11 May 2026

To Whom it may concern,

RE: Landscape plan and design motivation for FISANTEKRAAL – PTN 32 of Farm 168: LSDP

This motivation accompanies the attached drawing pack and forms part of the submission for approval of the Site Development Plan (SDP) and Landscape Master Plans for the various sites within the Fisantekraal development. The intent is to demonstrate compliance with environmental, aesthetic, and functional requirements, and to promote sustainable landscape management across all relevant erven.

1. Associated Documents

This motivation must be read in conjunction with the following documents:

- 25688-FIS-LDP-RevG-MLP001 – Landscape Masterplan
- 25688-FIS-LDP-RevG-LP001– Go-Chill Landscape Plan
- 25688-FIS-LDP-RevG-LP002– Dalmar Landscape Plan
- Appendix_G3_FreshwaterReport_Fisantekraal_light_industrial_Jun16

2. Existing Vegetation and Trees

- A previous tree survey was conducted; however, it is now outdated as most trees have since been removed.
- All remaining existing vegetation is to be cleared in accordance with the previously approved landscape master plan.

3. River Rehabilitation, Maintenance, and Management (Erf 1996)

- River rehabilitation will be implemented within the designated setback area, strictly following the Environmental (River) Maintenance Management Plan (Appendix A, Withers Environmental Consultants, September 2016) and the control measures outlined on pages 9 and 10 of the Qualitative Impact Statement (2025) for erven 1992–1995 and portions of erf 1990.
- All rehabilitation and maintenance activities will be executed by a suitably qualified contractor under the supervision of an Environmental Control Officer (ECO) or Freshwater Ecologist. All removed material will be immediately transported off-site for disposal at an approved landfill.

Tel: 021 8581582 Email: rene@viridian.co.za www.viridian.co.za
72 Tredonne Estate, Old Sir Lowry's Road, Sir Lowry's Pass Village
Viridian Consulting (Pty) Ltd 2006/026753/07 Director: Rene Brett: BL Arch MCPUD (SACLAP20122)

- Short-Term Maintenance and Establishment of Ecological Stream Corridor:
    - A minimum 30m buffer will be established on either side of the stream, creating an ecological corridor through the development.
    - No hard structures will be permitted within this buffer.
    - The corridor will be clearly delineated and cordoned off as a no-go area prior to the commencement of construction.
    - Please refer to the River Management Plan (Appendix D: Table D1 – Plant List for Revegetation, and Figure D1, Blue Science Freshwater Assessment Report, June 2016). The owner is responsible for compliance.
- Riparian Zone and Buffer Area Rehabilitation:
    - No rubble will be dumped in the riparian/buffer zone.
    - Existing rubble will be removed within one year of construction commencement.
    - Disturbed areas will be covered with topsoil and shaped to match surrounding stream banks within one year.
    - Revegetation with appropriate indigenous species (as per Appendix D) will occur within one year.
    - Ongoing removal of alien vegetation will be conducted using methods endorsed by the Working for Water Programme.
- Long-Term Maintenance:
    - Regular monitoring and maintenance of the stream, riparian zone, and buffer areas will be undertaken as detailed in the River Maintenance Management Plan (RMMP), Table 5.

4. Planting and Irrigation Approach

- Go-Chill (Ptn A) and Dalmar Landscaping (Ptn B):
    - Trees:
        - All street trees on Brass Avenue and Boundary Street to be minimum 80L, unless they are under the Large Deciduous or Large Evergreen list.
        - Large Deciduous or Large Evergreen trees and palm trees to be 200L minimum with 8cm stem girth.
        - Riparian zone trees to be mixture of 20L 40L, 80L, and to be well rooted prior to procurement.
        - A generous number of trees will be planted to provide shade, screening, and enhance biodiversity.
        - Landscaped edges will remain clear for vehicle access.
        - Tree selection and placement will match planter sizes and site requirements, with a mix of evergreen and deciduous species for year-round benefits.
    - Groundcovers and Shrubs:
        - Planting design considers sun/shade exposure, with low groundcovers and shrubs at the edges and taller species at the back for screening.
    - Species selection prioritizes water-wise, indigenous, and low-maintenance plants.

Irrigation:

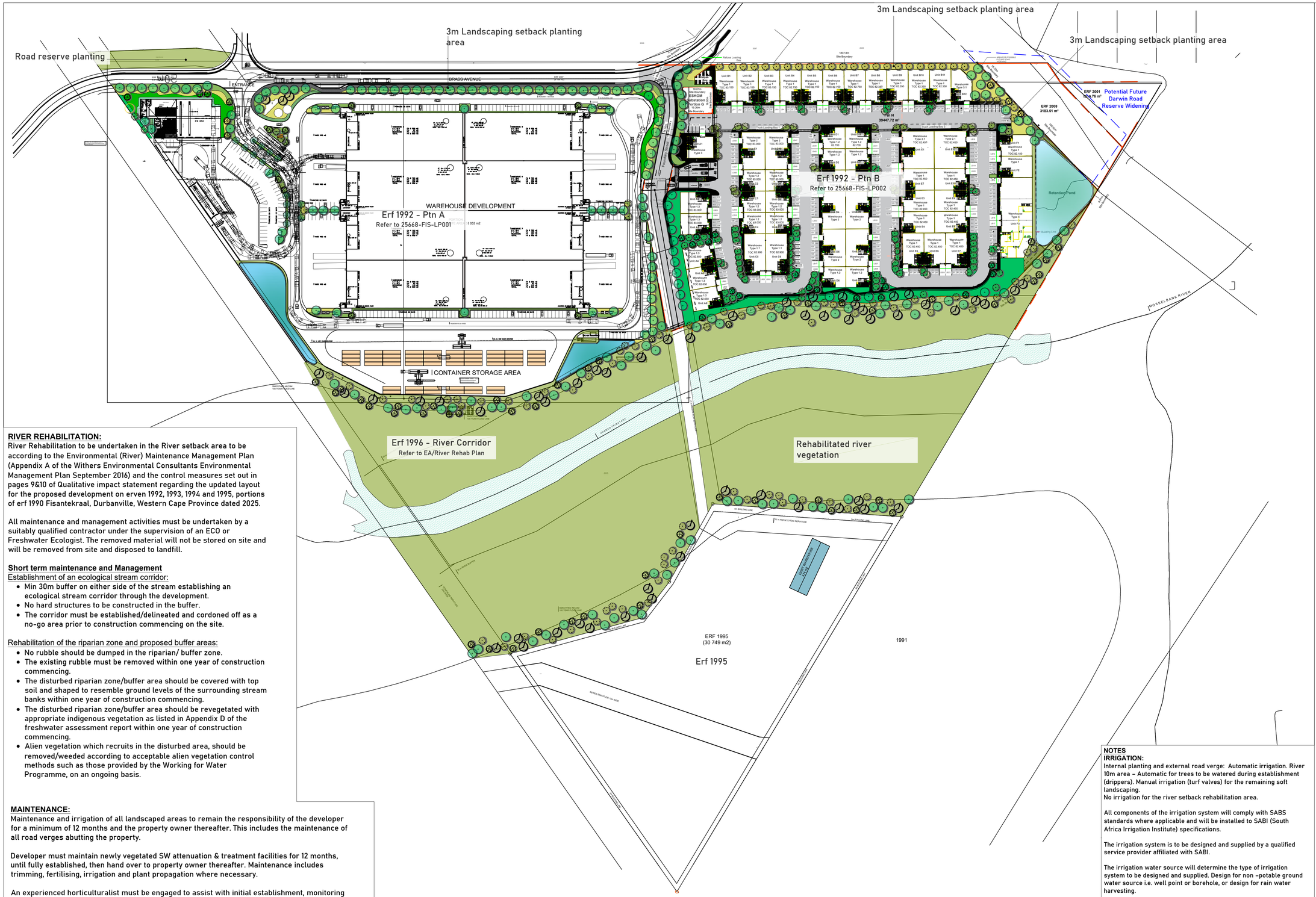
- Internal and road verge planting: automatic irrigation.
- River 10m area: automatic drip irrigation for tree establishment only.
- Remaining soft landscaping: manual irrigation (turf valves).
- No irrigation will be provided in the river setback rehabilitation area.
- All irrigation components will comply with SABS standards and be installed to SABI specifications by a qualified, SABI-affiliated service provider.
- Irrigation will be designed for non-potable water sources (e.g., rainwater harvesting); groundwater extraction is not currently planned.
- Separate irrigation lines for general planting and trees (bubblers for trees).
- The contractor is responsible for verifying water pressure and flow before installation.

