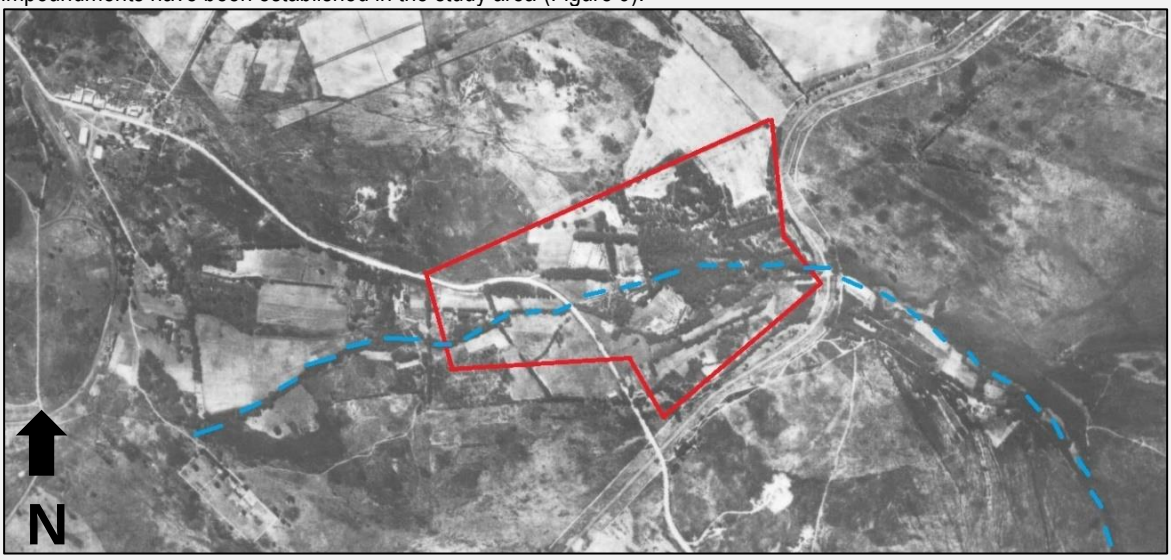


Figure 8: Historical photograph (1938) of the study area (indicated in red) relative to the location of the unnamed tributary of Sir Lowry's Pass River (blue dashed line).

Figure 9: Digital satellite imagery of the study area (red outline), circa 2020, relative to the watercourse (blue dashed line).

On review of the digital satellite imagery of the study area, the unauthorised infilled material to be removed (located south east of Old Sir Lowry's Pass) appears to have been infilled towards the end of 2014. Figure 10 below depicts the distinct infilled material located within portions of CVB wetland 3 on digital satellite imagery circa 12/2014 vs. Figure 11 of the same area on digital satellite imagery circa 2/2014 prior to the infilling of material. The CVB wetland has since been fragmented by the infilled material.

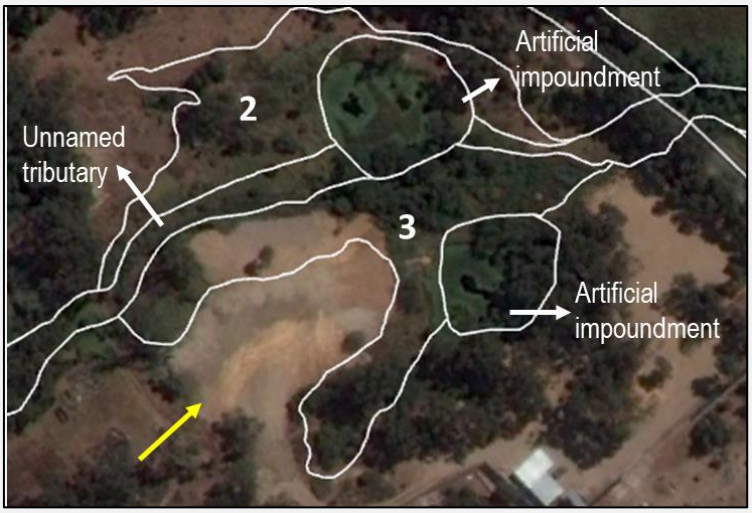


Figure 10: Digital satellite imagery (December 2014) of the unauthorised infilled material south east of Old Sir Lowry's Pass Road. The unauthorised infilled material (yellow arrow) encroaches into the delineated boundary of the CVB wetland 3. Numbers depict the different CVB wetlands.

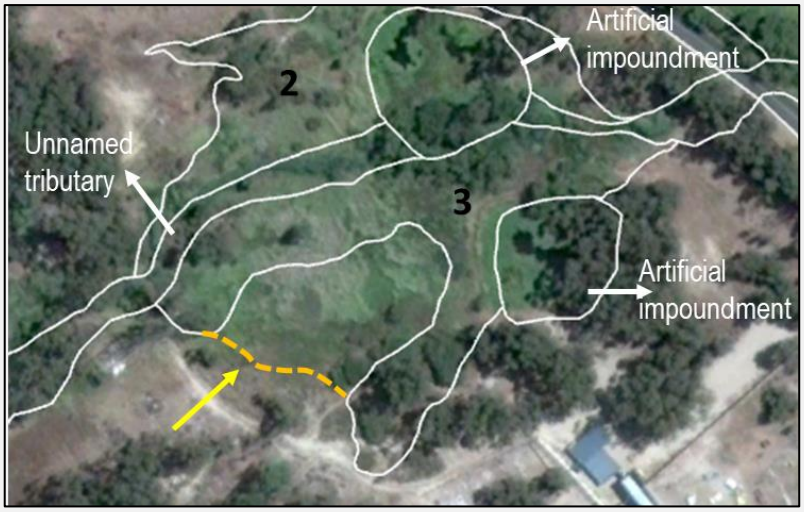


Figure 11: Digital satellite imagery (February 2014) of the area of unauthorised infilled material south east of Old Sir Lowry's Pass Road. No infilling is present in the wetland (yellow arrow) and the CVB wetland is continuous in this area. Orange dotted lines depict where the wetland edge was previously based on digital signatures. Numbers depict the different CVB wetlands.

The proposed Mount View mixed-use development is expected to have a moderate risk significance on the unnamed tributary and CVB wetlands (FEN, 2021). This can primarily be attributed to the installation of a new and upgrading of an existing culvert within the unnamed tributary, removal of unauthorised infilled material and location of stormwater outlet structures within the delineated CVB wetland extent, which will necessitate work within said watercourses and associated conservation buffer, impacting on the vegetation, geomorphology and hydrological functioning of the watercourses. The impacts can be reduced if suitable long-term rehabilitation and management measures are implemented.

Table 5 below summarises the activities that were assessed as part of the proposed Mount View mixed-use development, the possible impacts to the unnamed tributary and CVB wetlands as well as the objectives for the WRMP.

Table 5: Summary of activities, potential impacts and rehabilitation objectives for the unnamed tributary of the Sir Lowry's River and CVB wetlands with the proposed Mount View mixed-use development

Activities	Impacts	Risk Significance	Rehabilitation Objectives
• Site access, clearing and preparation for civil works including initial service installation (water, sewer and telecommunication).	Preparation for civil works will necessitate the vegetation including the removal of all alien trees including their roots within the construction footprint, and the removal of all existing piles of disposed and spread material around the site, requiring the movement of construction vehicles in the vicinity of the watercourses. These disturbances will likely result in increased dust generation, leading to potential smothering of watercourse vegetation and impacts to water quality, as well as increased proliferation of alien invasive species.	**Low Negative**	• Manage vegetation removal and ensure it is disposed of correctly. • Mitigate and manage soil erosion and sedimentation within the watercourses as a result of the construction activities. • Alien invasive plant species control during construction and operation.
Construction activities outside the delineated extent of the watercourses but within the variable conservation buffer: • Establishment of walkways; • The fence of three erven will be located within the variable conservation buffer; • The addition of a flood management berm on the downgradient side of the culvert below Old Sir Lowry's Pass Road as part of the floodline alteration activities will encroach into the edge of the conservation buffer and; • Landscaping within the variable buffer.	• Disturbances of soil leading to increased alien vegetation proliferation, and in turn to altered freshwater habitat; • Altered runoff patterns, leading to increased erosion and sedimentation of the watercourses; and • Increased sediment loads entering the watercourses.	**Low Negative**	• Mitigate and manage soil erosion and sedimentation within the watercourses. • Alien invasive plant species control during construction and operation. • Revegetation of the conservation buffer with suitable fynbos vegetation.
Construction activities within the delineated extent of the watercourses: • Removal of unauthorised infilled material (cut-to-spoil) associated with CVB wetland 3;	• Temporary impact on the hydrological functioning of the tributary due to activities within the active channel; • Alteration to the flow patterns and timing in the active channel; • Potential changes to the water retention pattern of the watercourses;	**Medium Negative**	• Soil profiling and creation of a low-lying area for water to pond and allow for the reinstatement of wetland habitat following removal of the infilled area. • Ensure suitable hydrological connectivity prior to commencement of rehabilitation.

Activities	Impacts	Risk Significance	Rehabilitation Objectives
• Installation of the rectangular portal culvert with 330mm brick wing walls under the section of the internal roadway which traverses the upstream reach of the unnamed tributary; • Upgrading/extension of the existing culvert below Old Sir Lowry's Pass Road as part of the floodline alteration activities; • The addition of an open stormwater channel upgradient of Old Sir Lowry's Pass Road as part of the floodline alteration activities will encroach into the delineated edge of CVB wetland 5; • Rehabilitation of culvert after installation; and • Establishment of stormwater outlet structures (e.g. stormwater outlets associated with CVB wetland 4).	• Removal of any remaining vegetation which may still provide habitat and deliver ecoservices; • Potential sedimentation of the watercourses; • Increased likelihood of dust generation due to exposed soil; • Constriction of flow associated with works on the proposed culverts leading to turbulent erosive flow of increased velocity and possible loss of recharge to downstream areas, impacting on downstream biota; • Decrease of surface water quality due to the use of concrete within the active channel of the tributary; and • Potential indiscriminate movement of construction equipment leading to compaction of soil which may result in the formation of gullies, resulting in erosion and incision;		• Mitigate and manage soil erosion and sedimentation within the watercourses. • Ensure all stormwater services are suitably designed. • Ensure sustainable drainage solutions are utilised as part of the Mount View mixed-use development.
Rehabilitation of the watercourses and associated conservation buffer	• Soil compaction within the watercourses; • Possibility that the flow regime and increased sediment loads may be altered during the rehabilitation and revegetation of the unnamed tributary and CVB wetlands. This may result in a loss of recharge to the downstream reaches if water ponding occurs.	**Medium Positive**	• Ensure indigenous vegetation is reinstated. • Alien invasive species control during construction and operation. • Implement all mitigations as stipulated in Action 3 of this report.

5.2 Action 2: Planning

The intention of this WRMP is to achieve the rehabilitation objectives as listed in Table 5 above in the most economical and feasible manner by improving the ecological condition and function of the identified watercourses, associated with the proposed Mount View mixed-use development. In order to achieve the rehabilitation objectives and increase the rehabilitation success rate, cogent conceptual planning is essential to provide clear and concise requirements to orient the rehabilitation and management activities to achieve the desired final results. Table 6 provides requirements to be considered during planning and before implementing the WRMP.

Table 6: Planning requirements to be considered prior to the implementation of the WRMP measures.

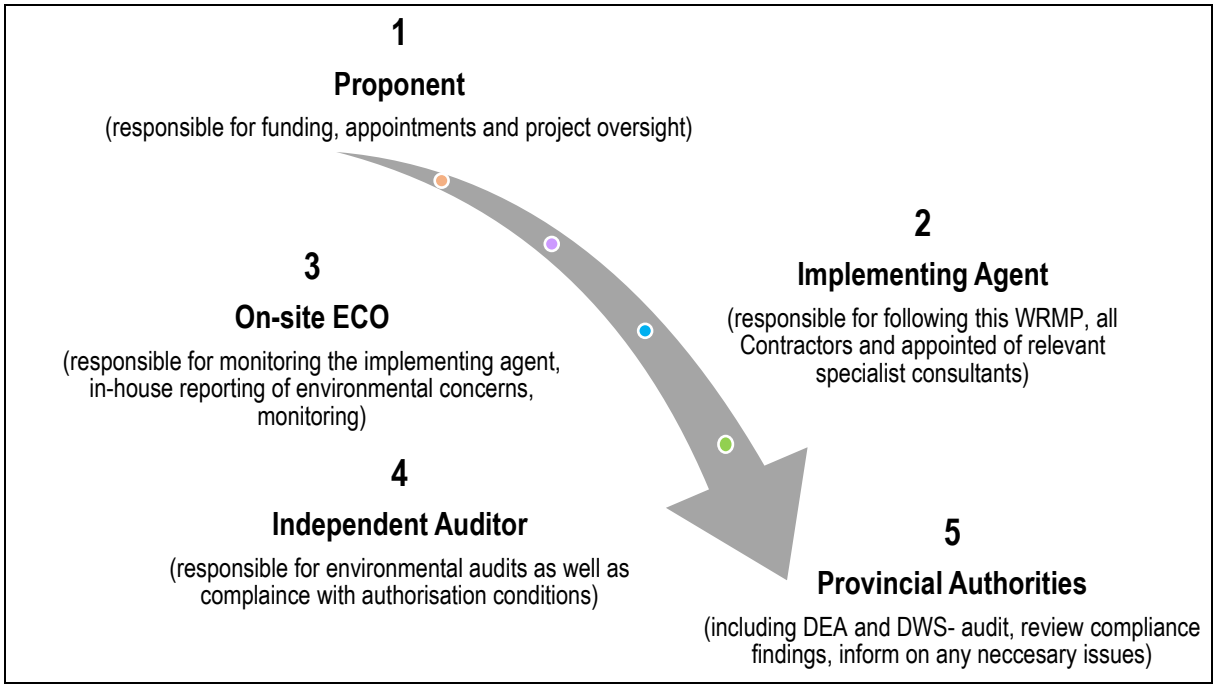
Planning Requirements to be considered prior to the implementation of the watercourse rehabilitation and management measures.
1.1 Obtaining all relevant authorisations and permits Before rehabilitation activities can commence all necessary permits and authorisations will be required, including but not limited to: ➢ Environmental Authorisation (as applicable); and ➢ Water Use Authorisation. ***Note: If any plants or seeds will be harvested from the surrounding area for revegetation purposes, a permit may be required from the Western Cape Province: Department of Environmental Affairs and Development Planning (DEA&DP) and/or CapeNature prior to plant harvesting.*** **1.2. Appointment of a Contractor and all required specialists** During the planning phase certain aspects need to be considered in order to effectively implement this plan. This includes: ➢ Appointment of a suitably qualified Contractor(s) to undertake the required work; ➢ Appointment of an Environmental Officer to audit and monitor the rehabilitation activities as well as to undertake the required post rehabilitation monitoring; ➢ Appoint any specialist consultants required for guidance, management and monitoring that may need to be retained; and ➢ The Environmental Officer is to compile a monthly audit report indicating all observations, actions and any remediation measures that were implemented and the reports are to be submitted to the competent authorises. ***Note: Should the Contractor not have the appropriate expertise for implementation of this plan then it is the responsibility of the Contractor to retain a suitably qualified freshwater ecologist to oversee the implementation.*** **1.3 Budgetary Allowance** A rehabilitation budget needs to be prepared prior to the commencement of rehabilitation activities. The preparation of a budget is a crucial step in planning of a project, as it allows for the prediction and calculation of all the costs related to implementation of the rehabilitation activities, including, but not limited to labour, material, expertise and post rehabilitation maintenance and management. **1.4 Timing** Rehabilitation of the unnamed tributary of the Sir Lowry's Pass River and associated CVB wetlands should commence as soon as possible and should optimally be concurrent as work progress. Rehabilitation should have a fixed deadline for completion. **1.5 Planning for on-site requirements** **Establishment and Access** ➢ The existing watercourse footprint area must be pegged by a suitably qualified freshwater ecologist and demarcated with danger tape (although fencing is considered preferable). At no point should construction equipment extend past the designated construction site (unless for the required rehabilitation works). All vehicles may only make use of the proposed access roads to enter the site. No indiscriminate movement of vehicles will be tolerated in the existing CVB wetland. ➢ Adequate signage (in the adequate various languages) must be placed around the existing watercourses to indicate to the public and construction workers that access to the watercourses is prohibited (unless for authorised personnel). **Indigenous plant harvesting and propagation**. ➢ As part of the proposed rehabilitation plans, indigenous wetland species must be re-instated following the removal of the unauthorised infilled material with the CVB wetland 3. As such, plans should be made for where the species are to be sourced and budgetary allowances made for the purchasing of various species, with inputs from a suitably qualified botanist and/or landscape architect. ➢ Availability of species needs to be secured before rehabilitation activities commence to ensure that plants/seeds are ready and available for re-vegetation (Action 3), so as not to leave areas exposed and vulnerable to erosion and incision. **1.6 Kick-off meeting/ Environmental Induction**

Planning Requirements to be considered prior to the implementation of the watercourse rehabilitation and management measures.
Before commencing with the rehabilitation activities, a kick-off session must be undertaken with all the responsible persons involved in the implementation of the WRMP. The key aims of the meeting are: ➢ Agreeing on the timeline for rehabilitation activities; ➢ Identifying the rehabilitation expectations and limitations; and ➢ Validating the WRMP rehabilitation strategies and the involvement of all the responsible persons in the implementation process. **1.5 Training of Contractors** All contractors involved in the implementation of this WRMP must receive basic training in environmental awareness, including minimisation of disturbance to areas of increased ecological sensitivity, as well as fauna and flora with a no poaching policy, management of waste and prevention of water pollution.