- Erf 1995 Landscaping:
  - No landscape plan is submitted for this erf, as there is no approved SDP.
  - A future landscape plan and SDP submission for this site remains a possibility.

For any queries or to discuss this motivation, please contact the undersigned

Yours faithfully

René Maria Brett Pr LArch SACLAP 20122
Director, Viridian Consulting (Pty) Ltd



RIVER REHABILITATION:
River Rehabilitation to be undertaken in the River setback area to be according to the Environmental (River) Maintenance Management Plan (Appendix A of the Withers Environmental Consultants Environmental Management Plan September 2016) and the control measures set out in pages 9&10 of Qualitative impact statement regarding the updated layout for the proposed development on erven 1992, 1993, 1994 and 1995, portions of erf 1990 Fisantekraal, Durbanville, Western Cape Province dated 2025.

All maintenance and management activities must be undertaken by a suitably qualified contractor under the supervision of an ECO or Freshwater Ecologist. The removed material will not be stored on site and will be removed from site and disposed to landfill.

Short term maintenance and Management
Establishment of an ecological stream corridor:

- Min 30m buffer on either side of the stream establishing an ecological stream corridor through the development.
- No hard structures to be constructed in the buffer.
- The corridor must be established/delineated and cordoned off as a no-go area prior to construction commencing on the site.

Rehabilitation of the riparian zone and proposed buffer areas:

- No rubble should be dumped in the riparian/ buffer zone.
- The existing rubble must be removed within one year of construction commencing.
- The disturbed riparian zone/buffer area should be covered with top soil and shaped to resemble ground levels of the surrounding stream banks within one year of construction commencing.
- The disturbed riparian zone/buffer area should be revegetated with appropriate indigenous vegetation as listed in Appendix D of the freshwater assessment report within one year of construction commencing.
- Alien vegetation which recruits in the disturbed area, should be removed/weeded according to acceptable alien vegetation control methods such as those provided by the Working for Water Programme, on an ongoing basis.

MAINTENANCE:
Maintenance and irrigation of all landscaped areas to remain the responsibility of the developer for a minimum of 12 months and the property owner thereafter. This includes the maintenance of all road verges abutting the property.

Developer must maintain newly vegetated SW attenuation & treatment facilities for 12 months, until fully established, then hand over to property owner thereafter. Maintenance includes trimming, fertilising, irrigation and plant propagation where necessary.

An experienced horticulturalist must be engaged to assist with initial establishment, monitoring and ongoing maintenance.

The approved MLP shall be implemented at cost of developer/owner for each erf prior to occupancy. If individual plots are sold off and the landscaping is not implemented by the developer, a detailed LP must be submitted for each erf for regional approval (to the Env. & Heritage Management branch) together with the SDP and accompanied by the approved MLP.

Fencing:
SW treatment and attenuation facilities must be fenced (clear-vu or concrete palisade).

Setback River Area:
Please refer to River Management Plan compiled by freshwater specialist.
Refer to Appendix D: Table D1 - Plant List for Revegetation of the Mosselbank Tributary and Figure D1 (page 40- 41 of the Blue Science Freshwater Assessment Report June 2016).
Compliance of the River Management Plan will be the responsibility of the owner.

Tree species have been selected to avoid known PSHB reproductive host species. Species must be verified immediately prior to planting against the most recent PSHB host list: https://www.fabinet.up.ac.za/images/PSHB/PSHB_host_list_v6_20230417.pdf.

No reproductive host species shall be planted, substitutions will be made if listings change.

NOTES
IRRIGATION:
Internal planting and external road verge: Automatic irrigation. River 10m area – Automatic for trees to be watered during establishment (drippers). Manual irrigation (turf valves) for the remaining soft landscaping.
No irrigation for the river setback rehabilitation area.

All components of the irrigation system will comply with SABS standards where applicable and will be installed to SABI (South Africa Irrigation Institute) specifications.

The irrigation system is to be designed and supplied by a qualified service provider affiliated with SABI.

The irrigation water source will determine the type of irrigation system to be designed and supplied. Design for non –potable ground water source i.e. well point or borehole, or design for rain water harvesting.

General planting (groundcover and shrubs) and trees, should be irrigated on separate, dedicated lateral spray lines and trees watered with bubblers.

Before installation it is the responsibility of the contractor to measure the pressure and flow of the available water points and ensure it is sufficient for the proposed irrigation design.

TREES:
All street trees on Brass Avenue and Foundary Street to be minimum 80L, unless they are under the Large Deciduous or Large Evergreen list.

Large Deciduous or Large Evergreen trees and palm trees to be 200L minimum with 8cm stem girth.

Riparian zone trees to be mixture of 20L 40L, 80L, and to be well rooted prior to procurement.

LEGEND:

TREES:
All street trees on Brass Avenue and Foundary Street to be minimum 80L, unless they are under the Large Deciduous or Large Evergreen list.
Riparian zone trees to be mixture of species and sizes (20L 40L, & 80L), and to be well rooted prior to procurement.