5.3 Action 3: Watercourse Rehabilitation and Management Implementation

A site-specific WRMP has been developed to provide step-by-step implementation measures to rehabilitate disturbance within the watercourses and associated conservation buffer (Section 5.1). The implementation of these measures is the core of the WRMP, as this entails putting rehabilitation and management activities into visible outputs. The success of the rehabilitation efforts is highly dependent upon cogent conceptual planning undertaken at the early stage of the construction activities associated with the proposed Mount View mixed-use development. The mitigation measures that must be adhered to during the construction and operational phases are listed in the tables that follow as well as the watercourse assessment undertaken by FEN (2021). A list of the roles and responsibilities of the individuals involved in the implementation of this WRMP is provided in Table 7.

Table 7: Summary of various parties involved with the implementation of this WRMP.



Party	Responsibility
Proponent	• The Proponent must ensure sufficient funding for the implementation and long-term maintenance of the mandated rehabilitation requirements as stipulated in this report; • The Proponent will be responsible for the appointment of an Environmental Control Officer (ECO) to monitor and audit the rehabilitation requirements, the Implementing Agent, as well as an independent auditor; • The Proponent will be responsible for ensuring the Implementing Agent receives a copy of this document and understand its contents; • The proponent must give the authority to the on-site ECO to stop works on site should he/she feel that there is a serious threat to or impact on the surrounding environment.
Implementing Agent	• An overarching Contractor should be appointed as the Implementing Agent, to manage all sub-contractors and appoint specialists, as required; • The Implementing Agent must ensure that all sub-contractor/s take full responsibility for each of his/her employees and any penalties imposed; • The Implementing Agent must immediately inform the Proponent and on-site ECO if any changes to the project are envisaged and if any aspects of this implementation plan or the RoD cannot be complied with; • It is the responsibility of the Implementing Agent to ensure that the measures stipulated within this WRMP are adhered to; and • Should the Implementing Agent require clarity on any aspect of this WRMP, the Implementing Agent must contact the on-site ECO for advice or alternatively, a suitably qualified specialist. **Training of Rehabilitation Workers** The Implementing Agency is to facilitate an initial environmental induction to all sub-contractors and associated workers in environmental awareness, including minimisation of disturbance to areas of increased ecological sensitivity (i.e. depression wetland), as well as fauna and flora with a no poaching policy, management of waste and prevention of water pollution. Furthermore, the Implementing Agent is to ensure that all operational workers have received basic training on fire management and prevention measures and be aware of any emergency protocols required. **Contractor Performance** The Implementing Agency must ensure that the relevant sub-contractors adhere to the conditions of this Implementation Plan. Should the Contractor require clarity on any aspect of this WRMP, the Contractor must contact the Implementing Agency directly, who, if needed can consult with the specialists involved in the WRMP. Should the on-site ECO feel that the conditions of the WRMP is not being met by the Contractor(s), the on-site ECO has been given the authority by the Proponent to stop works if in his/her opinion there is/may be a serious threat to or impact on the surrounding environment and instruct the contractor(s) on suitable rectification and remediation actions that must be implemented immediately.
On-site Environmental Control Officer (ECO)	The on-site ECO is the person responsible for the day-to-day monitoring of the Implementing Agent's activities. The on-site ECO should ideally be appointed before the start of rehabilitation works so as to record baseline conditions and will be responsible for ensuring that all rehabilitation activities are implemented. The on-site ECO is mandated to do the following: • Ensure that all Implementing Agent's employees are fully aware of their environmental responsibilities and the sensitivities of the site. This should take the form of an initial environmental awareness-training program in which requirements of this document will be explained; • Monitor site activities on a regular basis to ensure that there is minimal unintended environmental impact to the surrounding areas as well as the areas to be rehabilitated; • Monitor the site activities and rehabilitation actions in line with this WRMP as well as any relevant licences/Records of Decision (RoD); • The on-site ECO should have all relevant contact details for the team responsible for implementation of this plan and any rapid response units, as needed should additional clarity be required; • Ensure that a 'hotline' exists for reporting incidents, specifically unplanned/uncontrolled fires breaking out and resolving any problems rapidly; • Compile a monthly status report, indicating any non-compliances as well as progresses made on the implementation of this WRMP; and

	• Monitor all proposed road construction activities and ensure efficient remediation/mitigation measures are implemented, as deemed necessary. A monthly monitoring report must be compiled.
Independent Auditor	The independent auditor must be suitably qualified with relevant experience to undertake external audits of the findings of the on-site ECO, in line with the conditions stipulated within the Environmental Authorisation (EA) and relevant Water Use Authorisation (WUA). The independent auditor will: • Conduct all audits in line with the relevant authorisation requirements and a review of management and rehabilitation measures; • Undertake a site visit to discuss the findings with the on-site ECO and ensure that the rehabilitation activities are complaint; and • Compile a relevant audit and monitoring report which is to be submitted to the relevant provincial authorities.

This WRMP includes practical rehabilitation and management methods to achieve rehabilitation objectives and a desired end result. The rehabilitation and management methods of the WRMP were grouped into seven (7) tasks (Figure 12) and discussed in Section 5.3.1 – 5.3.8 to guide the implementation thereof.

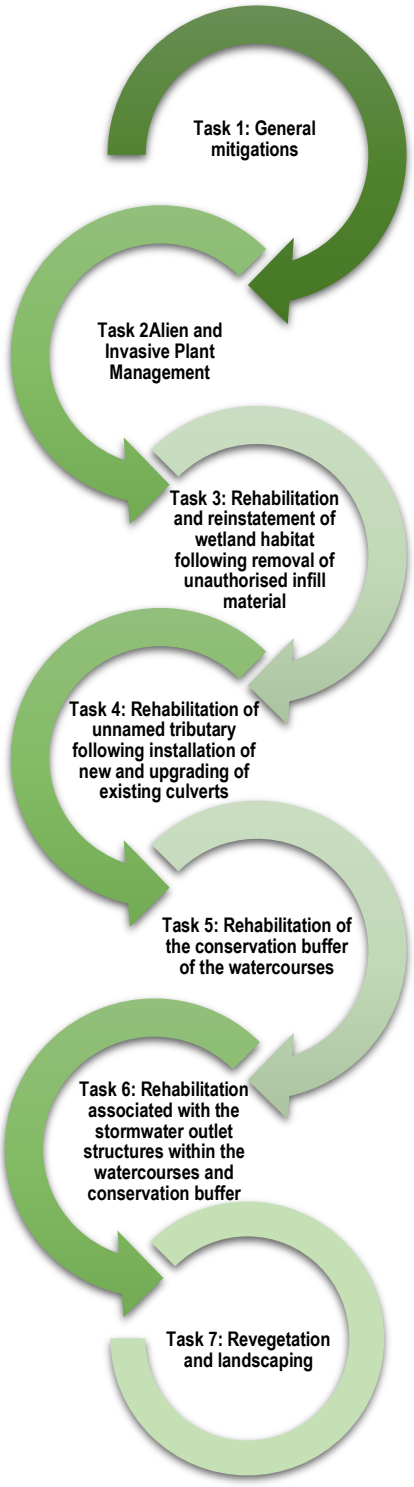


Figure 12: Grouped tasks for the rehabilitation and management method implementation.

Additionally, Section 5.3.8 also provides generalised management methods to be implemented post-rehabilitation activities, as part of any necessary general periodic maintenance activities and during emergency repairs.

5.3.1 Task 1: General control measures

This section provides general mitigation measures that are applicable to the construction and operational phases of the proposed Mount View mixed-use development (Table 8).

Table 8: General mitigation measures applicable to the construction and operational phases of the proposed Mount View mixed used development in relation to the affected watercourses and conservation buffer.

Responsible persons	Proponent	ECO
	Implementing Agent	Independent Auditor
Objective/ Requirement	Control Measures	
Construction phase general mitigation	• It is recommended that the variable conservation buffer calculated also be utilised as a construction buffer from the delineated edge of the watercourses. This area should be demarcated a no-go area and no unauthorised activities are allowed within the buffer or the delineated extent of the watercourses. A construction security fence (should a more solid fence be required during construction) such as a pole and electric wire fence as this will still allow movement of faunal species (Figure 13);	

Figure 13: Example of temporary safety fencing used to demarcate a watercourse.

- No indiscriminate movement of vehicles or personnel is allowed within the watercourses and conservation buffer. Careful planning of all construction equipment must be undertaken beforehand to ensure that the minimum impact on the watercourses occurs.
- Contractor laydown areas, vehicle re-fuelling areas and material storage facilities are to remain outside of the watercourses and at least 32 m from the delineated extent;
- Areas which are to be cleared of vegetation, including contractor laydown areas, must remain as small as possible, in order to reduce the risk of proliferation of alien vegetation, and in order to retain a level of protection to the watercourses during construction (e.g. dust generation, sediment trapping, slowing of stormwater runoff – specifically due to the study area being at a gradient sloping towards the watercourses);
- Clear areas for the proposed construction in a phased manner and retain as much indigenous vegetation as possible;
- No indiscriminate driving of construction equipment is allowed. All vehicles and machinery must utilise existing roads or pre-planned construction roads;
- Material to be used as part of the construction activities must be stockpiled outside the 32 m NEMA ZoR of the watercourses to prevent sedimentation thereof and to avoid any other vegetation being impacted by the construction activities. These stockpiles may not exceed a height of 2 m unless approved by the ECO and should be protected from wind, for example through using tarpaulins;
- No waste disposal is to be permitted within the watercourses and conservation buffer;
- Any solid waste or litter generated as part of the construction activities must be disposed of within suitable waste bins;
- Re-fuelling of vehicles must be undertaken at a suitable facility off site or on a non-permeable surface, associated with a construction camp outside of the watercourses and conservation buffer; and
- All wastes are to be removed from the site and disposed of at a registered facility.

Operational phase general mitigations	• Incorporate as much indigenous terrestrial, wetland and riparian vegetation into the landscape plan for all open space areas and stormwater attenuation facilities; • An alien vegetation management plan should be developed and implemented and managed by the property managers or Homeowner Association for all open space areas as well as the watercourses; • No vehicles are permitted to enter into the watercourses. Any maintenance works must be undertaken by foot or the relevant authorisations obtained beforehand; • Existing access roads must be used for monitoring purposes. No indiscriminate movement of vehicles is allowed.

5.3.2 Task 2: Alien and Invasive Plant Management

Large woody species of Alien and Invasive Plants (AIPs) including (but not limited to) *Eucalyptus camaldulensis* (River Red Gum, Category 1b), *Acacia saligna* (Port Jackson Willow, Category 1b), *Salix babylonica* (Weeping Willow, Category 2), *Populus x canescens* (Grey poplar/Matchwood poplar, Category 2) as well as graminoid AIP species including *Pennisetum clandestinum (*Kikuyu Grass, Category 1b) were identified within the current delineated unnamed tributary, CVB wetlands and surroundings. The National Environmental Management Biodiversity Act, 2004 (Act No. 10 of 2004) (NEMBA) Section 73 requires every person to exercise a Duty of Care relating to invasive species within their property, and as such the landowner is responsible for AIP control. Category 1b species require compulsory control and must be removed and destroyed as they have high invasive potential. An AIP control plan was therefore developed as part of this WRMP, especially due to the high densities of alien woodland riparian vegetation noted within the unnamed tributary of the Sir Lowry's Pass River.

This AIP control plan focuses on mechanisms to control the identified species within the study area. It must be noted that some the identified AIPs, for example *Acacia saligna*, have been known to have large and resilient seed banks that can germinate for upwards of five (5) decades thus it is imperative that sufficient capacity and funding be provided for follow-up control for a number of years after the initial clearing.

AIP control can be divided up into two phases, namely:

1. The initial control phase where AIPs are removed from the study area; and
2. The follow-up control whereby AIPs (coppice, saplings, and seedlings) within the rehabilitated watercourses and conservation buffer as well as all open space areas as part of the development must be done once a year during spring (September – November) for a minimum period of seven (7) years to ensure that new AIP infestation does not occur, after which the follow-up period should be re-assessed based on the need.

The above phases can be carried out by setting measurable, time-bound goals that can be undertaken concurrently over a short (0-2 years), medium (2-5 years) and long (5-10 years) term period with inputs from with a freshwater ecologist, botanist and/or landscape architect.

- The removal of alien invasive vegetation, particularly the dense stands of mature woody AIPs such as *Eucalyptus camaldulensis*, along the riparian habitat of the unnamed tributary is highly recommended. However, it is recognised that the removal of woody AIPs all at once can lead to erosion and reduce available roosting areas for avifauna; therefore, it is recommended that the removal of woody AIPs and subsequent reinstatement of indigenous riparian vegetation (see Task 7 below) within the riparian habitat and margins of the unnamed tributary be carried out in phases over a medium (2-5 years) to long (5-10 years) term period, starting from the upstream reach of the unnamed tributary and subsequently moving downstream to include the CVB wetlands, while monitoring and revegetating the affected areas, to ensure the continued functioning of the system.
- The removal of younger alien tree species such as *Acacia saligna (*Port Jackson*)* which are known to be highly invasive and outcompete all indigenous vegetation, as well as herbaceous

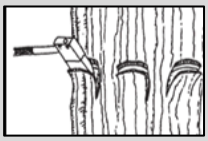
and graminoid alien species such as *Pennisetum clandestinum* (Kikuyu Grass) dominating the unnamed tributary, CVB wetlands, and conservation buffer, can be achieved over a short (0-2 years) to medium (2-5 years) term period. Subsequent reinstatement of indigenous riparian and wetland vegetation (see Task 7 for details) and suitable terrestrial vegetation from the from the Boland Granite Fynbos vegetation type (as classified by Mucina and Rutherford, 2006) for the conservation buffer, can be undertaken concurrently with the clearing of AIPs, especially when it comes to the eradication of *P. clandestinum* which has been proven challenging due to its creeping rhizomes and leafy runners which root from the node and form dense mats of grass.

- It must be noted that the alien and invasive species list (2020) indicates that *Pennisetum clandestinum* is only considered a category 1b[2] in protected areas and wetlands in which it does not already occur. As such it is recommended that *P. clandestinum* be controlled to prevent further spreading rather than entirely removed.
- Removal can be undertaken in phases, however, if any runners are left kikuyu will grow proliferate. The best method for removal is to use herbicides before digging it out (for details see Table 10 below). This must be done with care, especially using herbicides in the wetlands, and in conjunction with revegetation of indigenous vegetation within the conservation buffer be undertaken in phased manner allowing the area to naturally reclaim indigenous vegetation.

The following definitions (Table 9) are applicable to this section relating to AIP control:

[2] **Category 1b**: Invasive species that require control by means of an invasive species management programme. Please refer to Annexure B for further details.

Table 9: Definitions for terminology associated with AIP removal.