Small Deciduous Trees:
Dombeya rotundifolia
Dias cotinifolia

Large Deciduous Trees:
(200L with 8cm stem girth)
Celtis africana
Celtis sinensis

Small Evergreen Trees:
Apodytes dimidiata
Buddleja saligna
Nuxia floribunda

Large Evergreen Trees:
(200L with 8cm stem girth)
Ekebergia capensis
Syzigium guineense
Olea europea africana

Washingtonia robusta (200L min)

SOFT LANDSCAPING

Low sun mix (5/m²)
Agapanthus praecox varieties
Arctotis stoechadifolia
Carpobrotus edulis
Carissa macrocarpa "Greencarpet"
Delosperma lydenburgense
Felecia ameloides
*Gazania *Yellow*
Geranium incanum
Helichrysum argyrophyllum
*Lampranthus *Purple*
Pelargonium peltatum
Osteospermum varieties
Scabiosa columbaria
Tulbaghia violaceae

Low shade mix (5/m²)
Asystasia gangetica
Plectranthus strigosus

Medium sun mix (3-5/m²)
Dietes bicolor
Chasmanthe floribunda
Watsonia miniata

Tall sun mix (3-5/m²)
Dietes bicolor
Chasmanthe floribunda
Watsonia miniata

Medium Bulb Mix (5/m²)
Dietes bicolor
Carissa macrocarpa 'Green Carpet'
Chasmanthe floribunda
Aristea major
Elegia tectorum

Hedge Planting(3/Lm)
Searsia crenata
Carissa macrocarpa
Plumbago auriculata
Tecoma capensis

Storm water ponds (3/m²)
Cyperus prolifer
Cyperus textilis
Elegia tectorum
Ficinia nodosa
Kniphofia praecox
Monopsis lutea
Wachendorfia thyrsiflora
Watsonia angusta
Zantedeschia aethiopica
Cynodon dactylon

Rehabilitation Zone

HARD LANDSCAPING

Paving Texture

VIRIDIAN CONSULTING
LANDSCAPE ARCHITECTS
083 409 9252 | rene@viridian.co.za | www.viridian.co.za
72 Tredonne Estate, Sir Lowry's Pass Village Road, Sir Lowry's Pass Village

CLIENT:

PROJECT TITLE:
Fisantekraal Ptn A & B of Farm 168

DRAWING DESCRIPTION:
Master Landscape Plan

DRAWING NUMBER: 25668-FIS-MLP-001

PROJECT CODE:	DRAWING CODE:	LAYOUT NO:	REVISION:
25668	MLP	001	G

DRAWN:	CHECKED:	DATE:	SCALE:
MM	RB	2026-05-11	1:1250 @ A1 1:2500 @ A3

SIGNATURE:
RBrett
Rene Maria Brett SACLAP 20122

STATUS:
FOR APPROVAL

LEGEND:

TREES:

All street trees on Brass Avenue and Foundary Street to be minimum 80L, unless they are under the Large Deciduous or Large Evergreen list.
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(200L with 8cm stem girth)
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Celtis sinensis

Small Evergreen Trees:
Apodytes dimidiata
Buddleja saligna
Nuxia floribunda

Large Evergreen Trees:
(200L with 8cm stem girth)
Ekebergia capensis
Syzigium guineense
Olea europea africana

Washingtonia robusta (200L min)

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Geranium incanum
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*Lampranthus *Purple*
Pelargonium peltatum
Osteospermum varieties
Scabiosa columbaria
Tulbaghia violaceae

Low shade mix (5/m²)
Asystasia gangetica
Plectranthus strigosus

Medium sun mix (3-5/m²)
Dietes bicolor
Chasmanthe floribunda
Watsonia miniata

Tall sun mix (3-5/m²)
Dietes bicolor
Chasmanthe floribunda
Watsonia miniata

Medium Bulb Mix (5/m²)
Dietes bicolor
Carissa macrocarpa 'Green Carpet'
Chasmanthe floribunda
Aristea major
Elegia tectorum

Hedge Planting(3/Lm)
Searsia crenata
Carissa macrocarpa
Plumbago auriculata
Tecoma capensis

Storm water ponds (3/m²)
Cyperus prolifer
Cyperus textilis
Elegia tectorum
Ficinia nodosa
Kniphofia praecox
Monopsis lutea
Wachendorfia thyrsiflora
Watsonia angusta
Zantedeschia aethiopica
Cynodon dactylon

Rehabilitation Zone

HARD LANDSCAPING

Paving Texture

VIRIDIAN CONSULTING
LANDSCAPE ARCHITECTS

083 409 9252 | rene@viridian.co.za | www.viridian.co.za
72 Tredonne Estate, Sir Lowry's Pass Village Road, Sir Lowry's Pass Village

CLIENT:
Go-Chill Cape Town

PROJECT TITLE:
Go-Chill Cape Town
- Ptn A of Farm 168, Fisantekraal

DRAWING DESCRIPTION:
Ptn A Go-Chill: Landscape SDP

DRAWING NUMBER: 25668-FIS-LP-001

PROJECT CODE:	DRAWING CODE:	LAYOUT NO.:	REVISION:
25668	LP	001	G

DRAWN:	CHECKED:	DATE:	SCALE:
MM	RB	2026-05-11	1:750 @ A1 1:1500@ A3

SIGNATURE:
RBrett
Rene Maria Brett SACLAP 20122

STATUS:
FOR APPROVAL

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Wachendorfia thyrsiflora
Watsonia angusta
Zantedeschia aethiopica
Cynodon dactylon

Rehabilitation Zone

HARD LANDSCAPING

Paving Texture

VIRIDIAN CONSULTING
LANDSCAPE ARCHITECTS

083 409 9252 | rene@viridian.co.za | www.viridian.co.za
72 Tredonne Estate, Sir Lowry's Pass Village Road, Sir Lowry's Pass Village

CLIENT:
Dalmar Durbanville Business Park

PROJECT TITLE:
Dalmar Durbanville Business Park
- Ptn B of Farm 168, Fisantekraal

DRAWING DESCRIPTION:
Ptn B Dalmar: Landscape SDP

DRAWING NUMBER: 25668-FIS-LP-002

PROJECT CODE:	DRAWING CODE:	LAYOUT NO:	REVISION:
25668	LP	002	G

DRAWN:	CHECKED:	DATE:	SCALE:
MM	RB	2026-05-11	1:500 @ A1 1:1000@ A3

SIGNATURE:
RBrett
Rene Maria Brett SACLAP 20122

STATUS:
FOR APPROVAL

FRESHWATER ASSESSMENT REPORT FOR THE PROPOSED LIGHT INDUSTRIAL DEVELOPMENT OF PORTION 32 OF FARM 168, DURBANVILLE

JUNE 2016

Prepared By:

Ms Toni Belcher, Mr Stuart Barrow and Mr Dana Grobler

PO Box 455, Somerset Mall, 7137

Tel: (021) 851 0555

EXECUTIVE SUMMARY

An industrial development is proposed for Portion 32 of Farm 168, Durbanville which is currently zoned for agricultural use. The site is located within the urban edge in an area earmarked for industrial development in terms of the City of Cape Town's Spatial Development Plan. The intention is thus to rezone the property from Agricultural Zone I to General Industrial Zone I. An unnamed tributary of the Mosselbank River flows through the property. In this freshwater report, the potential impacts to the tributary are discussed and mitigation measures are suggested.