Hand Pull 	Low or sparse infestations of saplings and seedlings can be pulled out by hand. All root material should be removed to avoid re-sprouting of the plant. Safe to use in the river as no chemicals are used. Hand pulling does create soil disturbance, but if the area is sparsely invaded such disturbances are unlikely to be ecologically damaging.
Frill 	The technique whereby an axe or cane knife is used to chip/cut around the base of a tree (±2mm deep) in order to place herbicide into the cuts (cutting not to be as deep as to ringbark). Herbicide to be applied within 30 minutes from frilling. Suitable for mature trees in low/sparse infestation. No contamination of water with herbicides as these are applied directly to the tree.
Ringbark 	A cane knife or axe is used to remove the bark from the tree and cambium, in a horizontal band about 30cm wide (about 50cm from the ground). Ring barking interferes with the circulation of the tree and results in it slowly dying. No contamination of water with herbicides as these are applied directly to the tree.
Tree Felling 	Complete removal of the AIP down to a stump by means of a chainsaw, hand axe, brush-cutter. Suitable for clearing dense stands. Potential for pollution as a result of bar oil in equipment and may result in blockages to infrastructure due to debris build-up.
Slashing 	The seed stalks/branches of annual plants can be slashed with a cane knife, mattock, bill hook or slasher before the seeds have matured. No contamination of water with herbicides as these are applied directly to the tree. ** Care should be taken to prevent plant material and propagules from ending up in the river. **Costs are generally low for controlling annuals in this way, as no herbicide is required.
Stumping 	The treatment of the remaining stump after felling with an appropriate herbicide (see recommended below). No contamination of water with herbicides as these are applied directly to the tree. **Stumping can also imply the treatment of the remaining stump after felling with an appropriate herbicide.
Foliar Spray 	The application of herbicides directly to the leaves. Foliar spraying can be done by using the following: a) A hose and handgun spraying the solution from a herbicide tank; b) A backpack spray unit; or c) Splatter guns which allow for larger droplets at higher concentrations – suitable for regrowth. **It must be ensure herbicide is being applied at the right concentration and rate to cover the foliage of the pest plant with fine droplets and avoid run-off. A flat-fan nozzle and low pump pressure will assist in reducing spray drift.
Soil application	The application of herbicide (see recommended below) to the soil which is taken up by the plants roots.
Stump Coppice	New shoots that regenerate from the stumps of felled trees.
Root Suckers	New vertical regrowth that arises from the base of the trunk, a new stem arising away from the main, stumped stem.

The diagram as well as Table 10 below indicates the recommended control measures to be implemented as part of this WRMP. All recommended herbicides and active ingredients are listed under species specific control. It is important to note that AIP control (specifically *Acacia saligna* thickets) must be done from the outer sections inwards in order to contain the existing AIP and prevent further spread.

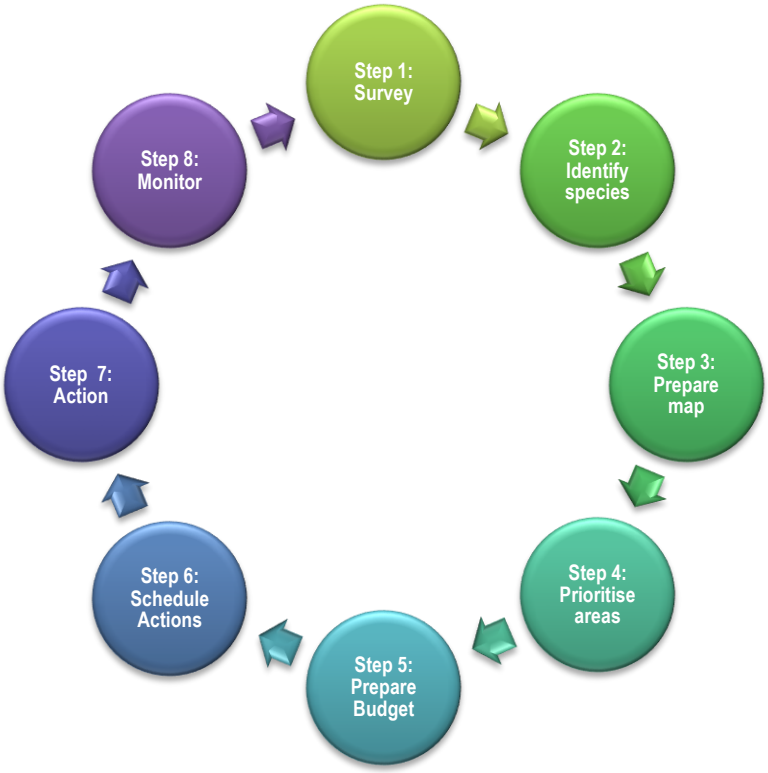


Figure 14: Schematic diagram for the required steps associated with an AIP plan.

Table 10: Relevant objectives and control measures to be implemented as part of the AIP clearing

Objectives or requirements	Control Measures
Initial Control	
General	• AIP must be removed from the watercourse and surrounding terrestrial habitat (within 32 m thereof) to comply with existing legislation (amendments to the regulations under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) and Section 28 of the National Environmental Management Act, 1998 (Act No. 107 of 1998) as provided in **Annexure B**; • AIP should be manually removed as far as feasibly possible and spot chemical treatment can be undertaken utilising products safe for use within the watercourse. • All herbicides used must be approved by DEA and all directions as stipulated on the proposed herbicide must be strictly adhered to.
Chemical Control	• Dense seedling growth must be controlled with knapsack sprayers with a flat fan nozzle; • Suitable dye must be used to limit over- or under spray of areas; • Chemical control will entail limited usage of registered herbicides for a specific species and one must adhere to the measurements on the product label; and • **Label instructions may not be exceeded due to negative impacts on surrounding flora and fauna for the use of herbicides containing Glyphosate, Diquat and Paraquat in the identified watercourses associated with the rehabilitated area.**
Species Specific Treatment	The following are species specific treatment for the woody AIPs (mainly *Eucalyptus camaldulensis* and *Acacia saligna)* and graminoid AIP species, *Pennisetum clandestinum,* noted within the rehabilitation areas. Use of these listed chemical treatments should occur after or during the mechanical removal process and may be used on other common weeds, as deemed appropriate by the ECO.

  	**Treatment of woody AIPs including *Eucalyptus camaldulensis* (**River Red Gum**) and *Acacia saligna* *(Port Jackson*)*:** • Seedlings must be hand pulled and no herbicide is needed; • Young plants should be lopped/pruned and treated by means of a foliar spray of 50ml of Triclopyr Ester* mixed with 10l of water and applied at a rate of 3 l/ha; and • Adult plants must first be cut down to a stump and frilled before being treated with 300ml of Triclopyr Amine salt* mixed in 10 l of water applied at a rate of 1.5 l/ha. Additionally, a Triclopyr Ester* solution can also be applied to approximately 0.6m length of stump. • All branches that have been mechanically removed must be transported off site to a designated dumping facility. Cut branches should not be left in stockpiles as the seeds will likely germinate. **Treatment of *Pennisetum clandestinum* (**Kikuyu Grass) • A herbicide with active ingredient Glyphosate*, dalapon or haloxyfop-P methyl ester should be used. Plants should be sprayed during their active growing season (autumn). It is to be noted that Glyphosate* or haloxyfop herbicides may not be used within the watercourses where water is free flowing as it is known to be toxic to aquatic life. • Haloxyfop-P Methyl Ester is deemed to have a minimal environmental impact (although on an acute basis is toxic to aquatic life) and is not expected to leach into groundwater. Furthermore, it has been identified to degrade in soil under normal environmental conditions[3].
Follow-up Control	

Follow-up AIP treatment	• Follow-up control is essential to control alien saplings, seedlings and coppice regrowth to achieve and sustain the progress that was made in the initial phase. If the follow up control phase is neglected, the alien infestation may become worse and denser than before the eradication process started.
	• Follow-up should be quarterly after the initial AIP clearing, thereafter, annually, within the growing season (September – November) for at least seven (7) years.
	• An annual assessment before mobilisation of the clearing crew should be undertaken to determine equipment and personnel requirements in order to secure the necessary funding.
	• After initial control operations dense regrowth may arise as new regrowth will sprout in the form of stump coppice, seedlings and root suckers. The following should therefore be applied:
	  ○ Plants that are less than 1 m in height must be controlled by foliar application.
	  ○ Areas with dense seedlings should not be uprooted or hoed out, as these areas will result in soil disturbance and will in return promote flushes and germination of alien seedling growth.

Although not considered an AIP, *Phragmites australis* and *Typha capensis* (already occurring within the CVB wetlands) are known to dominate wetlands associated with deep sandy soil and outcompete other indigenous vegetation, of which the likelihood for these species to dominate may increase with the disturbances, including increased sediment runoff into the receiving watercourses, associated with the proposed Mount View mixed-use development. As such, these species need to be controlled and managed within the rehabilitated watercourses. The following table provides a description of the various mechanisms that should be used to control *Phragmites australis* and *Typha capensis.*

[3] The DOW Chemical Company. 2011. Product Safety Assessment: haloxyfop-P Methyl Ester

Table 11: Summary of mechanisms used for the control of *Phragmites australis* and *Typha capensis*.

Control Type	Description
Mechanical Control	
Mowing and Cutting	For a perennial rhizomatous grass, mowing does little to reduce *P. australis* dominance. It was identified that mowing actually stimulates shoot production and resulted in increased density of Phragmites shoots (but decreased shoot height and biomass) in wetlands (Gu¨sewell *2003*; Hazelton *et al.* 2014). On a large scale, hand cutting is noted to be ineffective due to the time and labour requirements, however, is considered an important strategy of rapid response efforts. Overall, simply cutting will be ineffective in eliminating *P. australis* and *T. capensis*, but with proper timing, cutting may help reduce dominance (through depletion of underground reserves) and control further expansion (Hazelton *et al.* 2014). It is, however, imperative that all cut material be removed and disposed of off-site at a suitable disposal facility in order to prevent recolonisation of rhizomes.
Burning	Burning has not been effective unless coupled with either hydrological restoration or herbicide application (Marks *et al.* 1994). Burning alone has produced variable results and in some instances was noted to stimulated *P. australis* growth and stand development (Hazelton *et al.* 2014).
Chemical Control	
Herbicides   	Because of the physiology of *P. australis* and *T. capensis*, well-established stands are difficult to control with only one herbicide treatment. Creating multiple stresses on the plants is the most effective way to control phragmites. There are two broad-spectrum herbicides, Glyphosate and Imazapyr that are commercially available and known to control *P. australis* effectively when used properly. These chemicals are nonselective and will enter any plant species (targeted and non-target plant species) through contact with the leaves or stems and be translocated to the rhizomes. As such, application of glysophate should be done to targeted *P. australis* after senescence of other indigenous species (during the Western Cape dry season) to minimise effects (Hazelton *et al.* 2014). Both herbicides are available in separate formulas for application either on aquatic or terrestrial sites. Improper use of the terrestrial formulations in an aquatic habitat may harm fish and macro invertebrates and therefore **label instructions may not be exceeded due to negative impacts on surrounding flora and fauna**. Two types of applications are noted to be the most effective for the treatment of *P. australis* and *T. capensis:* *Foliar Treatment:* Spray should be applied to wet the leaves and, when present, the flower plumes of the target plants. Excessive application, such that the chemicals are dripping off the plants, should be avoided due to injuries to desirable indigenous plants. This application can be undertaken in areas where *P. australis* is dense, with limited other species (NRCS, 2013). *Cut stem treatment:* This method should be used in isolated or scattered stands of *P. australis*, where impacts to desirable, native plant species must be avoided. Cut plants to waist height and add one drop of herbicide to hollow stems with a squirt bottle or syringe. Be careful to remove seed heads from the site after cutting to prevent seed spread. Due to the pervasiveness of this species and its ability to aggressively recolonize through seed or rhizomes, long-term management and monitoring are necessary. Once areas of phragmites have been controlled (e.g., greater than 85-percent reduction), it is recommended that an annual maintenance control program be implemented (NRCS, 2013).
Biological control	
Once *Phragmites australis* and *Typha capensis* proliferation is within controllable levels, plant competition by other indigenous species will likely assist with the long-term restoration trajectory. Areas where *P. australis* and *T. capensis* have been eradicated should be replanted/ re seeded with indigenous species as soon as possible (In line with precautionary timeframe after chemical control) in order to allow for establishment so as to competitively exclude samplings. Unmanaged areas where *P. australis* has been controlled effectively, but not replanted with indigenous species, are often reinvaded by *P. australis* immediately either by seeds or regrowth from rhizomes that were not killed (Hazelton *et al.* 2014).	
Requirements for the on-site Alien Invasive Plant Control Plan	
Description 1. Details of the property, name, address and province; 2. A map indicating the location of the property with administrative boundaries of local or district municipality and province;	**Extent and distribution of the invasive species on the property** 1. Reflect AIP infestation as a percentage (%) cover per area. Prepare a map of area showing the property boundaries;

3. Types of landuse; 4. Property size in hectares (ha); 5. Contact details and name of the landowner(s); 6. Purpose of the control plan; 7. Timeframe: the timeframe for implementation should be realistic depending on the property size, infestation levels, species present and available funding. (Timeframe can range between 3 and 10 years); and 8. The desired result (e.g. remove invasive plants and restore grassland habitat) should be determined. 9. A list of all AIPs on the property detected during the survey (The list to include Species name, common name and NEMBA Category).	2. Divide the property into manageable units (management units), reflected as polygons on the property map. Use natural boundaries or infrastructure (roads, fences) to distinguish between the management units; 3. Assign an alpha-numeric identification number using the first three letters of the property name followed by a three digit number, starting at 001; 4. Survey each management unit, list and describe the species present according to their size (i.e. seedlings, young, mature). Also indicate what proportion (percentage %) of the management unit is covered by the invasive plants, capture the information as follow: a. Management Unit and hectares; b. Extent of overall invasion (%); c. Comments and remarks; and d. Priority (High: clear within 6 - 12 months, Medium 12 - 24 months; Low 24 + months). **Objectives and actions** 1. Set objectives to demine the desired state to reach compliance. 2. Provide actions to reach the relevant objectives. The following are examples of objectives: a. Objective 1: Control AIP Infestation - Bring the AIP infestation on the property under control by 2025. b. Objective 2: Prevention - put measures in place to prevent the introduction of new NEMBA listed alien and invasive species onto the property, and from spreading from the property to neighbouring properties. c. Objective 3: Early Detection & Rapid Response (EDRR) and eradication - To detect emerging IAS through regular surveys and remove them before they become established, produce seeds or offspring and start spreading.

5.3.3 Task 3: Rehabilitation and reinstatement of wetland habitat following removal of unauthorised infill material within CVB wetland 3

Unauthorised infilled material located within portions of CVB wetland 3 is proposed to be removed as part of the Mount View mixed-use development. KLS Consulting Engineers calculated the footprint and volume of material to be removed as 4111 m³. The following table provides site-specific mitigation measures for the construction and rehabilitation phases of the removal of the unauthorised infill material associated with CVB wetland 3.

Table 12: Rehabilitation interventions and control measures proposed for the removal of unauthorised infilled material and subsequent rehabilitation and reinstatement of wetland habitat within CVB wetland 3.

<table>
<tr><th rowspan="2">Responsible persons</th><th>Proponent</th><th>ECO</th></tr>
<tr><th>Implementing Agent</th><th>Independent Auditor</th></tr>
<tr><th>Objective/ Requirement</th><th colspan="2">Control Measures</th></tr>
<tr><td>Vegetation clearing and earthworks</td><td colspan="2">

Any rehabilitation works should be undertaken just before the wet season (between the months of February – May) so that vegetation reinstated can be quickly re-established.
All vegetation removed (especially since some of the current vegetation was identified as AIPs) must be disposed of at a suitable disposal facility.
Any building rubble or general waste products removed along with the infill material must be disposed of at a suitable facility and may not be reused on site. Any stockpiled material may not exceed 2 m in height. Any uncontaminated soil excavated should be kept for later usage as backfill material where required. Special mention is made to topsoil which should be reinstated after excavation. As far as possible these stockpile areas should coincide with/be serviceable from the existing roads to move material up for re-use. Final locations for stockpile areas must be finalised and agreed upon by the ECO;

Figure 15: Orange point indicate the position where construction machinery must be located relative to the unauthorised fill area (red arrow) and CVB wetland. Yellow areas indicate representative areas for temporary stockpiling of material removed from the unauthorised fill area.

All exposed stockpiled soil must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) to prevent erosion and sedimentation of the watercourses.
The removal of the unauthorised infilled material must be of adequate size and depth to ensure reinstatement of wetland habitat following the natural topography of the immediate surrounds. It is recommended that a suitably qualified freshwater ecologist be consulted with the final design details and sign-off on site once the material has been excavated.
All suitable excess material removed as part of the removal of unauthorised infilled material can be utilised as part of the soil profiling activities elsewhere in the study area or be removed to spoil on site, however, not within the watercourses, conservation buffer or open space areas. Topsoil may have a high density of alien invasive seeds which will need to be controlled into the operational phase. The topsoil may be used as part of the rehabilitation activities wherafter suitable control of the alien and invasive plant species must be implemented.