The instream habitat of the unnamed tributary of the Mosselbank River is considered to be in a moderately to largely modified ecological state whilst the riparian habitat is considered to be in a critically modified state. The stream is still however considered to be of a moderate ecological importance and sensitivity due to the fact that it still provides a link / corridor to the larger Mosselbank and Diep River System. The potential impacts of the proposed activity are the facilitated invasion by alien flora, modification to flow and impaired water quality. These can be mitigated by the following proposed measures:

Buffer along the unnamed tributary: The primary concern of the proposed development, from a freshwater ecology perspective, is potential impact of the development on the unnamed tributary of the Mosselbank River which transects the property and its reduced ecological integrity. It is proposed that this stream be given a minimum buffer of 30m from the top of each bank of the river which equates to an ecological stream corridor through the development of approximately 75 to 80m wide. This buffer represents an area which should be suitably vegetated and where no hard structures should be constructed. No soil, rubble or any other material should be moved, disturbed or dumped within the buffer zone. Existing rubble within the buffer area should also be removed. Areas within the proposed buffer zone where soil/material has already been disturbed should be revegetated with appropriate indigenous vegetation. The aim of the buffer zone is to maintain an ecological corridor and protect the water course from the impacts of surrounding industrial development. The buffer zone should also be kept free of alien vegetation and in particular Acacia saligna, Echium plantagineum and Pennisetum clandestinum. Larger machinery, such as diggers or bulldozers, should not be operated within the buffer zone to remove alien vegetation.

Appropriate decommissioning of existing infrastructure and site rehabilitation: As part of the redevelopment of the site, the rubble from demolished buildings on the property should not be dumped in the riparian/ buffer zone and the existing rubble should be removed from this area. The building rubble should be crushed and the levelled within the footprint of the old building. Any hazardous waste, metal or plastic should be removed from the site and appropriately disposed of at an approved waste disposal site. The site, outside of the development footprint, should be covered with top soil. Disturbed areas or areas where the soil is left bare are typically invaded by alien vegetation. These areas should be revegetated with appropriate indigenous vegetation. Alien vegetation which recruits in the disturbed area should be removed or weeded.

Road crossings: A road crossing is proposed across the unnamed tributary within the property. If possible, the existing low-level crossing should be utilised and upgraded but should not be significantly changed in order to minimise disturbance of the water courses bed and banks. The current drainage through the crossing comprises of 12 pipe culverts each with a diameter of ~1m.

*The upgraded crossing should not allow **less** flow through the structure than the current one. No additional crossings should be constructed.*

The Department of Water and Sanitation will need to be approached with regards to the need for a water use authorisation for upgrading the crossings within the site. The risk associated with the shorter term construction and longer term maintenance related activities are deemed to be moderate to low provided that the mitigation measures are implemented. It is however highly likely that even with mitigation some permanent modification to the stream habitat could be expected as a result of the proposed development of the property adjacent to the stream. The instream habitat is currently in a moderately to largely modified ecological state while that of the riparian habitat is critically modified. There is the potential, given the current ecological state, that the riparian habitat could be slightly improved such that the overall ecological state of the stream remains in a largely modified ecological condition.

TABLE OF CONTENTS

1. BACKGROUND

It is proposed to redevelop Portion 32 of Farm 168 (Fisantekraal), Durbanville within the City of Cape Town. Currently the property is zoned for agricultural use. An unnamed tributary of the Mosselbank River flows through the property however the site is located within the urban edge in an area earmarked for industrial development in terms of the City of Cape Town's Spatial Development Plan (Northern District). The intention is to rezone the property from Agricultural Zone I to General Industrial Zone I. This freshwater assessment report is intended to inform the authorisation process with regards to the potential impacts of the proposed development on the tributary and to recommend mitigation measures.

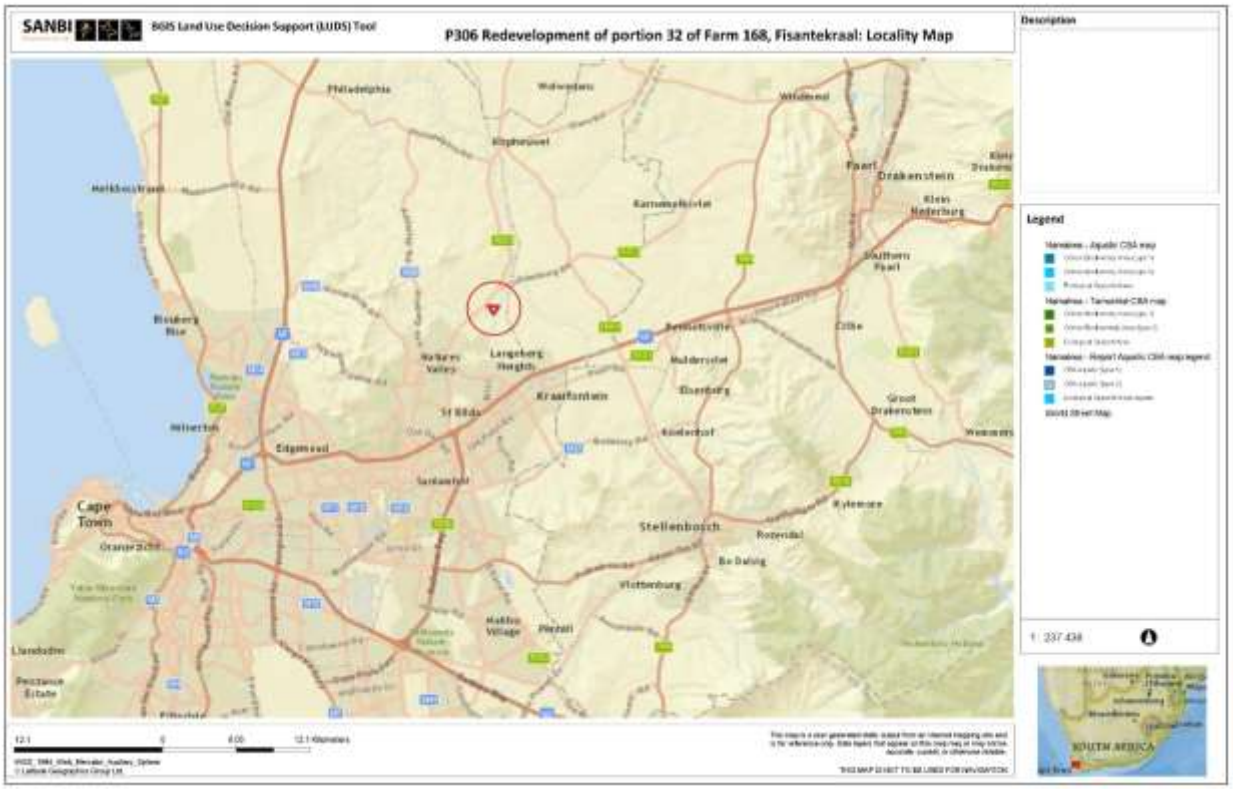

Figure 1. Locality map of the portion 32 of Farm 168 (SANBI Biodiversity GIS, 2015)

Table 1: Summary of key information related to the water resources which may be impacted by the proposed activities

Descriptor	Name / details	Notes
Water Management Area	Berg-Olifants WMA	
Catchment Area	Tributaries of the upper Diep River System	
Quaternary Catchment	G21E	
Present Ecological state	D (largely modified)	DWAF 2012 for Mosselbank River
Ecological Importance and Sensitivity	Ecological Importance – Moderate Ecological Sensitivity – High	DWAF 2012 for Mosselbank River
Type of water resource	Unnamed tributary of the Mosselbank River	
Water resource component potentially impacted	Tributary of the Mosselbank River in the Diep River System	
Latitude	33°47'51.75"S	Location of centre of site
Longitude	18°41'59.48"E	
Environmental & water use authorisation processes	This freshwater assessment report is prepared as input into an environmental and water use authorisation application	