</td></tr>
<tr><td>Excavation activities to create the additional</td><td colspan="2">The CVB wetland 3 is in a degraded state as a result of AIP infestation and the historical infilling of the CVB wetland. Due to the transformation of the topography of the surrounding landscape and the fragmentation of the CVB wetlands on site, it is assumed that lateral inputs and surface runoff hydrologically drive this system with contributions over-bank flooding of the unnamed tributary.</td></tr>
</table>

wetland habitat	Furthermore, the vegetation composition is considered modified and consists largely of AIPs. The figure below shows the CVB wetland 3 in relation to the unauthorised infilled material.  **Figure 16: (Left) CVB wetland 3, *Typha capensis* and *Zantedeschia aethiopica* dominant and AIP species *Eucalyptus camaldulensis* in the vicinity, adjacent to (Right) the unauthorised infilled area infested with *Acacia saligna* and *E. camaldulensis*.** <u>Proposed rehabilitation interventions:</u> It is the opinion of the freshwater specialist that fairly extensive works need to be undertaken within this wetland and surrounding area, to reinstate the wetland habitat to compensate for the loss as a result of the removal of infilled material. The rehabilitation interventions proposed must ensure ongoing hydrological functioning of the CVB wetland 3 and reinstated wetland habitat over the long-term. The following main activities were identified, and the following sections provide relevant mitigation and rehabilitation requirements to address the activities: • Removal of alien vegetation (see 'Task 2: Alien and Invasive Plant Management' above); • Excavation activities to reinstate wetland habitat (footprint and volume approximately 4111 m³ as calculate by KLS Consulting Engineers (2021)); and • Revegetation of the CVB wetland footprint area (see Task 7, Section 5.3.7). <u>Removal of infilled material from wetland</u> • The infilled area must be excavated to approximately the same depth of the CVB wetland 3. The outer edges of the existing wetland where it adjoins the new wetland area must be levelled out so that there is no longer a separation between the two areas to ensure the area is suitably recharged from overbank flooding; • The base of the infilled area must be lightly compacted to be stable and ensure that no gullies would form, but still be permeable to allow some water to drain through it following the excavation activities. • Topsoil (sourced from the infilled area) must be placed atop the base layer. Some of the topsoil contains a seedbank of the vegetation originally located in the wetland which will aid with the rehabilitation of the CVB wetland as a whole. It is, however, imperative that AIP control be continued for this area as the topsoil also have an extensive seedbank of AIPs. • To ensure that the new wetland habitat is hydrologically sustained, it is recommended that the wetland floor be shaped and sloped to maintain the average slope in a westerly direction to ensure that the inflow of surface runoff and contributions from bank overspilling of the unnamed tributary channel flows through the CVB wetland (in an easterly direction), and hydrologically drives the additionally created wetland habitat south of the CVB wetland 3. • In order to ensure that the reinstated wetland footprint area corresponds to the geomorphological and hydrological regime of the existing CVB wetland, the entire wetland footprint should be shaped to create seasonal and temporary wetland zones. A such, the proposed shaping of this area (in terms of the slope ratios and depth) must be approved by a suitably qualified freshwater ecologist prior to commencement of any works. • The wetland footprint area should not be uniformly levelled/excavated as variable ponding should be encouraged in areas of the CVB wetland to increase the presence and diversity of niche habitats. Oversight from a freshwater specialist is recommended for this component of the rehabilitation phase to ensure the hydrological retention of the system is not adversely altered. Similarly, final earthworks must be approved by a suitably qualified freshwater specialist who must write a closures report indicating they are happy with the final works.

- The base of the wetland should be lined with pebbles and small rocks in selected areas. This will aid with flood attenuation (by increasing the surface roughness) but also aid with the establishment of vegetation and prevent the excessive dominance of reeds or other undesirable species.
- The outer edge of fill area must be shaped as per Figure 17, to create zonation in the new wetland habitat. Previously removed material can be used for this purpose;

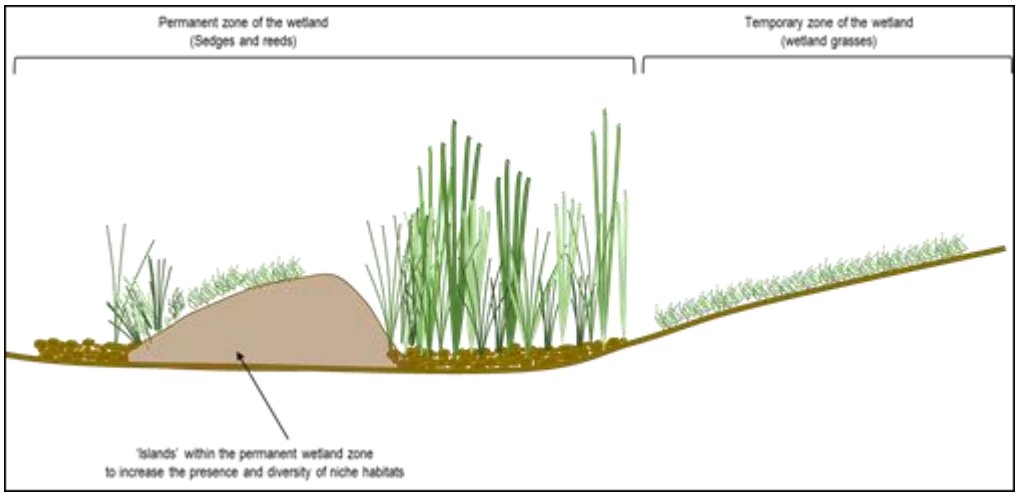


Figure 17: Cross section of the footprint area of the wetland, indicating the desired zonation to create microhabitats for floral and faunal establishment.

Rehabilitation considerations

- While the removal of the unauthorised infilled material may occur at the start of the construction activities, the rehabilitation of the CVB wetland as a whole (including the reinstated wetland habitat) should only be undertaken towards the end of the construction of the proposed Mount View mixed-use development. Dust generated from the construction works may smother new re-instated vegetation, specifically saplings and smaller species (e.g. *Isopelis* and *Ficinia* spp).
- All rehabilitation work must be done during the drier summer months leading up to the raining season (March – April) to reduce contamination of surface water and ensure maximum survival of new plant species (see section below of re-vegetation). Some watering of plants during the first dry season may be necessary to ensure survival.
- Should the ECO not have the relevant expertise, it is recommended that the rehabilitation be overseen by a suitably qualified wetland specialist to ensure maximum service provision is achieved over the long-term in terms of hydrology, geomorphology, water quality and biota.

5.3.4 Task 4: Rehabilitation of unnamed tributary following installation of new and upgrading of existing culverts

A rectangular portal culvert with 330 mm brick wing walls is proposed below the new internal roadway that will traverse the upstream reach of the unnamed tributary. Enlargement of the existing pipe culvert below Old Sir Lowry's Pass Road to a 2.4 m wide and 1 m high portal culvert is also proposed along the downstream reach of the unnamed tributary. During the site assessment, extensive erosion was noted within the unnamed tributary. Where bank erosion was noted e.g. within the upstream reach of the unnamed tributary, due to reduced surface roughness and vegetation clearing, it has resulted in the invasion of alien vegetation species. Thus, the following table provides site-specific mitigation and rehabilitation measures for the installation of the proposed culverts and works within the active channel of the unnamed tributary in general.

Table 13: Rehabilitation interventions and control measures for the proposed culverts within the unnamed tributary and management measures to be implemented for erosion and sediment control.

<table>
<tr><th>Responsible Persons</th><th>Proponent
Implementing Agent</th><th>Environmental Control Officer
Independent Auditor</th></tr>
<tr><th>Objective/ Requirement</th><th colspan="2">Control measures</th></tr>
<tr><td>Erosion control and sustainable installation of the proposed culverts within the unnamed tributary.</td><td colspan="2">The unnamed tributary of the Sir Lowry's Pass River is considered degraded with the riparian zone heavily invaded by alien and invasive tree species and the active channel incised with eroded embankments, especially along the upstream reach of the tributary (Figure 18 below). A new rectangular portal culvert with 330 mm brick wing walls is proposed in the upstream reach of the tributary where an internal roadway will traverse the unnamed tributary (Figure 18). This culvert will be sized to accommodate up to a 1:100 year flood event in the tributary and have reno-mattresses at the inlet and outlet to reduce erosion, including riprap below the culvert outlet to dissipate flow and further reduce erosion. Enlargement of the existing pipe culvert is proposed below Old Sir Lowry's Pass Road to a 2.4 m wide and 1 m high portal culvert (Figure 18).
 
Figure 18: (Top left) location of the proposed new culvert crossing within the unnamed tributary; (Top right) existing pipe culvert outlet below Old Sir Lowry's Pass Road proposed to be upgraded; (Bottom left) incised river channel of the unnamed tributary with a high north western embankment (Bottom right) poorly vegetated areas with eroded embankments noted on the northern reach of the tributary.

<u>Installation of the proposed culverts within the active channel of the unnamed tributary</u>

The recommended mitigation measures as provided below must be implemented to ensure hydrological connectivity of the tributary is maintained.
• The design of the culvert should ensure adequate flow connectivity between the upstream and downstream portions of the tributary;
• The culvert structure must extend the width of the unnamed tributary to ensure recharge of the tributary downgradient of the crossing;
• The culverts must be placed to be level/flush with the unnamed tributary bed to ensure under scouring or erosion at the inlet side does not occur;
• Soil surrounding the wingwalls must be suitably backfilled and sloped (minimum of a 1:3 ratio) and concrete aprons as well as gabion mattresses (as included in the development plan) should be installed both up and downstream for energy dissipation and sediment trapping (Figure 19).</td></tr>
</table>

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	

Figure 19: Example of suitable culvert crossings within a watercourse.

- It is recommended that the construction associated with the culverts be undertaken during the dry summer months, when limited throughflow of water is experienced. However, should construction occur within the raining season, a diversion must be excavated around the proposed culvert crossing location for the period of construction to ensure hydrological connectivity is maintained, however this should be considered at the time of construction on consultation with the ECO.
- With regards to the diversion of flow in preparation for the installation of the culvert crossing:
  - Should construction works not be finalised during the dry season, a sump area should be created directly upstream of the proposed new culvert crossings in order to prevent any summer runoff from ponding in the construction area, especially during casting of concrete. Water must be diverted downstream, around the construction area by means of a PVC pipe.
  - The pipe within the downstream reach should be at ground level and within a well vegetated area and/or lined with cobbles to prevent incision as a result of the high velocity of water being released (for example see Figure 20 below).

Figure 20: Examples of a sump area upstream of instream construction area and the outlet pipe with sediment traps downstream of a construction area.

- Should gravity not be sufficient to convey water to the downstream reach of the tributary, the contractor may pump water from the sump area to the downstream reach. The pump must be suitably bunded and a drip tray provided at all times.
- Suitable sediment traps such as geotextile wrapped hay bales or geotextile nets must be installed every 20 m from the pipe outlet (Figure 21). Should nets be utilised, stones must be installed both upstream and downstream of the nets.

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	

Figure 21: Examples of silt traps to be used during the construction phase, to limit additional sediment from entering the downstream reach of the tributary.

- The duration of impacts within the tributary should be minimised as far as possible by ensuring that the duration of time in which flow alteration and sedimentation will take place is minimised; and
- It is recommended that a freshwater specialist or ECO should monitor the diversion site once a week during the diversion period to monitor the tributary conditions during construction and after the removal of the diversion. Any improvements/ maintenance of these sediment traps must be addressed immediately on request of the freshwater specialist and/or ECO.

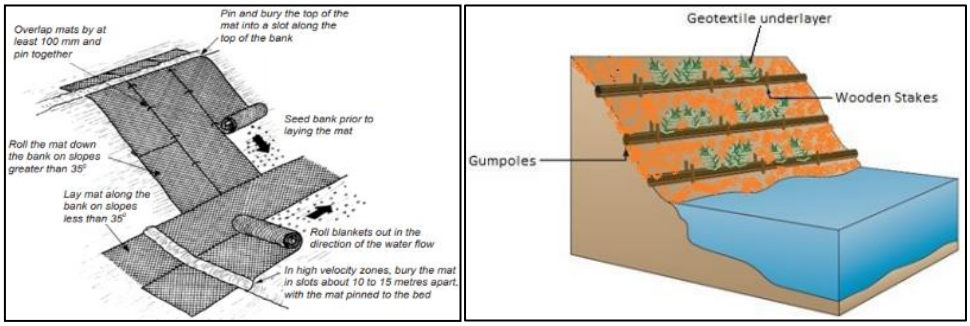
- With regards to excavation and soil compaction activities within the tributary associated with the culvert:
  - During excavation activities, soil removed from the dewatered section should be stockpiled outside the delineated edge of the unnamed tributary;
  - Excavated materials should not be contaminated, and it should be ensured that the minimum surface area is taken up, and the stockpiles may not exceed 2 m in height. Mixture of the lower and upper layers of the excavated soil should be kept to a minimum, so as for later usage as backfill material or as part of rehabilitation activities; and
  - All exposed soil must be protected for the duration of the construction phase with a suitable geotextile (e.g. Geojute or hessian sheeting) to prevent erosion and sedimentation of the tributary.

Should the installation of the proposed culverts require concrete works, the following measures are recommended:

Cement usage

- Concrete and cement-related mortars can be toxic to aquatic life. Proper handling and disposal should minimize or eliminate discharges into watercourses. High alkalinity associated with cement, which can dramatically affect and contaminate both soil and ground water. The following recommendations must be adhered to:
  - Fresh concrete and cement mortar should not be mixed within 10 m of the unnamed tributary of Sir Lowry's Pass River and the wetlands. Mixing of cement may be done within the construction camp, may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be taken to use ready mix concrete;
  - No mixed concrete shall be deposited directly onto the ground whilst it awaits placing. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing;
  - Cement bags must be disposed of in the demarcated hazardous waste receptacles and the used bags must be suitably disposed of; and
  - Spilled or excess concrete must be disposed of at a suitable landfill site.
  - Only indigenous vegetation species may be used as part of the landscaping of the development, and invasive plant species should be eradicated.

- Rehabilitation on completion of construction:

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	
	- Soil surrounding the wingwalls must be suitably backfilled and sloped (minimum of a 1:3 ratio and/or tie in with the existing embankments) and concrete aprons as well as gabion mattresses should be installed both up and downstream for energy dissipation and sediment trapping. - All soil within the tributary surrounding the culvert must be loosened on completion of works to allow for re-vegetation and prevent erosion. - Ensure alien and invasive plant species are managed post construction until suitable indigenous vegetation basal cover is achieved. - All waste is to be removed from the site and disposed of at a registered facility, including cleaning of the active channel of the unnamed tributary from any litter and debris.	
Monitoring of soil erosion and siltation within the unnamed tributary.	It is recommended that the bank erosion noted along the upstream reach of the unnamed tributary be monitored during the operational phase of the proposed development. If the erosion exacerbates, stabilisation tactics as suggested below must be implemented. Excessive sediment build-up will potentially allow proliferation and dominance by AIPs compromising the management efforts of clearing AIPs and may impact the ecology and function of the downstream reaches of the watercourse. A generalised sediment removal method statement is provided along with control measures that must be implemented during the sediment removal activities. <u>Erosion control</u> Although erosion of the tributary embankments (specifically within the northern portion) was noted, it is still considered to be stable. As such, rehabilitation interventions are recommended only if erosion compromises the stability of the embankments, specifically along the north western boundary of the tributary (Figure 22). Erosion control measures include: • Strategic placement of hessian sheets or gum poles or stabilisation with sandbags on the steep embankments must be taken in order to prevent additional erosion from occurring (Figure 22). Indigenous vegetation species can be planted on the embankments to aid with stabilisation; • Only when significant embankment failure is evident, hard engineering structure can potentially be installed as a control measures, however this must be in consultation with a freshwater specialist and be suitably authorised. Alternatively, the embankment can be suitably sloped to a maximum of a 3 (horizontal):1 (height) ratio; • Works should preferably be undertaken by hand; • Use vegetation plugs including vegetation core bags containing hydro-seeding to stabilise banks, rock packs or gabions where erosion is visible; and • Continual erosion monitoring should occur by a trained staff member.  **Figure 22: Use of hessian sheeting and gumpoles as a stabilisation method.** <u>Sedimentation control</u> • Remove any deposited sediment from the culvert crossings and the unnamed tributary, that might cause a hinder or build-up and prevent flow of water; • Once all material has been removed, the tributary embankments (where applicable) should be sloped to no greater than a a 3 (horizontal):1 (height) ratio, and soil ripped. It is important that the embankment of the upper and lower reaches of the tributary tie into the resloped embankment to prevent future erosion and incision that may result; • Works should preferably be undertaken by hand; and • Reshape deposited material and disperse it in the landscape to mimic the natural topography of the area.	