2. TERMS OF REFERENCE

The suggested and agreed upon scope of works for this freshwater assessment is as follows:

1. Literature survey and initialisation
2. Assessment of the site
3. Compile Freshwater Assessment Report, including any wetland assessments
4. Provide input into a Management Maintenance Plan (MMP)
5. Undertaken a risk assessment of the proposed works
6. Review and liaison

3. ASSUMPTIONS AND LIMITATIONS OF THE STUDY

Input into this report was informed by a combination of desktop assessments of existing freshwater ecosystem information for the study area and catchment, as well as by a more detailed assessment of the freshwater features at the proposed development site. The site was visited in December 2015. During the field visit, the characterisation and integrity assessments of the freshwater features were undertaken. Mapping of the freshwater features was undertaken using a Garmin Colorado 300 GPS and mapped in PlanetGIS and Google Earth Professional. The SANBI Biodiversity GIS website was also consulted to identify any constraints in terms of fine-scale biodiversity conservation mapping as well as possible freshwater features mapped in the Freshwater Ecosystem Priority Areas maps. This information/data was used to inform the resource protection related recommendations.

Limitations and uncertainties often exist within the various techniques adopted to assess the condition of ecosystems. The following limitations apply to the techniques and methodology utilized to undertake this study:

- The guideline document, "A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas" document, as published by DWAF (2005) was followed for the delineation of the riparian area.

- A Present Ecological State (PES) assessment and ecological importance and sensitivity assessment was conducted according to the guidelines as developed by DWAF (1999).

- Recommendations are made with respect to the adoption of buffer zones within the development site, based on river's ecological state, ecological importance and sensitivity and the site characteristics.

The level of aquatic assessment undertaken was considered to be adequate for this study.

4. USE OF THE REPORT

This report reflects the professional judgment of its authors. The full and unedited content of this should be presented to the client. Any summary of these findings should only be produced in consultation with the authors.

5. OVERVIEW OF THE STUDY AREA AND PROJECT PROPOSALS

5.1. REVIEW OF STUDY AREA

The study area is Portion 32 of Farm 168, Fisantekraal within the City of Cape Town Metropolitan area. This property lies on the outskirts of the suburb of Durbanville (Figure 2). The terrain is flat and land use varies from agricultural fields, small settlements, and open space. The property is transected by an unnamed tributary of the Mosselbank River which flows west to east. The property currently contains a number of farm buildings, pasture for cattle and abandoned or decommissioned buildings. Nearly all of the natural vegetation cover has been removed and currently consists of alien and weedy vegetation. The tributary still however consists largely of indigenous *Phragmites australis* reeds.

The upper reaches of the Mosselbank River has been highly modified as a result of urban and agricultural activities. Much of the river channel has been straightened and canalized and most of the riparian vegetation removed. Some of the reaches within the urban areas consist of concrete channels and pipes. Flow within the river has also been highly modified as a result of increasing hardening of surfaces, the discharge of treated wastewater from Kraaifontein Wastewater Treatment Works and the construction of many small farm dams.

5.2. ACTIVITY DESCRIPTION

The applicant proposes to construct an industrial development on Portion 32 of Farm 168, Durbanville which is approximately 19ha in extent. The zoning and use of the land is agricultural however the site is located within the urban edge in an area earmarked for industrial development in terms of the City of Cape Town's Spatial Development Plan (Northern District). The intention is to rezone the property from Agricultural Zone I to General Industrial Zone I. The basic layout of the proposed development is shown in Figure 3.

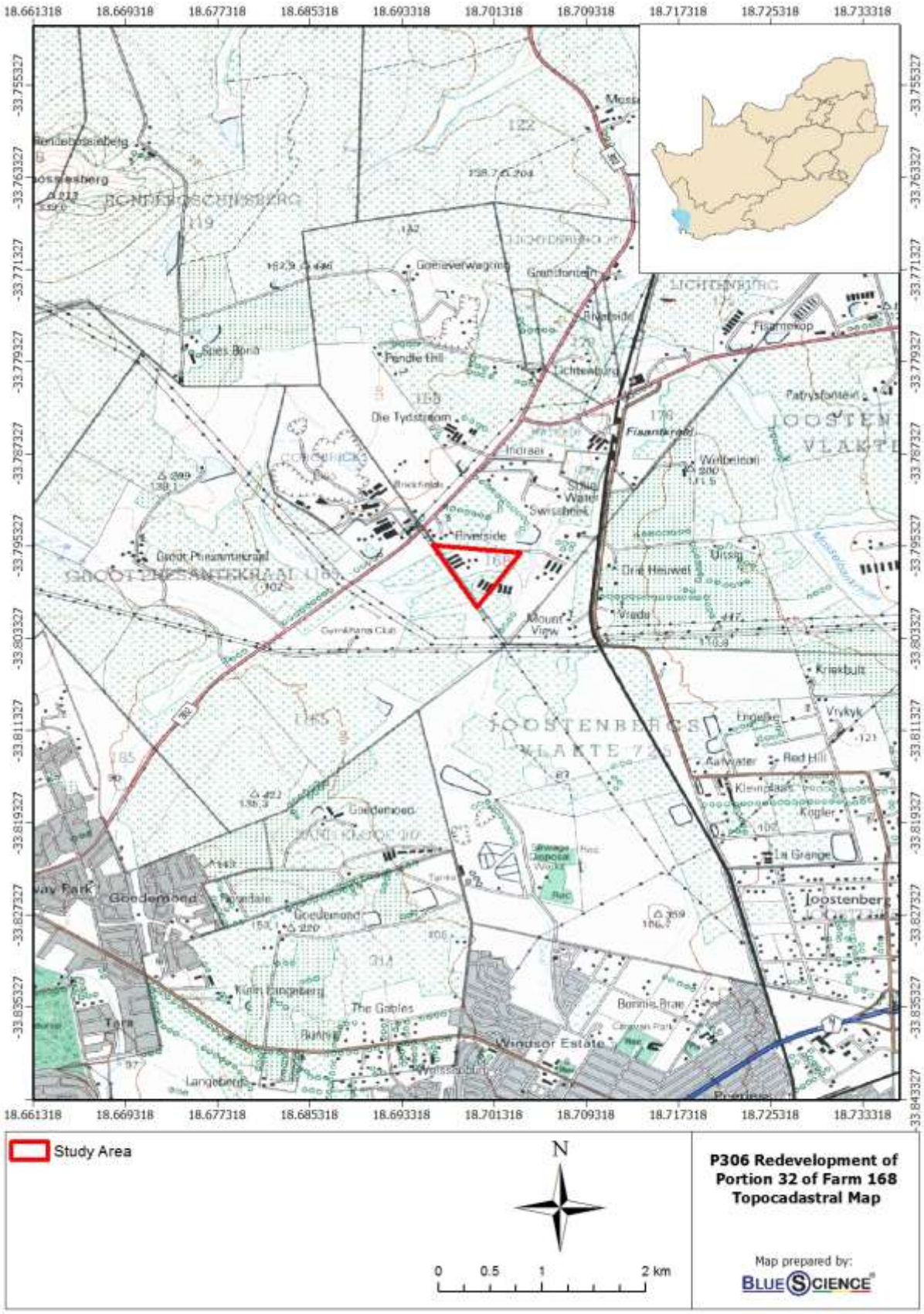

Figure 2. Topography map (3318 DC) showing the boundaries of Portion 32 of Farm 168