5.3.5 Task 5: Rehabilitation of the variable conservation buffer of the watercourses

The following table provides mitigation and rehabilitation measures for the proposed activities within the variable conservation buffer of the watercourses in the study area.

Table 14: Rehabilitation interventions and control measures proposed for the conservation buffer of the watercourses associated with the proposed Mount View mixed-use development.

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	
Rehabilitation and maintenance of the conservation buffer	The conservation buffer applied to the watercourses in the study area in accordance with the (CoCT) Floodplain and River corridor Management Policy (2009), is the terrestrial habitat surrounding the watercourses. As with the watercourses, the conservation buffer is also invaded with AIPs, has been overgrazed and various off stream artificial impoundments are located herein (Figure 23). Three portions of private erven associated with the proposed lower and upper Mount View mixed-use development, as well as the flood management berm as part of the floodline alteration activities, will encroach into the designated conservation buffer, and portions of *in situ* compacted walkways are proposed within the conservation buffer, (Figure 24).	

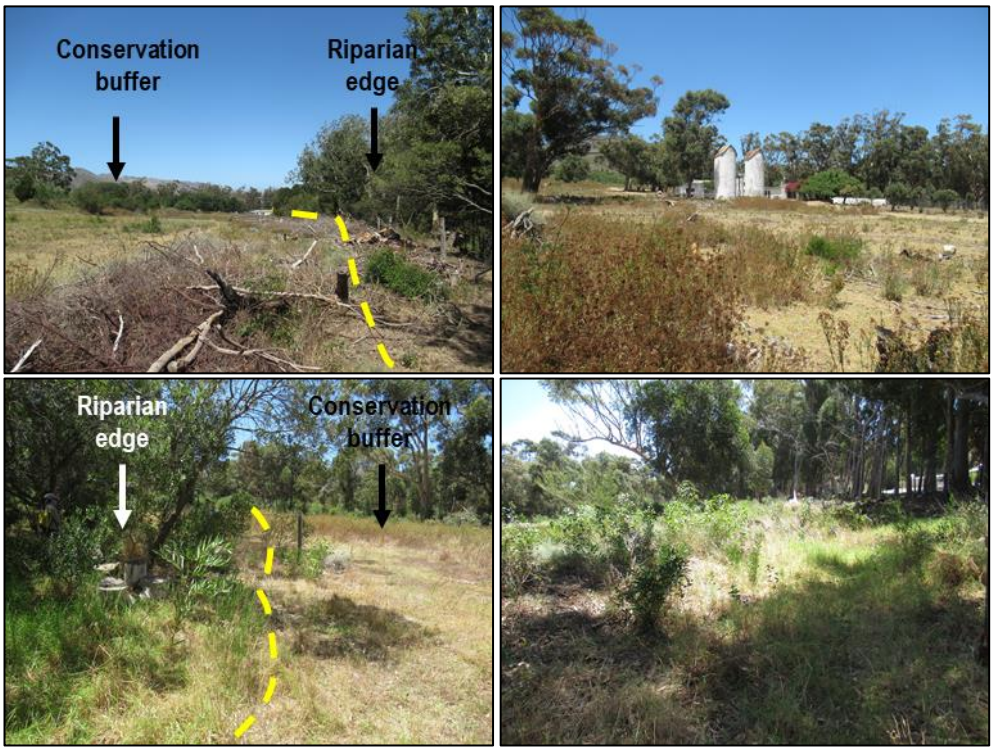


Figure 23: Typical conditions of the conservation buffer associated with the watercourses in the study area. (Top) Conservation buffer along the upstream reach, and (Bottom) downstream reach of the unnamed tributary. Yellow dashed lines estimated the boundary of the riparian habitat.

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	

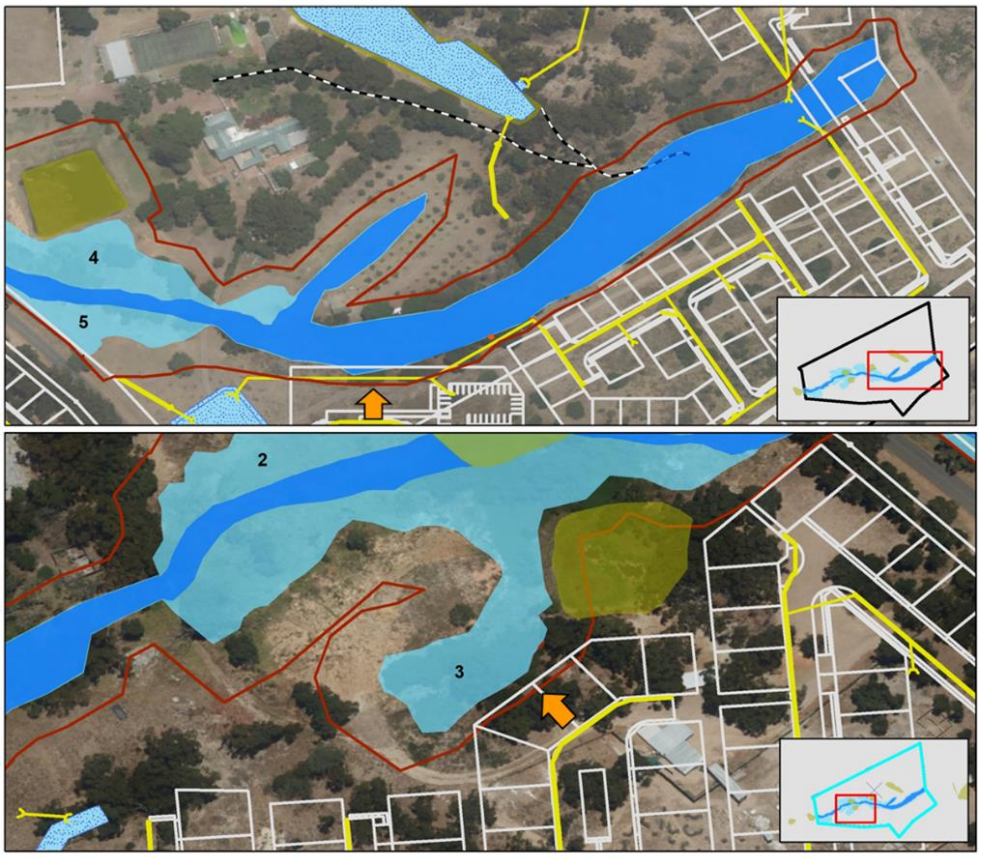


Figure 24: The proposed Mount View mixed-use development relative to the delineated extent of the watercourses (blue areas) and associated conservation buffer (brown line), and boundary of three private erven (orange arrows) located within the conservation buffer.

It is understood that the portions of the erven encroaching into the conservation buffer are the outdoor lawn or garden areas of the proposed residential erven (thus no building infrastructure). As such, a stub wall of approximately 300 mm height and 230 mm width is proposed along the outer edge of the variable conservation buffer to separate the lawn area of the private erven from that of the conservation buffer. This will provide a means of restricting and protecting the conservation buffer from AIP infestation as well as a clear delineation of where the conservation buffer is located for maintenance and management purposes. A low (300mm height) solid concrete foundation and masonry wall is proposed for the stub wall (Figure 25). The design will ensure that no further encroachment of *Pennisetum clandestinum* (which may be used in private gardens) spreads into the conservation area.

Responsible Persons	Proponent / Implementing Agent	Environmental Control Officer / Independent Auditor
Objective/ Requirement	Control measures	

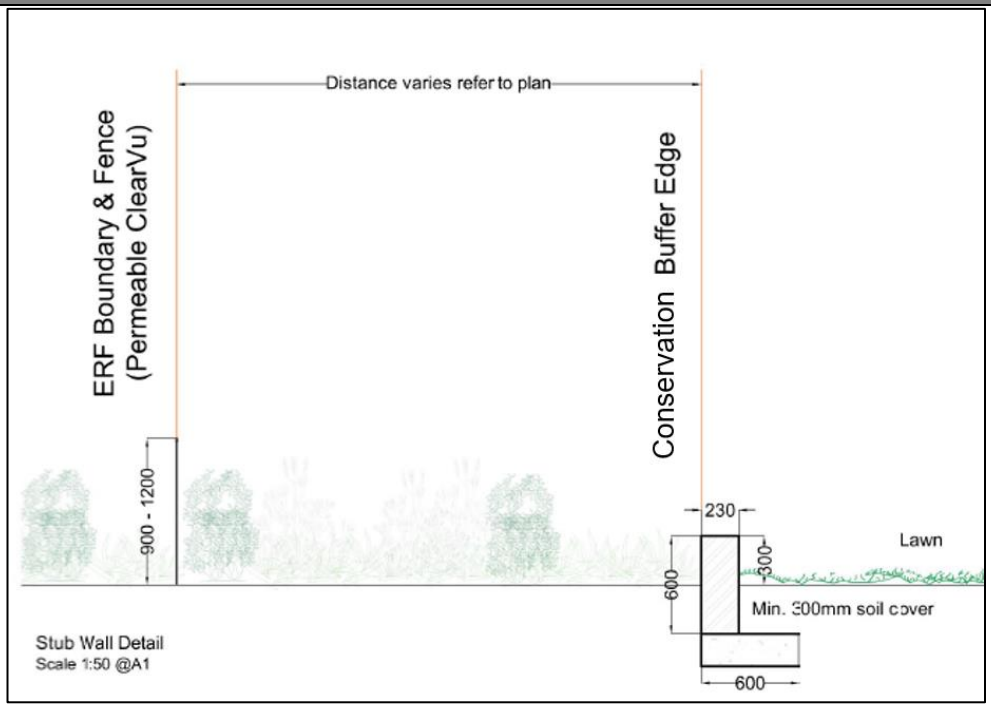


Figure 25: Schematic diagram of the proposed stub wall outside the edge of the variable conservation buffer of the watercourses for the portions of the proposed Mount View mixed-use development located within the variable conservation buffer as provided by Viridian Consulting (2021).

The following mitigation measures are thus recommended for the proposed construction of a stub wall, flood management berm, and *in situ* compacted walkways within the conservation buffer

- All footprint areas must remain as small as possible and vegetation clearing to be limited to what is absolutely essential;
- All vehicles are to remain within existing roads and no new roads should be developed to access this construction site;
- Excess material from the removal of unauthorised infill material (as per Task 3 above) that is deemed suitable by the ECO and civil contractor may be utilised for the establishment of the proposed flood management berm of which portions are located within the conservation buffer to reduce the need to import materials;
- It is required that the property of the residential development as included in the development plan (e.g. see Figure 25 above) be fenced off with suitable fencing. Although ClearVu fencing is suitable for security as it cannot be easily removed or cut, it does limit the movement of fauna (with only insects and avifaunal species able to navigate it). If ClearVu is desired a suitable faunal specialist should assist in designing under tunnels for larger faunal species (such as porcupine) or a post and wire fence should be utilised instead;
- No formal paving should be used for the proposed walkway. *In situ* compaction of soil for the walkways as proposed is preferred. Alternatively bark mulch could be utilised (see example photos below).

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	
	 **Figure 26: Example of compacted soil walkway within a riparian zone.** **Cement works for the construction of a stub wall** See Task 4 with regards to concrete mixing on site. Rehabilitation on completion of construction • Revegetation of the areas surrounding the walkways with suitable indigenous species is recommended. These can be low growing species such as grasses, shrubs, or fynbos vegetation to allow for access especially during fire emergencies; • Once construction activities are done, the surrounding area to the construction footprint and the conservation buffer in general must be suitably rehabilitated. Only indigenous vegetation species may be used as part of the landscaping of the development with inputs from a suitably qualified botanist, and invasive plant species should be eradicated as per Task 2 above. • It is recommended that the conservation buffer be managed and maintained by the Homeowner Association (HOA) and not by private residents.	

5.3.6 Task 6: Rehabilitation associated with the proposed stormwater outlet structures within the watercourses and conservation buffer

Use of stormwater structures such as stormwater channels and discharge points to convey runoff from urban areas may adversely increase sediments, nutrients and various contaminants entering watercourses if not properly designed. This will contribute to degradation of water quality for downstream users and the instream environment, including increased flows in the river channel, erosion of bed and banks at the outlet, sediment, nutrient and salt inputs, litter and pollutants entering the watercourses, and disturbance to the native vegetation. The table below thus provides mitigation and rehabilitation measures for the stormwater outlet structures located within the watercourses and associated conservation buffer.

Table 15: Rehabilitation associated with the proposed stormwater outlet structures within the watercourses and conservation buffer.

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	
Stormwater management and use of Sustainable	The internal stormwater network for the proposed Mount View mixed-use development will involve the use of stormwater attenuation facilities located outside the watercourses and conservation buffer to attenuate stormwater runoff and promote on-site infiltration. Outlet structures will then discharge stormwater into an open stormwater channel network, which will convey stormwater runoff into the	

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	
Drainage Systems (SuDs)	watercourses. Several of these stormwater channels and discharge points are located within the delineated extent of the unnamed tributary, CVB wetlands and conservation buffer (exact locations still to be confirmed). Some of these stormwater channels will be constructed with gabion weirs to reduce stormwater velocity and erosion, while others will utilise open swales (considered to be SuDs) (Figure 27). Figure 28 below shows typical design details of stormwater inlet and outlet structures proposed for the Mount View mixed-use development as provided by KLS Consulting Engineers (2020).	

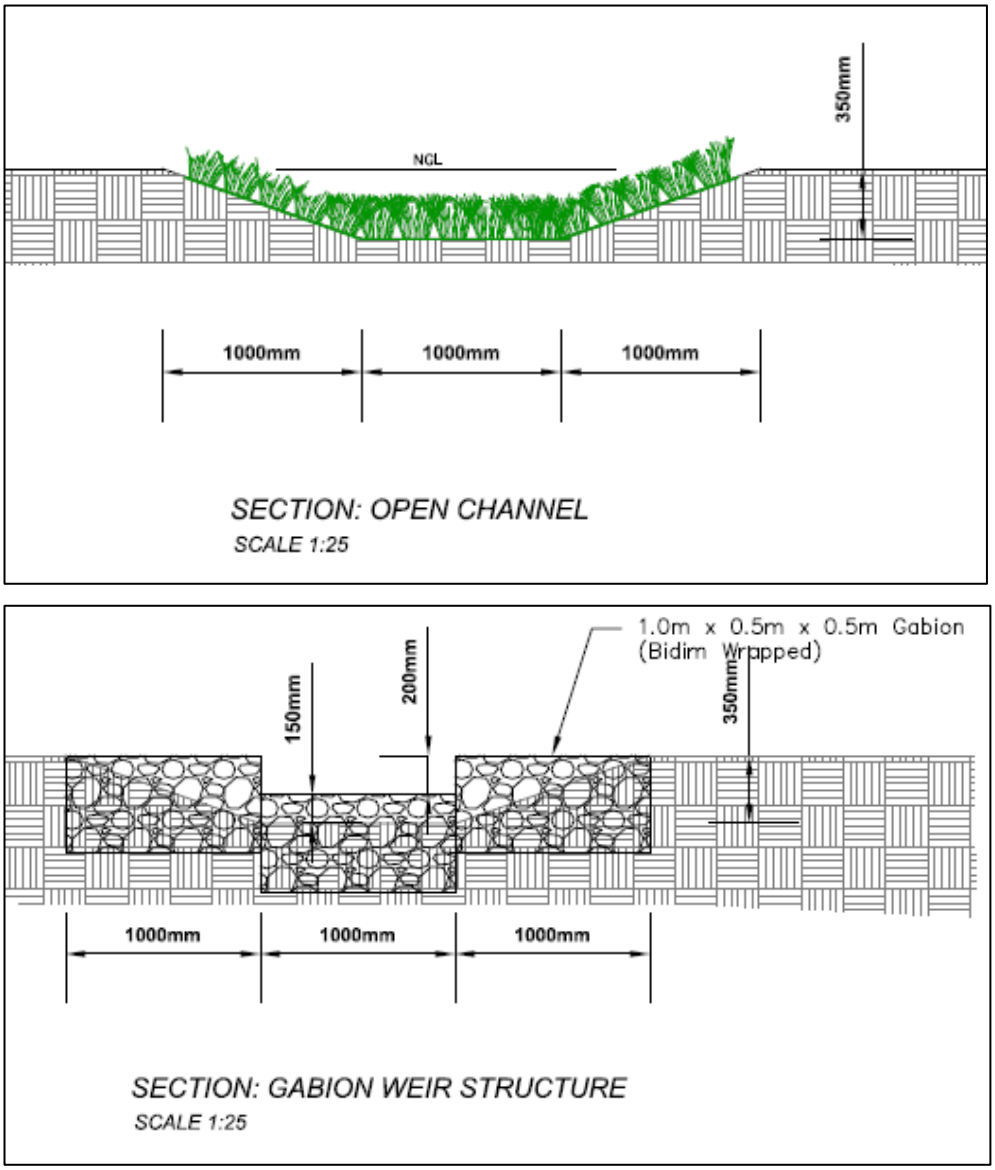


Figure 27: Typical design details of the stormwater outlet structures for the proposed Mount View mixed-use development as provided by KLS Consulting Engineers (2020). (Top) Open stormwater channel/swale; (Bottom) Gabion weirs within a stormwater channel.