Figure 3. The proposed layout of the redevelopment of protion 32 of Farm 168

6. PHYSICAL CHARACTERISTICS OF THE STUDY SITE

6.1. VISUAL CHARACTERISTICS

The property is relatively flat, sloping gently from the north and south down to the unnamed tributary. The natural vegetation cover has been transformed by agricultural practices. Much of the infrastructure on the property has been decommissioned. The area is dominated by exotic grasses and weedy shrubs and in particular, kikuyu grass *Pennisetum clandestinum* (Not listed in areas where it currently occurs) and Patterson's curse *Echium plantagineum* (Category 1b). The watercourse of the unnamed tributary is dominated by the common reed *Phragmites australis*. Dug trenches which carry surface water run-off down to the tributary are dominated by bulrushes *Typha capensis*.

Figure 4. A disused field dominated by *E. plantagineum*

Figure 5. Used pastures on the site dominated by grazed grasses, with evidence of sand removal in the background

6.2 CLIMATE

The Durbanville area has a Mediterranean climate, with most of the rainfall occurring in winter. Temperatures, on average range, between 29 C° and 16 C° in February and 19 C° and 7 C° in July (Figure 6, top). Similarly, July receives on average, 94.3 mm of rainfall while February receives only 9.1mm (Figure 6, bottom). Durbanville receives about 475mm of rainfall per annum. The prevailing wind directions are the south easterly and the north westerly, with south westerly winds also occurring frequently.

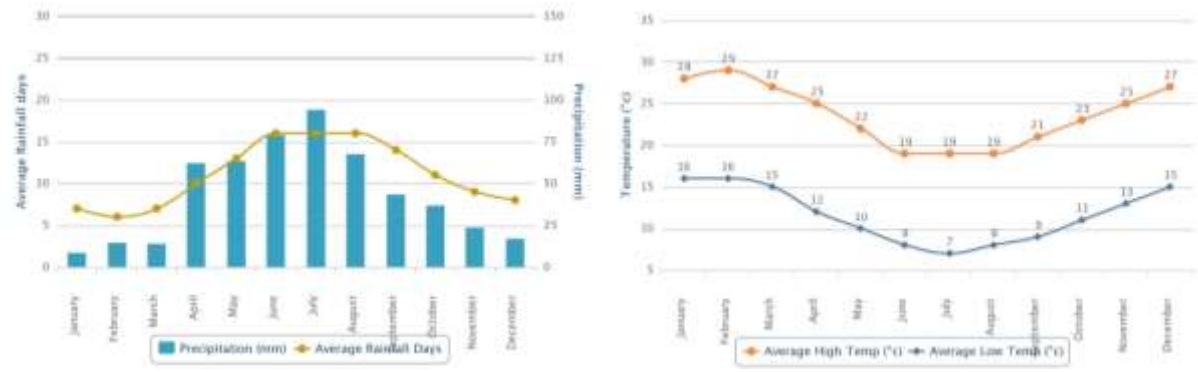

Figure 6. Average monthly rainfall (left) and temperatures (right) for Durbanville (Worldweatheronline, 2015)

6.3 GEOLOGY AND SOIL

The underlying geology of the area is broadly described as Malmesbury shale. The south-eastern portion of the site has sandy, undifferentiated, structureless soils (beige area in Figure 7). Although these soils may have favourable physical properties, they are limited by one or more of the following factors: low base status, restricted soil depth, excessive or imperfect drainage and high erodibility. The north-eastern half of the property has soils which are not dominated by a specific characteristic (yellow in Figure 7). During the site visit the soils across the site were observed to be dominated by deep sands to the extent that harvesting or mining of sands appeared to have taken place at various locations on the site (See Figure 5).

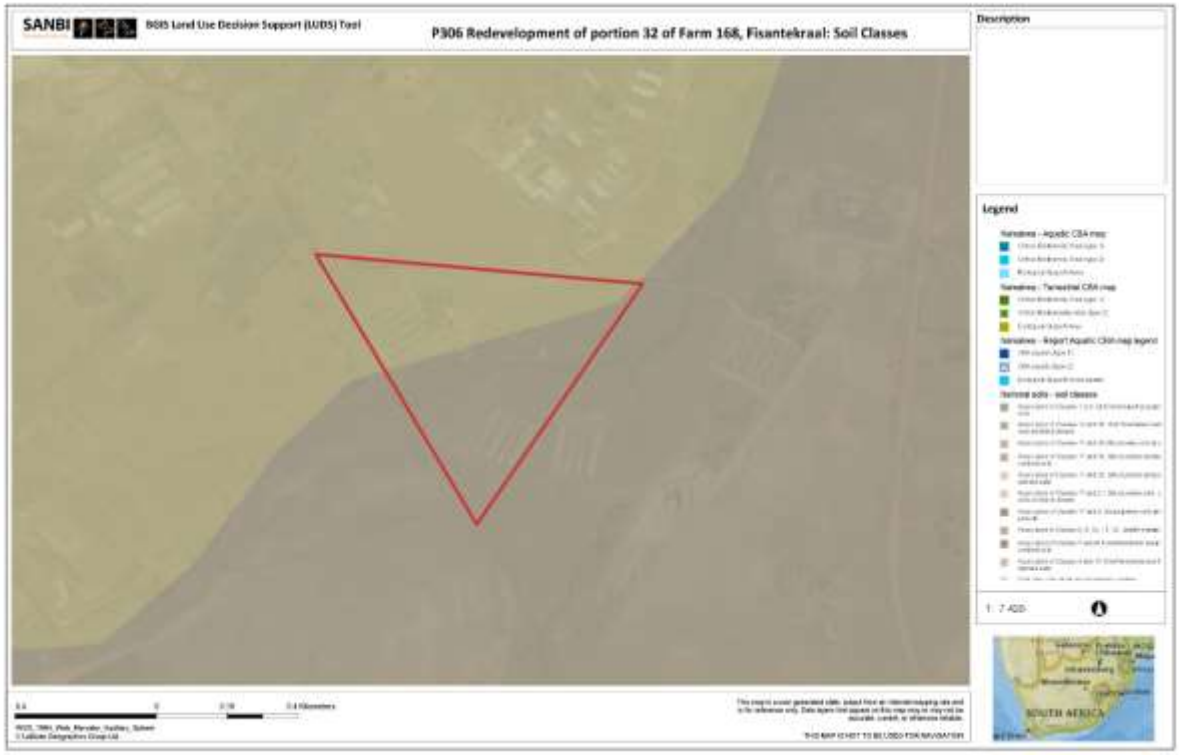

Figure 7. Soil map for the area (SANBI Biodiversity GIS, 2015)

6.4. FLORA

The natural vegetation on the site is mapped as Cape Flats Sandstone Fynbos (FFd 5; purple in Figure 8), with the surrounding areas mapped as Swartland Shale Renosterveld (FRs 9; blue in Figure 8). Both of these vegetation types are considered to be Critically Endangered (Mucina & Rutherford, 2006).