Responsible Persons	Proponent / Implementing Agent	Environmental Control Officer / Independent Auditor
Objective/ Requirement	Control measures	

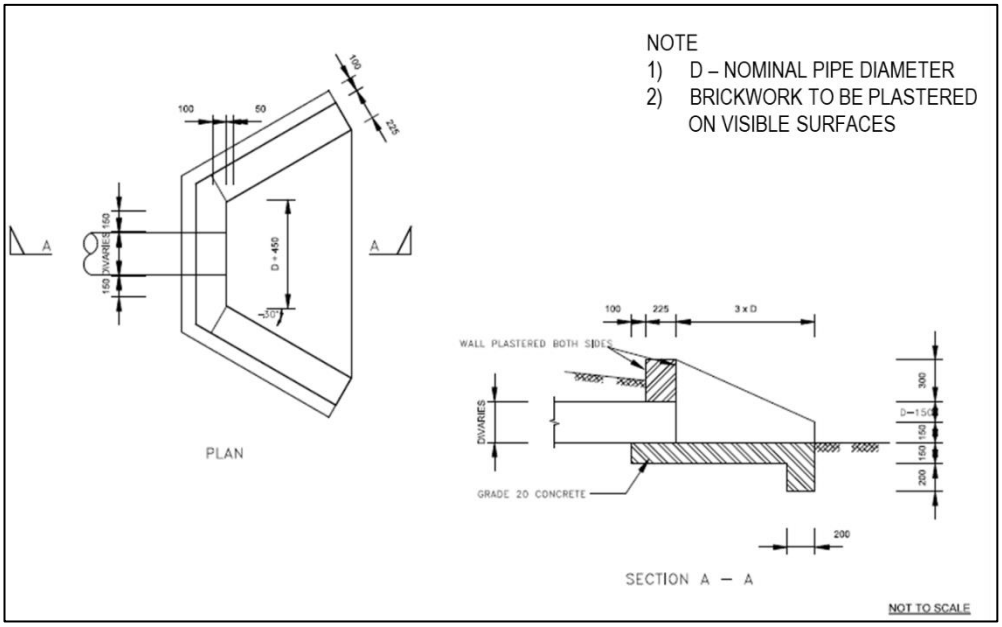


Figure 28: Typical design details of the stormwater inlet and outlet structures for the proposed Mount View mixed-use development as provided by KLS Consulting Engineers (2020).

Portions of the open stormwater channel/swale and associated flood management berm as part of the floodline alteration activities will be located within the conservation buffer, with the open stormwater channel also falling along the southern boundary of the CVB wetland 5 in its proposed position upgradient of and parallel to Old Sir Lowry's Pass Road.

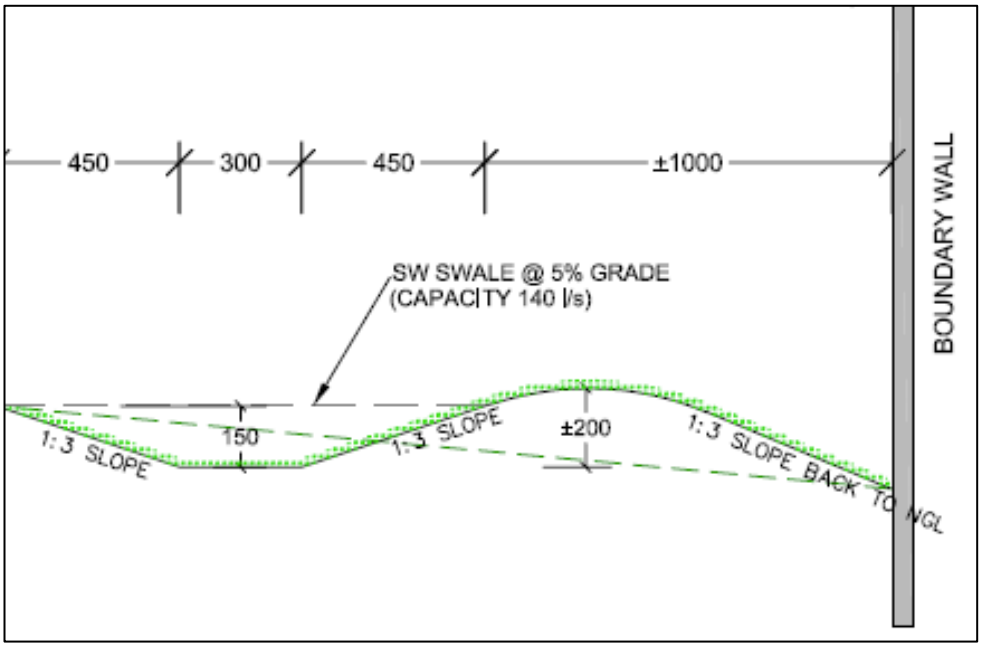


Figure 29: Typical design details of the open stormwater channel/swale and berm as provided by KLS Consulting Engineers (2020).

Proposed mitigation measures for the establishment of stormwater outlet structures within the watercourses and conservation buffer

- The use of Sustainable Drainage Systems (SuDs) to manage stormwater is considered critical for the mixed-use development as there will be an increase in hardened surfaces within close proximity

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	

to the watercourses. SuDs will assist in preventing significant impacts on the hydrological functioning of the watercourses, reduce the risk of flooding during high flow periods and reduce the risk of increased erosion. The following is deemed applicable for the construction of the SuDs:

- SuDs should be constructed through excavation of the in situ material, sloped to a ratio not steeper than 3:1 and lined with rocks and cobbles to assist with energy dissipation and prevent sedimentation and erosion as well as improve the aesthetic appeal of the SuDs (Figure 30);
- SuDs should be vegetated with indigenous obligate and facultative species suitable for seasonal saturation. Wooden boardwalks could be developed over the swales for pedestrian walkways should the developer so desire; and

Figure 30: Examples of open swales, considered to be SuDs utilised as part of residential developments for conveyance of stormwater.

- Encroacher species such as *Typha capensis* that tend to proliferate in sediment deposited stormwater channels must be maintained to ensure functionality of the stormwater outlet structures.

Mitigation measures for the stormwater outlet structures located within the delineated extent of the watercourses (particularly those located within CVB wetland 4).

Since some of the stormwater discharge points proposed may fall within the delineated extent of the watercourses, the design of the stormwater discharge points must incorporate energy dissipating structures to prevent erosion and incision. Figure 31 below provides an example of a stormwater outlet into a wetland habitat.

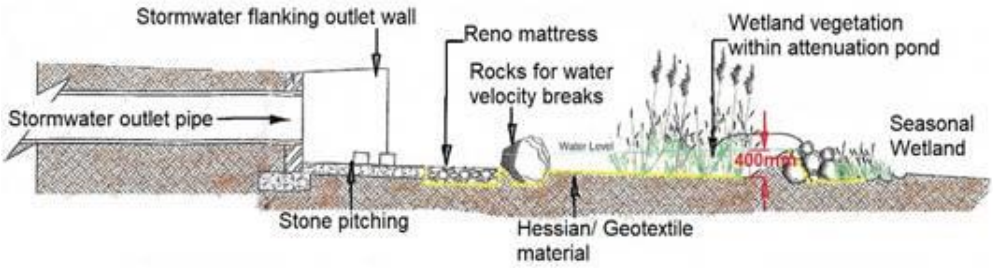


Figure 31: Schematic of an outlet structure directly adjacent to a wetland.

- Stormwater inlets and outlet points must be designed at ground level so as to prevent erosion and gully formation.
- Cobbles should be placed on the concrete apron, in front of the outlet pipe and below the gabion mattress to further assist with energy dissipation. At no point should erosion or gully formation be allowed as this will have impacts on the water dispersal across the watercourse, which could potentially reduce the extent and functionality of the watercourse in the long-term.

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	
	Concrete works associated with the outlet structure (also see concrete casting mitigation measures as provided in Task 4 above) • The construction works for the outlet structures located within the watercourse habitat (including concrete aprons, reno mattresses, wingwalls etc) must ideally be undertaken during the drier summer months to reduce the impact on water quality. • Care must be taken to prevent any concrete spillage within the watercourses and conservation buffer. Concrete spilled outside of the demarcated area must be promptly removed and taken to a suitably licensed waste disposal site. • Batter board mixing trays and impermeable sumps should be provided, onto which any mixed concrete can be deposited whilst it awaits placing. • All wet concrete areas must be contained so as to prevent any contaminated runoff into the watercourses during the curing process. At no point may dirty water be dirty pumped into the watercourses and conservation buffer from the construction area. Rehabilitation on completion of construction • All embankments disturbed as part of the construction activities and development of the stormwater outlet structures must be reinstated and a slope tying in with the surrounding area. • All soil compacted surrounding the watercourse as a result of construction equipment must be loosened prior to revegetation. • As much indigenous wetland vegetation should be installed within the proposed stormwater outlet structures.	

5.3.7 Task 7: Revegetation and Landscaping

Revegetation needs to commence as soon as possible after the soil was prepared to prevent AIP proliferation, erosion and sedimentation of the watercourses and conservation buffer. The successful establishment of a vegetation cover will also improve the wetland and riparian habitat, providing a preferred habitat with adequate vegetation density for faunal species dispersal. The guidelines for revegetation of the rehabilitated areas are illustrated in Table 16.

Table 16: Revegetation and landscaping guidelines.

Responsible Persons	Proponent Implementing Agent	Environmental Control Officer Independent Auditor
Objective/ Requirement	Control measures	
Revegetation and landscaping of the riparian zone of the unnamed tributary, CVB wetlands and conservation buffer area	The following limitations are recognized for the watercourses in terms of revegetation: the unnamed tributary is heavily shaded due to the presence of woody AIPs dominating the riparian zone, and water for irrigation is limited within the study area. Therefore, it is recommended that a balance between hydroseeding and a revegetation component (i.e. broadcasting or sowing dry seed) be considered for the revegetation and landscaping of the study area, with inputs from a suitably qualified botanist. In terms of revegetation of the watercourses and conservation buffer, the following mitigation and rehabilitation measures are recommended: 1. Revegetation with indigenous species should be undertaken during the months prior to the rainfall season in order to aid with the establishment of individual species and should be undertaken towards the end of the construction of the proposed Mount View mixed-use development. Dust generated from the construction works may smother new re-instated vegetation, specifically saplings and smaller species (e.g. *Isopelis* and *Ficinia* spp). No fertilisers or chemical soil ameliorants may be used during this process as this may impair the water quality. 2. Hydroseeding is recommended for the conservation buffer and eroded banks of the unnamed tributary as a means to stabilize the banks and prevent erosion. Hydroseeding should be carried out by a suitably qualified professional with inputs from a landscape architect, preferably during the Western Cape autumn and spring season as warm soil and moderate rain promotes young seedlings grow deep root. Utilisation of Coir logs for hydroseeding along embankments is	

recommended to assist with root anchorage and prevent seeds being washed away during rain events.

Figure 32: Examples of Coir logs for hydroseeding along embankments.

3. The following criteria are recommended to be used to inform the selection of wetland plant species for the for the wetland footprint area directly impacted by the proposed development and where wetland habitat is proposed to be reinstated, and at stormwater outlets. Plants must be hardy, and ideally able to withstand:
   - Elevated nutrients;
   - Periodically high hydrocarbons (oils);
   - Occasional high sediment inflows;
   - Elevated ammonia concentrations;
   - Periods of low oxygen, depending on zonation; and
   - Periodic inundation (it is assumed that inundation is likely during the rainy season).
   - Plants must be readily available;
   - Plants must establish rapidly to facilitate prompt onset of wetland function;
   - Plants should ideally be locally indigenous and no plants that are alien and invasive (e.g. Acacia saligna) should be planted or allowed to remain in the study area.
4. The following indigenous species (among others) should be favoured for the revegetation of the fill area associated with CVB wetland 3:
   - *Calopsis paniculata*
   - *Carex clavata*
   - *Cyperus congestus*
   - *Cyperus textillis*
   - *Elegia asperiflora*
   - *Elegia capensis*
   - *Elegia fistulosa*
   - *Eleocharis dregeana*
   - *Epischoenus gracilis*
   - *Ficinia nodosa*
   - *Isolepis cernua*
   - *Isolepis diabolica*
   - *Isolepis hystrix*
   - *Isolepis marginata*
   - *Isolepis setacea*
   - *Juncus dregeanus*
   - *Juncus effusus*
   - *Juncus lomatophyllys*
   - *Pycreus polystachyos*
   - *Zantedeschisa aethiopica*

	5. The following indigenous species (among others) should be favoured for the revegetation of the unnamed tributary of the Sir Lowry's Pass River riparian habitat: Trees: · *Searsia spp* · *Salix mucronate* · *Olea eurpaea subsp Africana* Shrubs, Restios, groundcover: · *Cyperus textillis* · *Eliocharis limosa* · *Ischyrolepis capensis* · *Pennisetum macrourum* · *Searsia angustifolia* · *Zantedeschia aethiopica* · *Xyris capensis* · *Elegia spp* · *Calopsis paniculata* · *Prionium serratum* · *Juncus effusus* · *Watsonia pillansii*  6. Should the appointed ECO not have the relevant expertise, it is recommended that the rehabilitation be overseen by a suitably qualified freshwater specialist and botanist/landscape architect with suitable experience to ensure maximum service provision is achieved over the long-term in terms of hydrology, geomorphology, water quality and biota. 7. The variable conservation buffer around the watercourses should be revegetated with suitable terrestrial vegetation from the from the Boland Granite Fynbos vegetation type (as classified by Mucina and Rutherford, 2006). This vegetation should be agreed upon by the landscape architect and the freshwater specialist and/or a suitably qualified botanist. 8. Saplings must be replanted annually during the winter period for the first 3 years after completion of construction, in order to maximise the success rate of revegetation. Since vegetation loss is common during re-establishing activities, provisioning of additional saplings will ensure a higher success rate. 9. Water may need to be made available for irrigation purposes for the first season after indigenous vegetation has been planted. It is recommended that all planted specimens within the seasonal and temporary zone be watered during the first summer. It is anticipated that there will be a loss of some planted saplings. Additional specimens should be planted one year after the rehabilitation works, prior to the rainy season to maximise success for long-term proliferation.

5.3.8 Management methods post-rehabilitation

Once the rehabilitation measures have been implemented (as described in Section 5.3.1 – 5.3.8 above), periodic maintenance, and in some cases emergency repairs, must be undertaken for infrastructure that traverses the unnamed tributary, for example, the proposed culvert crossings. This section provides generalised method statements and control measures for certain activities which must be implemented to insure ongoing ecological and hydrological functioning of the watercourses and conservation buffer. Additionally, the control measures as prescribed for general activities, vegetation clearing and earthworks (where applicable) and revegetation activities (Tables 8, 10 and 16) must also be implemented during the maintenance/repair works. Please note that the provided method statements are subject to variability pending on the equipment used and persons/contractor undertaking the activities.

Table 17: Method statement and control measures recommended for maintenance and repair activities.