The natural vegetation on the site has however largely been modified and very little indigenous vegetation was observed during the site visit. Most of the site is dominated by pastures or buildings. The pastures are dominated by grasslands and *P.clandestinum* was particularly abundant. Disused fields and other disturbed sites were dominated by *E. plantagineum*. Drainage trenches running down to the unnamed tributary were dominated by *T. capensis*. The water course itself was fringed by *Acacia saligna* (Category 1b) although most of the trees have been cleared from the site. Within the channel *P. australis* was dominant. Sedges such as *Bolboschoenus maritimus* and *Cyperus textilus* occurred in patches along the marginal zone while *Cynodon dactylon* grass dominated the banks.

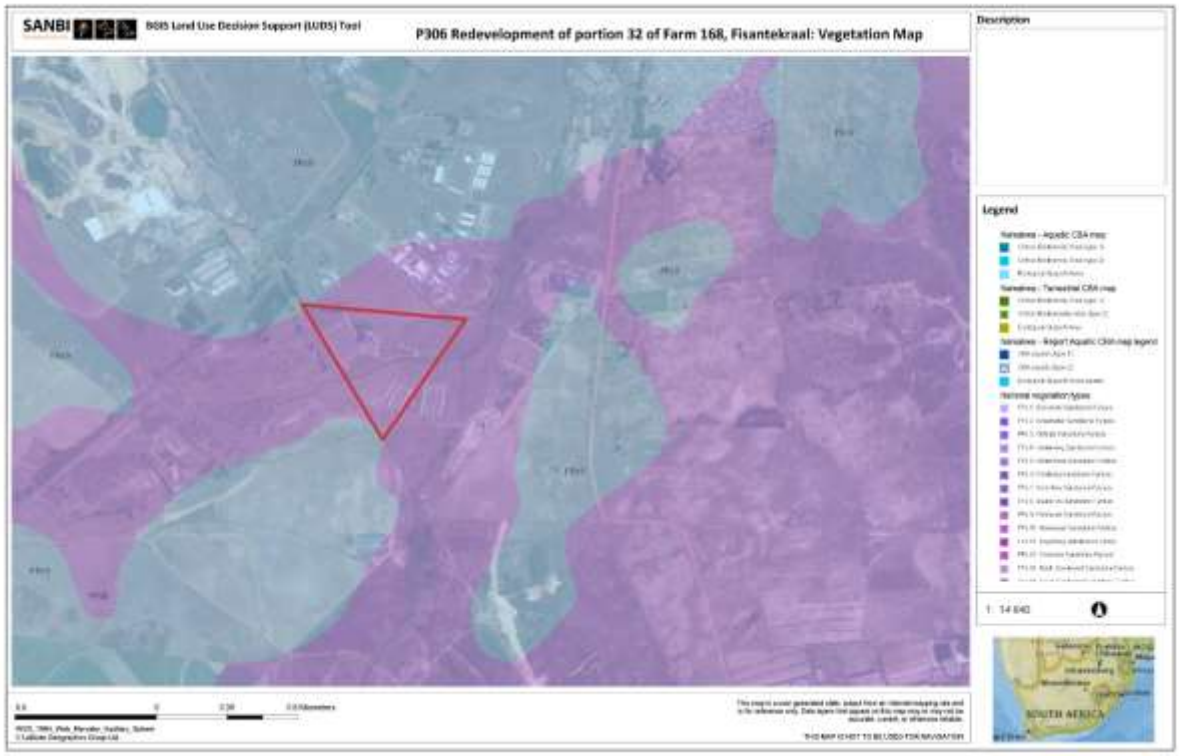

Figure 8. Vegetation types for the study area (SANBI Biodiversity GIS, 2015)

6.5. AQUATIC FEATURES

The activity lies within the quaternary catchment; G21E, drained by the Mosselbank River, a tributary of the Diep River. The National Freshwater Ecosystem Priority Areas (FEPA) initiative identified freshwater resources which should be protected against modification. Freshwater Ecosystem Priority Area (FEPA) wetlands were mapped nationally using available data. There are no FEPA rivers or wetlands mapped at the site (Figure 9).

Figure 9. NFEPA features in the study area (SANBI Biodiversity GIS, 2015)

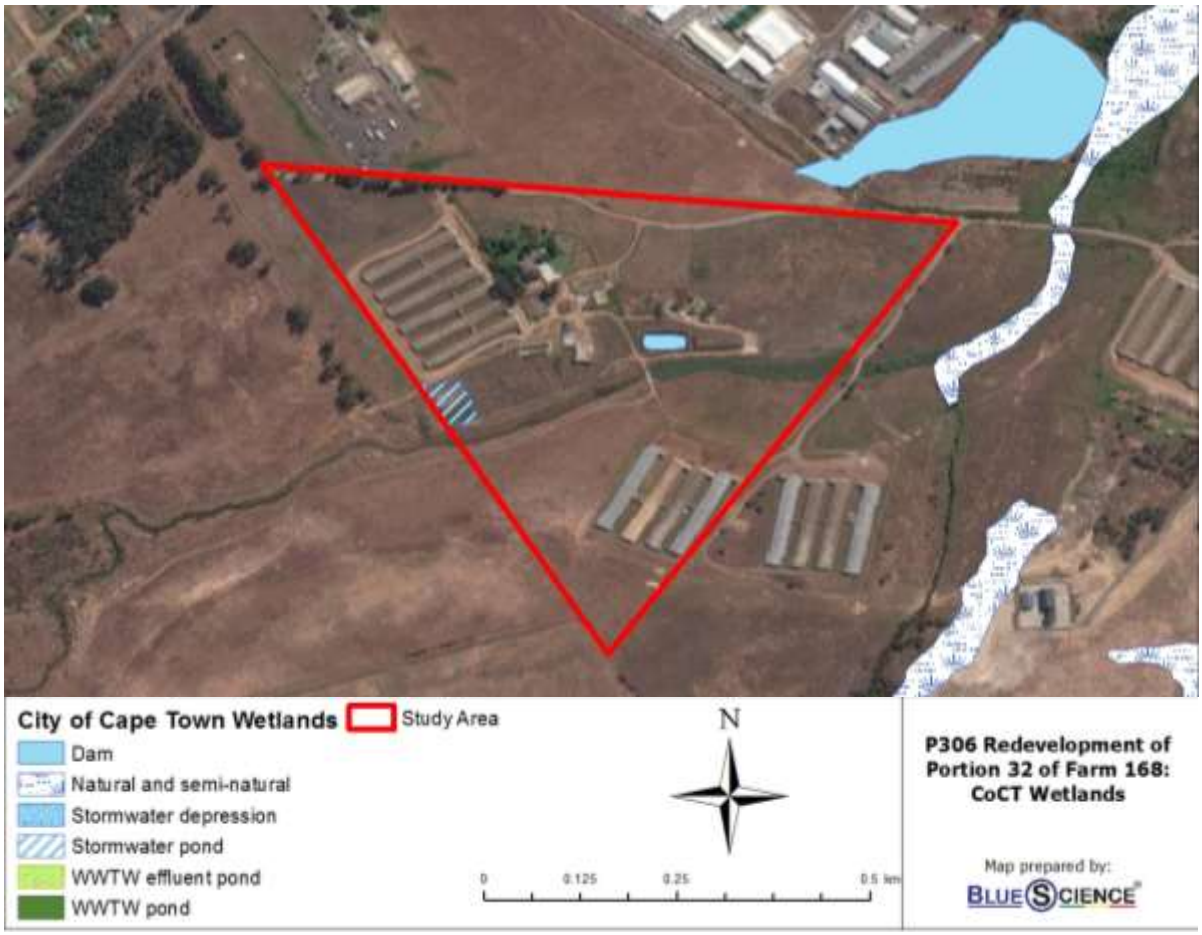

Figure 10. City of Cape Town wetlands on the study site.