<table>
<tr><th colspan="2">Activity 1: Sediment removal</th></tr>
<tr><td colspan="2">Removal of sediment may be required, specifically after heavy rainfall events when it may result in the blockage of culvert crossings. A generalised sediment removal method statement is provided. Additionally, control measures that must be implemented during the sediment removal activities is also provided.</td></tr>
<tr><th>Method Statement</th><th>Control measures</th></tr>
<tr><td>1. Enter applicable maintenance site by means of the closest access point;
2. Remove any deposited material from culvert, starting from the inlet towards the outlet side;
3. Stockpile all removed material outside the watercourse;
4. Dispose of all material removed from the culvert from site.</td><td>• Sediment clearing activities must preferably be undertaken in the drier summer season;
• Should sediment clearing activities be undertaken in the rainy winter period (specifically due to a blocked culvert after a heavy rainfall event), a sediment trap must be installed at the outlet side of the culvert. Sediment traps must be made from geotextile wrapped hay bales or may be a material drift fence;
• Removal of sediment must preferably be done through manual labour and the use of heavy machinery must be avoided;
• Personnel may only enter the applicable area of the CVB wetland where material needs to be removed. All other areas are considered a no-go areas;
• Removed material must be stockpiled outside the CVB wetland and may not be higher than 2m. These materials must be disposed of at a registered disposal facility as soon as all the maintenance activities is concluded.</td></tr>
<tr><th colspan="2">Activity 2: Emergency infrastructure repairs</th></tr>
<tr><td colspan="2">Emergency repairs that require urgent action to manage risk and damage to the unnamed tributary. This includes repairs culvert crossings.</td></tr>
<tr><th>Method Statement</th><th>Control measures</th></tr>
<tr><td><u>Culvert repairs:</u>
1. Enter applicable site in the unnamed tributary by means of the closest access point;
2. Remove any damaged material from the site;
3. Repair culvert with the use of concrete or replace culvert;
4. Rehabilitate the work area in the unnamed tributary.</td><td>• Culvert repair activities must preferably be undertaken in the drier summer season;
• Should culvert repair activities be undertaken in the rainy winter period, a sediment trap must be installed at the outlet side of the culvert. Sediment traps must be made from geotextile wrapped hay bales or may be a material drift fence;
• Removed material must be stockpiled outside the unnamed tributary and may not be higher than 2m. These materials must be disposed of at a registered disposal facility as soon as all the repair activities is concluded;
• The following recommendations must be adhered to where use is made of concrete:
o Fresh concrete and cement mortar should not be mixed near the watercourses. Mixing of cement may be done within the construction camp, may not be mixed on bare soil, and must be within a lined, bound or bunded portable mixer. Consideration must be taken to use ready mix concrete;
o No mixed concrete shall be deposited directly onto the ground within the unnamed tributary. A batter board or other suitable platform/mixing tray is to be provided onto which any mixed concrete can be deposited whilst it awaits placing;
o A washout area should be designated outside of the unnamed tributary, and wash water should be disposed is a suitable waste management system;
o Cement bags must be disposed of in the demarcated hazardous waste receptacles and the used bags must be disposed of through the hazardous substance waste stream; and
o Spilled or excess concrete must be disposed of at a suitable landfill site. Chain of custody documentation must be provided.
• The work site must be rehabilitated as per the control measures listed in Tables 8 – 16.</td></tr>
</table>

Activity 3: Periodic maintenance	
Periodic maintenance of infrastructure that traverses the unnamed tributary, i.e. culvert crossings.	
Method Statement	**Control measures**
Periodic maintenance of culverts: 1. Removal of vegetation in and around the culvert 2. Removal of sediment in the culvert; 3. Minor repairs of the culvert: 3.1 Entering the unnamed tributary to access the culvert; 3.2 Method activities as per Activity 2: Emergency infrastructure repairs; 4. Rehabilitate the work area after maintenance activities (if required).	• Culvert maintenance activities must preferably be undertaken in the drier summer season; • Should culvert maintenance activities be undertaken in the rainy winter period, a sediment trap must be installed at the outlet side of the culvert. Sediment traps must be made from geotextile wrapped hay bales or may be a material drift fence; • Should repair activities be required, control measures as per Activity 2: Emergency infrastructure repairs and the control measures listed in Tables 8 – 16 applies.

5.4 Action 4: Aftercare and Monitoring

Prudent monitoring of the of the watercourses directly impacted by the proposed development and conservation buffer, and potentially by edge effects is of utmost importance, as this will ensure a continual flow of data, enabling all parties involved to accurately assess and manage the progress of the rehabilitation interventions and any arising issues. To ensure the accurate gathering of data, the following techniques and guidelines should be followed:

- Site walk through surveys should be applied as the preferred method of monitoring (at specified frequencies) with specific focus on:
  - Erosion monitoring (at the end of the wet season for 5 years, thereafter only after major rainfall events);
  - Sedimentation (at the end of the wet season for 5 years, thereafter only after major rainfall events);
  - Alien and invasive vegetation proliferation (at the start and end of the growing season);
  - Spill events (regularly at the direction of the relevant engineer);
  - Surface water monitoring; and
  - Waste and litter problems.
- General habitat unit overviews should also be undertaken;
- Stability and appropriateness of stormwater controls;
- All data gathered should be measurable (qualitative and quantitative);
- Monitoring actions should be repeatable;
- Data should be auditable; and
- Reports should present and interpret the data obtained.

The monitoring plan, as indicated in Table 18 below, comprises but is not limited to the following:

- Identification of areas of concern. These are areas that are affected by disturbances such as:
  - Erosion and sedimentation;
  - Waste disposal;
  - Alien vegetation species encroachment; and
  - Revegetation.
- Ensuring that the management/rehabilitation measures as stipulated in Section 5 of this report are adhered to;
- Gathering all equipment required for the monitoring process; and
- Compiling a monitoring report.

Table 18: Monitoring actions for the watercourses and associated conservation buffer.

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting
AIP control	1. Screening of the entire study area; 2. Logging locations of any newly coppiced species to be treated/removed.	1. Before the initial AIP clearing a baseline assessment should be taken to indicate densities and species and priority areas determined to guide clearing; 2. After the initial AIP clearing densities should be re-recorded, including all methods and chemicals used; 3. Quarterly assessment during the first year post rehabilitation. Densities and locations of newly coppiced AIPs to be recorded; and 4. Annually during the growing season for the second and third year, post rehabilitation to ensure long-term maintenance measures are effective.	1. Before and after AIP clearing report should be compiled; 2. Quarterly report during the first year post AIP clearing; and 3. Annually during each growing season, for at least 3 years post rehabilitation – report should include information from before and after mobilisation of follow-up clearing teams.
Waste and litter problems	1. All areas which are frequently traversed by personnel during the rehabilitation phase. 2. Stormwater inlets and outlets.	Monitoring of waste or litter problems should occur daily where rehabilitation and AIP clearing is taking place. The Contractor is to ensure that no staff litter on site, nor are inert material left on site after construction activities.	Monthly monitoring report compiled by the appointed ECO.
Erosion	1. At the watercourses and conservation buffer, with specific mention to road crossings associated with the unnamed tributary and the reinstated wetland habitat associated with CVB wetland 3; and 2. All areas disturbed by construction activities.	1. Weekly during rehabilitation activities (immediately after construction ended); 2. At the end of the wet season for 5 years, thereafter only after major rainfall events.	Monthly monitoring report compiled by the appointed ECO.
Sediment removal	1. Where sediment traps are installed in the watercourses during the construction period. 2. Upstream of culvert crossings associated with the unnamed tributary during the operational phase.	1. Weekly during rehabilitation activities; 2. At the end of the wet season for 5 years, thereafter only after major rainfall events.	Monthly monitoring report compiled by the appointed ECO.
Re-vegetation	1. At all watercourses and conservation buffer, particularly, at the road crossings associated with the unnamed tributary, area associated	1. Monthly for 6 months after re-instatement of vegetation; 2. Annually during the growing season for at least three (3) years post rehabilitation to	1. Before commencement of rehabilitation activities, a report should be compiled listing existing species as well as any endangered species that may need to be rescued. Should the

Aspect	Monitoring Location	Frequency of sampling	Frequency of Reporting
	with CVB wetland 3 where wetland habitat has been reinstated. 2. All areas where AIPs have been removed; and 3. Within stormwater attenuation facilities as part of the greater development.	ensure plant survival and to ensure that no AIPs are outcompeting indigenous species.	Contractor not have the expertise to undertake this list, they are to appoint a suitable botanist to assist; 2. Monthly for 6 months after the re-instatement; and 3. Annually during each growing season, for at least 3 years post rehabilitation.
Emergency repairs to infrastructure that traverses the unnamed tributary	Where infrastructure crossings or adjacent to the unnamed tributary and associated wetlands have failed, this may include, culverts stormwater swales etc.	As soon as failure of infrastructure are logged and the repair methodology are available. 1. A site visit must be undertaken prior to the implementation of the emergency repairs in the unnamed tributary. 2. A site visit must be undertaken after the conclusion of the emergency repair works if the repair period is shorter than 2 weeks. 3. Should the repair activities be longer than 2 weeks, a site visit must be undertaken every second week. 4. A site visit must be undertaken 1 month after the repair activities have concluded.	1. Should the repair works be completed during a period of 2 weeks: A report must be submitted after the conclusion of the repair works. 2. Should the repair works take longer than 2 weeks: • A report must be submitted every 2 weeks until the repairs are implemented. • A final report must be submitted 1 month after the final repair activities have concluded. These reports must be compiled by the appointed ECO.
Periodic maintenance to infrastructure that traverses the unnamed tributary	Where infrastructure crossing or located directly adjacent to the unnamed tributary or associated wetlands requires repairs, this may include culverts, stormwater swales etc.	1. A site visit must be undertaken prior to the periodic maintenance activities in the unnamed tributary. 2. A site visit must be undertaken after the conclusion of the maintenance activities if the maintenance period is shorter than 2 weeks. 3. Should the maintenance activities be longer than 2 weeks, a site visit must be undertaken every second week. 4. A site visit must be undertaken 1 month after the maintenance activities have concluded.	1. Should the maintenance activities be completed during a period of 2 weeks: A report must be submitted after the conclusion of the maintenance activities. 2. Should the maintenance activities take longer than 2 weeks: • A report must be submitted every 2 weeks until the maintenance activities are done. • A final report must be submitted 1 month after the final maintenance activities have concluded. These reports must be compiled by the appointed ECO.

This monitoring plan must be implemented by a competent person and submit the findings to the responsible authority for evaluation.

6 CONCLUSION AND RECOMMENDATIONS

FEN Consulting (Pty) Ltd was appointed to compile a WRMP to provide technical specialist input for the proposed residential development, referred to as the proposed Mount View mixed-use development.

In accordance with the rehabilitation requirements proposed within this document, most aspects will require mechanical inputs and cannot be done by hand. Although the initial impact is significant it must be noted that these activities are only for the short to medium period during construction activities, however the end goal is to restore the ecoservice provision and wetland health. These measures stipulated within this report will allow for the recharge of a reinstated wetland footprint area and improve the remaining original extent of wetland habitat, leading to an overall improvement of the CVB wetlands and the general environment.

With the implementation of the WRMP procedures, the negative impacts of the proposed Mount View mixed-use development on the watercourses and associated conservation buffer can be adequately managed. This WRMP further assists in the adequate rehabilitation and erosion control within the study area as well as the maintenance and enhancement of the Ecostatus and function of the unnamed tributary and associated CVB wetlands. The information gathered through monitoring programs will assist in a better understanding of the ecology of the area in the vicinity of the study area and ensure proactive management of risks to the watercourses.

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ANNEXURE A – PROJECT TEAM

Contact detail of the responsible people who will implement the MMP.

Table A1: Contact details of the responsible person who will implement the WRMP

Engineer	Mr Dewald Miles	Tel: 021 812 5325 Email: dewald@kls.co.za
EAP Practitioner	Guillaume Nel Environmental Consultants	Tel: 021 870 1874 Email: eg@gnec.co.za
ECO	Still to be appointed	Still to be appointed
Contractor	Still to be appointed	Still to be appointed
Consult who compiled WRMP	FEN Consulting (Pty) Ltd	Phone: 011 616 7893 Email: christel@sasenvgroup.co.za Email: rabia@sasenvgroup.co.za Email: kim@sasenvgroup.co.za

FEN Consulting Team

Christel du Preez
SACNASP Pr. Sci. Nat. Reg No: 120240

Christel completed an undergraduate degree in Environmental and Biological Sciences (2009-2011) at North West University, from where she continued with her Honours degree (2012) in Environmental Sciences focussing on urban ecology. Christel joined SAS as a junior wetland ecologist in January 2016, whilst completing her Master's degree (in urban wetland ecology). Christel achieved her Master's degree in May 2017. Her Master's degree thesis comprised of an in-depth study of the floral composition and ecosystem service delivery of wetlands along an urban-rural gradient. At SAS she has been involved with various projects focussing mainly on the assessment of wetland and riparian systems within various provinces of South Africa, as well as providing rehabilitation and management plans for a variety of freshwater systems.

Kim Marais
SACNASP Pr. Sci. Nat. Reg No: 117137/17
Kim obtained her undergraduate BSc. at Wits University in Ecology, Environmental Science and Conservation (EEC). During the course of her undergraduate degree she was involved in microbiological and water quality assessments of several urban rivers as well as the Bruma lake in Johannesburg. In 2012 she obtained her BSc. Honours degree, at Wits University in Zoology and published her Honours thesis titled "A Comparative analysis of the diets of *Varanus albigularis* and *Varanus niloticus* in South Africa*"* in African Zoology, April 2014.

Upon graduation Kim worked as a Junior Environmental Assessment Practitioner for 2,5 years, working throughout South Africa and Uganda before joining the SAS team in 2015 as the lead Environmental Scientist and Manager of the Cape Town branch. Kim has extensive knowledge of the environmental legislation as well as faunal and freshwater ecology, undertaking various freshwater and faunal assessments as well as Water Use Licence Applications in the Western Cape and having completed the short course on tools for wetland assessment held by Prof. Fred Ellery at Rhodes University and a wetland and aquatic plant identification course by Dr. G van Grinkel. Kim is registered as a Professional Natural Scientist with SACNASP in the field of Environmental Science, is a member of the South African Wetland Society.

Rabia Mathakutha
SACNASP Cand. Sci. Nat. Reg No: 120040

Rabia obtained her undergraduate BSc. Environmental Science at the University of KwaZulu-Natal in 2013 and BSc. Honours degree in 2014. She then moved on to do her Masters degree in Plant Science at the University of Pretoria, focusing on functioning and management of alien and invasive plants.

Rabia obtained her MSc. with distinction in 2018, during which time she published her Master thesis titled “Invasive species differ in key functional traits from native and non-invasive alien plant species” in the Journal of Vegetation Science, 2019. Rabia has since worked as a wetland ecologist with experience in Gauteng, Mpumalanga, Lesotho and Mozambique. Rabia joined FEN Consulting in August 2020 as a junior freshwater ecologist focussing mainly on the assessment of wetland and riparian systems within the Western Cape Province. Rabia is a member of Western Cape Wetland Forum and continues to attend various training courses in the field of freshwater ecology and environmental legislation.

ANNEXURE B – LEGAL REQUIREMENTS

The sections below present each legislative document and the aspects, which are pertinent to water resource management including the rehabilitation of disturbed areas.

The Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996)	The environment and the health and well-being of people are safeguarded under the Constitution of the Republic of South Africa, 1996 (Act No. 108 of 1996) by way of section 24. Section 24(a) guarantees a right to an environment that is not harmful to human health or well-being and to environmental protection for the benefit of present and future generations. Section 24(b) directs the state to take reasonable legislative and other measures to prevent pollution, promote conservation, and secure the ecologically sustainable development and use of natural resources (including water and mineral resources) while promoting justifiable economic and social development. Section 27 guarantees every person the right of access to sufficient water, and the state is obliged to take reasonable legislative and other measures within its available resources to achieve the progressive normalization of this right. Section 27 is defined as a socio-economic right and not an environmental right. However, read with section 24 it requires of the state to ensure that water is conserved and protected and that sufficient access to the resource is provided. Water regulation in South Africa places a great emphasis on protecting the resource and on providing access to water for everyone.
The National Environmental Management Act, 1998 (Act No. 107 of 1998)	The National Environmental Management Act, 1998 (Act No. 107 of 1998) and the associated Regulations as amended in 2017, refer specifically to biodiversity management in the following Clause: (4)(a) *Sustainable* development requires the consideration of all relevant factors including, (i) that the disturbance of ecosystems and loss of biological diversity are avoided, or, where they cannot be altogether avoided, are minimised and remedied. This Maintenance and Management Plan has been developed in fulfilment of the requirements as defined in the Environmental Impact Assessments EIA Regulations, 2014 (as amended) (No. R. 327) where a "maintenance management plan" is defined as a management plan maintenance purposes defined or adopted by the competent authority. The following EIA Regulation triggers the need for this MMP: 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; (c) falls within the ambit of activity 21 in this Notice, in which case that activity applies; (N.B. Points (d) and (e) does not apply as these activities fall within the coastal zone).
The National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004)	The objectives of this act are (within the framework of the National Environmental Management Act) to provide for: ➢ the management and conservation of biological diversity within the Republic of South Africa and of the components of such diversity; ➢ the use of indigenous biological resources in a sustainable manner; ➢ the fair and equitable sharing among stakeholders of benefits arising from bio prospecting involving indigenous biological resources; ➢ to give effect to 'ratified international agreements' relating to biodiversity which are binding to the Republic; ➢ to provide for co-operative governance in biodiversity management and conservation; and ➢ to provide for a South African National Biodiversity Institute to assist in achieving the objectives of this Act.

	This act alludes to the fact that management of biodiversity must take place to ensure that the biodiversity of surrounding areas is not negatively impacted upon, by any activity being undertaken, in order to ensure the fair and equitable sharing among stakeholders of benefits arising from indigenous biological resources. Furthermore, a person may not carry out a restricted activity involving either: a) a specimen of a listed threatened or protected species; b) specimen of an alien species; or c) a specimen of a listed invasive species without a permit. Permits for the above may only be issued after an assessment of risks and potential impacts on biodiversity is carried out. Before issuing a permit, the issuing authority may in writing require the applicant to furnish it, at the applicant's expense, with such independent risk assessment or expert evidence as the issuing authority may determine. The Minister may also prohibit the carrying out of any activity, which may negatively impact on the survival of a listed threatened or protected species or prohibit the carrying out of such activity without a permit. Provision is made for appeals against the decision to issue/refuse/cancel a permit or conditions thereof. ***National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) (Alien and Invasive Species Regulations, 2014)*** NEMBA is administered by the Department of Environmental Affairs and aims to provide for the management and conservation of South Africa's biodiversity within the framework of the NEMA. In terms of alien and invasive species. This act in terms of alien and invasive species aim to: ➢ Prevent the unauthorised introduction and spread of alien and invasive species to ecosystems and habitats where they do not naturally occur, ➢ Manage and control alien and invasive species, to prevent or minimize harm to the environment and biodiversity; and ➢ Eradicate alien species and invasive species from ecosystems and habitats where they may harm such ecosystems or habitats. Alien species are defined, in terms of the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) as: (a) a species that is not an indigenous species; or (b) an indigenous species translocated or intended to be translocated to a place outside its natural distribution range in nature, but not an indigenous species that has extended its natural distribution range by natural means of migration or dispersal without human intervention. Categories according to NEMBA (Alien and Invasive Species Regulations, 2014): ➢ **Category 1a**: Invasive species that require compulsory control. ➢ **Category 1b**: Invasive species that require control by means of an invasive species management programme. ➢ **Category 2**: Commercially used plants that may be grown in demarcated areas, provided that there is a permit and that steps are taken to prevent their spread. ➢ **Category 3**: Ornamentally used plants that may no longer be planted.
The Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983)	Amendments to regulations under the Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983) ensures that landowners are legally responsible for the control of invasive alien plants on their properties. The CARA legislation divides alien plants into weeds and invader plants, with *weeds* regarded as alien plants with no known useful economic purpose, while *invader plants* may serve useful purposes as ornamentals, as sources of timber and may provide many other benefits, despite their aggressive nature.
The National Water Act, 1998 (Act No. 36 of 1998)	The purpose of the National Water Act, 1998 (Act 36 of 1998) (NWA) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled. The NWA, 1998 also provides for water use licenses which an operation will have to apply for, before commencing with any Section 21 water use activity. Various conditions may be

	attached to these licenses and a breach thereof will result in criminal and civil liability. The conditions attached to water use licenses will function alongside the additional protective measures, duty of care and statutory liability provisions provided by the NWA and other legislation to regulate a whole array of water issues. Accordingly, and in terms of the *Guide to the National Water Act*, "water use" refers to doing something that has an impact on the water resource, for example: ➢ The amount of water in the resource; ➢ The quality of water in the resource; and ➢ The environment surrounding the resource. Section 4 governs the entitlement to use water and states that water may only be used if it is a Schedule 1 use, a continuance of an existing lawful use (ELU), or authorised in terms of a general authorisation (GA) or license. A water use may therefore not be implemented unless it is properly authorised through one of these types of authorisations. The National Water Act, 1998 (Act No. 36 of 1998) recognises that the entire ecosystem and not just the water itself in any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). Any area within a wetland or riparian zone is therefore excluded from development unless authorisation is obtained from the DWS in terms of Section 21 (c) & (i). A watercourse is defined as: a) A river or spring; b) A natural channel in which water flows regularly or intermittently; c) A wetland, lake or dam into which, or from which water flows; and d) Any collection of water which the minister may, by notice in the Gazette, declare a watercourse.
Government Notice 509 as published in the Government Gazette 40229 of 2016 as it relates to the National Water Act, 1998 (Act No. 36 of 1998)	In accordance with Regulation GN509 of 2016, a regulated area of a watercourse for section 21c and 21i of the NWA, 1998 is defined as: ➢ The outer edge of the 1 in 100 year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam; ➢ In the absence of a determined 1 in 100 year flood line or riparian area the area within 100 m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or ➢ A 500 m radius from the delineated boundary (extent) of any wetland or pan. This notice **replaces GN1199** and may be exercised as follows: i) Exercise the water use activities in terms of Section 21(c) and (i) of the Act as set out in the table below, subject to the conditions of this authorisation; ii) Use water in terms of section 21(c) or (i) of the Act if it has a low risk class as determines through the Risk Matrix; iii) Do maintenance with their existing lawful water use in terms of section 21(c) or (i) of the Act that has a LOW risk class as determined through the Risk Matrix; iv) Conduct river and storm water management activities as contained in a river management plan; v) Conduct rehabilitation of wetlands or rivers where such rehabilitation activities have a LOW risk class as determined through the Risk Matrix; and vi) Conduct emergency work arising from an emergency situation or incident associated with the persons' existing lawful water use, provided that all work is executed and reported in the manner prescribed in the Emergency protocol. A General Authorisation (GA) issued as per this notice will require the proponent to adhere with specific conditions, rehabilitation criteria and monitoring and reporting programme. Furthermore, the water user must ensure that there is a sufficient budget to complete, rehabilitate and maintain the water use as set out in this GA.

ANNEXURE C – PRINCIPLES OF THIS WETLAND REHABILITATION, IMPLEMENTATION AND MANAGEMENT PLAN

To assist in achieving the objectives of a WRMP, a set of principles were applied which contributed to formulating action plans and specific management measures.

Loss of biodiversity puts aspects of the economy, human well-being and quality of life at risk, and reduces socio-economic options for future generations. The importance of maintaining biodiversity and intact ecosystems for ensuring the on-going provision of ecosystem services, and the consequences of ecosystem change for human well-being, were detailed in a global assessment entitled the Millennium Ecosystem Assessment (MEA, 2005), which established a scientific basis for the need for action to enhance management and conservation of biodiversity.

Sustainable development is enshrined in South Africa's Constitution and laws. The need to sustain biodiversity is directly or indirectly referred to in a number of Acts, not least the National Environmental Management: Biodiversity Act, 2004 (Act No. 10 of 2004) and is fundamental to the notion of sustainable development. In addition, international guidelines and commitments, as well as national policies and strategies are important in creating a shared vision for sustainable development in South Africa.
Impacts on biodiversity can largely take place in four ways:

- **Direct impacts:** are impacts directly related to the proposed development including project aspects such as site clearing and soil compaction.
- **Indirect impacts:** are impacts associated with the proposed development that may occur within the zone of influence associated with the proposed Mount View mixed-use development, such as the surrounding terrestrial areas.
- **Induced impacts:** impacts that directly attributable to the proposed development but are expected to occur due to the activities of the project. Factors included here are urban sprawl and the development of associated industries.
- **Cumulative impacts:** can be defined as the sum of the impact of a project as well as the impacts from past, existing and reasonably foreseeable future projects that would affect the same biodiversity resources. Examples include numerous industrial/urban developments within the same drainage catchment.

Given the limited resources available for biodiversity management and conservation, as well as the need for development, efforts to conserve biodiversity need to be strategic, focused and supportive of sustainable development. This is a fundamental principle underpinning South Africa's approach to the management and conservation of its biodiversity and has resulted in the identification of spatial biodiversity priorities or biodiversity priority areas.

'Mitigation' is a broad term that covers all components of the 'mitigation hierarchy' defined hereunder. It involves selecting and implementing measures – amongst others – to conserve biodiversity and to protect the users of biodiversity and other affected stakeholders from potentially adverse impacts as a result of anthropogenic activities. The aim is to prevent adverse impacts from occurring or, where this is unavoidable, to limit their significance to an acceptable level.

The mitigation hierarchy, as advocated by the Department of Environmental Affairs (DEA) *et al.* (2013) in general consists of the following in order of which impacts should be mitigated:

1. **Avoid/prevent impact:** can be done through utilising alternative sites, technology and scale of projects to prevent impacts. In some cases, if impacts are expected to be too high, the "no project" option should also be considered, especially where it is expected that recommended mitigations

measures will not be adequate to limit environmental damage and eco-service provision to suitable levels;

2. **Minimise impact:** can be done through the utilisation of alternatives that will ensure that impacts on biodiversity and ecosystem services provision are reduced. Impact minimisation is considered an essential part of any development project;
3. **Rehabilitate impact:** is applicable to areas where impact avoidance and minimisation are unavoidable. As such, impacted areas must be returned to conditions which are ecologically similar to the pre-project condition or an agreed post project land use, for example arable land. Rehabilitation cannot, however, be considered as the primary mitigation toll as even with significant resources and effort of rehabilitation usually does not lead to adequate replication of the diversity and complexity of the natural system. Rehabilitation often only restores ecological function to some degree to avoid ongoing negative impacts and to minimise aesthetic damage to the setting of a project. Practical rehabilitation should consist of the following phases in best practice:
    a. **Structural rehabilitation** which includes physical rehabilitation of areas by means of earthworks, potential stabilisation of areas as well as any other activities required to develop a long term sustainable ecological structure;
    b. **Functional rehabilitation** which focuses on ensuring that the ecological functionality of the ecological resources associated with the project and its footprint supports the intended land uses. In this regard, special mention is made of the need to ensure the continued functioning and integrity of the wetlands throughout and after the rehabilitation phase.
    c. **Biodiversity reinstatement** which focuses on ensuring that a reasonable level of biodiversity is re-instated to a level that supports the local land uses. In this regard special mention is made of re-instating vegetation to levels which will allow the natural climax vegetation community or community suitable for supporting the intended land use.
    d. **Species reinstatement** which focuses on the re-introduction of any ecologically important species which may be important for socio-cultural reasons, ecosystem functioning reasons and for conservation reasons. Species reinstatement need only occur if deemed necessary.
4. **Offset impact:** The significance of residual impacts should be identified on a regional as well as national scale when considering biodiversity conservation initiatives. If the residual impacts lead to irreversible loss of irreplaceable biodiversity, the residual impacts should be considered to be of a *very high significance* and offset initiatives are not considered an appropriate way to deal with the magnitude and/or significance of the biodiversity loss. In the case of residual impacts determined to have *medium to high significance*, an offset initiative may be investigated. If the residual biodiversity impacts are considered of low significance no biodiversity offset is required.

ANNEXURE D – Details, Expertise and Curriculum Vitae of Specialists

1. (a) (i) Details of the specialist who prepared the report

Rabia Mathakutha	MSc Plant Science (University of Pretoria)
Kim Marais	BSc (Hons) Zoology (Herpetology) (University of the Witwatersrand)
Christel du Preez	MSc Environmental Sciences (North West University)

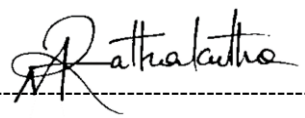
1. (a). (ii) The expertise of that specialist to compile a specialist report including a curriculum vitae

Company of Specialist:	Scientific Aquatic Services (Pty) Ltd		
Name / Contact person:	Rabia Mathakutha		
Postal address:	221 Riverside Lofts, Tygerfalls Boulevard, Bellville,		
Postal code:	7539	Cell:	083 739 2284
Telephone:	011 616 7893	Fax:	086 724 3132
E-mail:	rabia@sasenvgroup.co.za		
Qualifications	MSC Plant Science		
Registration / Associations	Registered Candidate Member of the South African Council for Natural Scientific Professions (SACNASP)		

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Rabia Mathakutha, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct

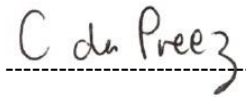


Signature of the Specialist

1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Christel du Preez, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



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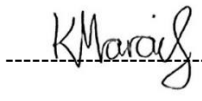
1. (b) a declaration that the specialist is independent in a form as may be specified by the competent authority

I, Kim Marais, declare that -

- I act as the independent specialist in this application;
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the relevant legislation and any guidelines that have relevance to the proposed activity;
- I will comply with the applicable legislation;
- I have not, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct



SAS ENVIRONMENTAL GROUP OF COMPANIES – SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF RABIA MATHAKUTHA

PERSONAL DETAILS

Position in Company	Field Ecologist Wetland ecology
Joined SAS Environmental Group of Companies	2020

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Candidate member of the South African Council for Natural Scientific Professions (SACNASP – Reg. No. 120040)
Member of the Western Cape Wetland Forum (WCWF)
Member of the South African Association of Botany (SAAB)

EDUCATION

Qualifications

MSc Plant Science (University of Pretoria)	2018
BSc (Hons) Environmental Science (Biogeography) (University of KwaZulu-Natal)	2015
BSc Environmental Science (Life Science stream) (University of KwaZulu-Natal)	2014

Short Courses

Official DWS Section 21 (c) and (i) Water Use Authorisation Course	2018
Basic and Applied Statistics in R	2016

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, Western Cape
Africa – Lesotho, Mozambique

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant Species Plan

SAS ENVIRONMENTAL GROUP OF COMPANIES –

SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF KIM MARAIS

PERSONAL DETAILS

Position in Company	Senior Scientist Water Resource Manager
Joined SAS Environmental Group of Companies	2015

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 117137/17)
Member of the Western Cape Wetland Forum (WCWF)

EDUCATION

Qualifications

BSc (Hons) Zoology (University of the Witwatersrand)	2012
BSc (Zoology and Conservation) (University of the Witwatersrand)	2011

Short Courses

Aquatic and Wetland Plant Identification (Cripsis Environment)	2019
Tools for Wetland Assessment (Rhodes University)	2018
Certificate in Environmental Law for Environmental Managers (CEM)	2014
Certificate for Introduction to Environmental Management (CEM)	2013

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, KwaZulu-Natal, Northern Cape, Eastern Cape,
Africa - Uganda

KEY SPECIALIST DISCIPLINES

Biodiversity Assessments

- Biodiversity Action Plans (BAP)
- Alien and Invasive Control Plans (AICP)
- Faunal Eco Scans
- Faunal Impact Assessments

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Watercourse Maintenance and Management Plans
- Freshwater Offset Plans

Aquatic Ecological Assessment and Water Quality Studies

- Riparian Vegetation Integrity (VEGRAI)
- Water quality Monitoring
- Riverine Rehabilitation Plans

Legislative Requirements, Processes and Assessments

- Water Use Applications (Water Use Licence Applications / General Authorisations)
- Water Use Audits
- Freshwater Resource Management and Monitoring as part of EMPR and WUL conditions

SAS ENVIRONMENTAL GROUP OF COMPANIES –
SPECIALIST CONSULTANT INFORMATION

CURRICULUM VITAE OF CHRISTEL DU PREEZ

PERSONAL DETAILS

Position in Company	Senior Scientist Watercourse ecology
Joined SAS Environmental Group of Companies	2016

MEMBERSHIP IN PROFESSIONAL SOCIETIES

Professional member of the South African Council for Natural Scientific Professions (SACNASP – Reg No. 120240)

Member of the Western Cape Wetland Forum (WCF)

Member of the Gauteng Wetland Forum (GWF)

EDUCATION

Qualifications

MSc Environmental Sciences (North West University)	2017
BSc Hons Environmental Sciences (North West University)	2012
BSc Environmental and Biological Sciences (North West University)	2011

Short Courses

Wetland and Aquatic plant Identification presented by Carin van Ginkel	2019
Wetland Management: Introduction and Delineation presented by the Centre of Environmental Management University of the Free State	2018
Tools for Wetland Assessment presented by Prof. F. Ellery and Rhodes University	2017
Basic Principles of ecological rehabilitation and mine closure presented by the Centre for Environmental Management North West University	2015

AREAS OF WORK EXPERIENCE

South Africa – Gauteng, Mpumalanga, Limpopo, Western Cape, Northern Cape, Eastern Cape

Freshwater Assessments

- Desktop Freshwater Delineation
- Freshwater Verification Assessment
- Freshwater (wetland / riparian) Delineation and Assessment
- Freshwater Eco Service and Status Determination
- Rehabilitation Assessment / Planning
- Maintenance and Management Plans
- Plant species and Landscape Plans
- Freshwater Offset Plans