Figure 11. View of the stormwater related wetland on the eastern edge (left) and the dam in the middle (right) of the property

6.6 LAND USE

A large portion of the site is mapped as natural (green in Figure 12) with the fringes mapped as cultivated land (yellow in Figure 12). During the site visit however it was observed that the areas mapped as natural are currently grazed or have been completely modified by various agricultural activities. The area has been earmarked for new general industrial development in the spatial Development Plan (Figure 13).

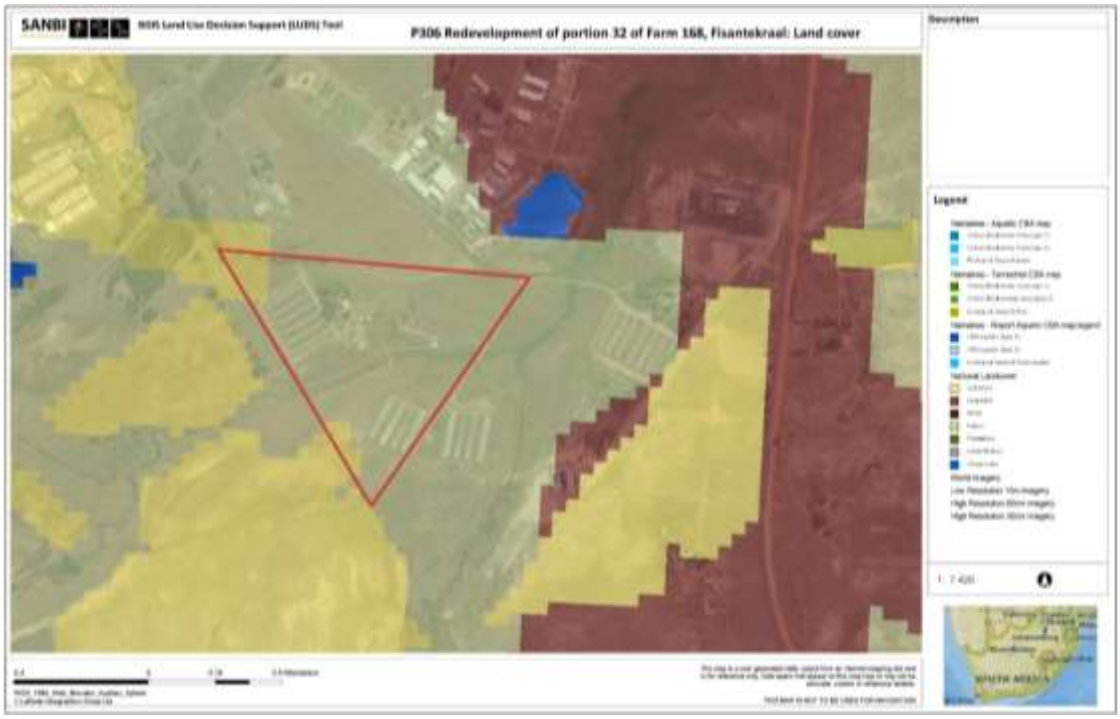

Figure 12. Land use map for study area (SANBI Biodiversity GIS, 2015)

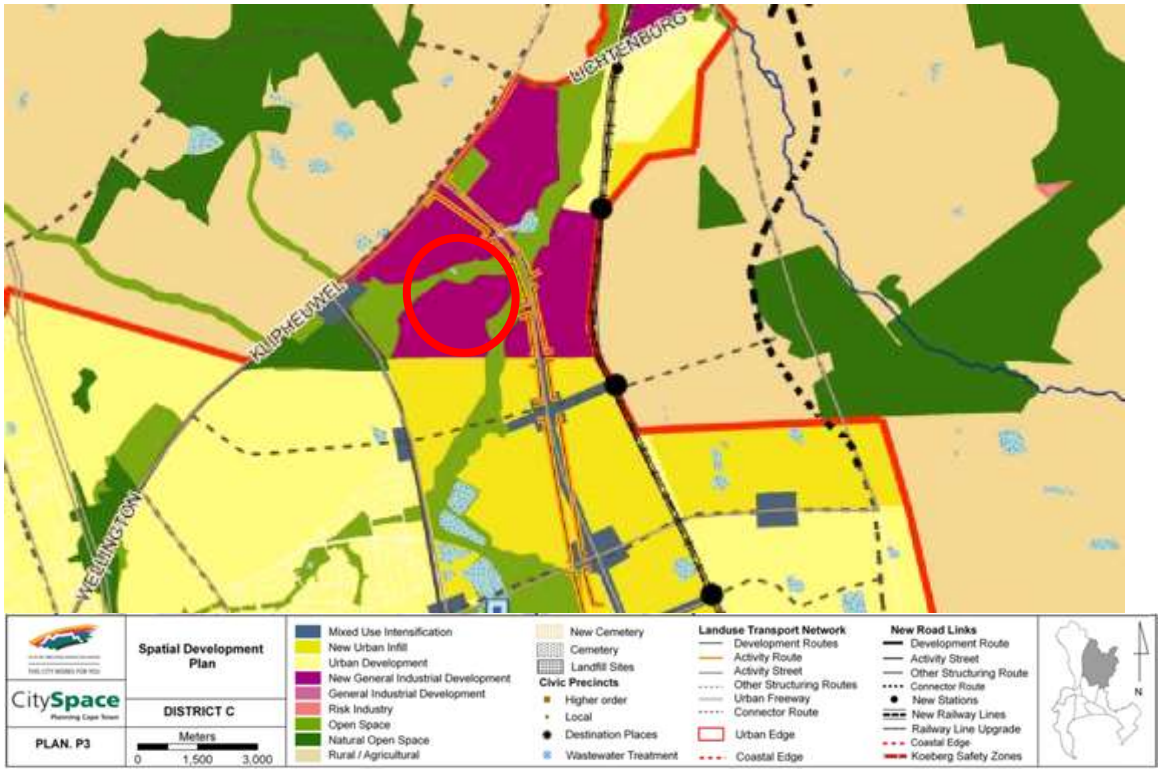

Figure 13. Spatial Development Plan for the area of concern (study area indicated by red circle)

6.7 BIODIVERSITY CONSERVATION VALUE

There are two freshwater biodiversity conservation mapping initiatives of relevance to the study area, the FEPAs and the City of Cape Town Biodiversity Network mapping. FEPAs are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. FEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for serving ecosystems and associated biodiversity of rivers, wetlands and estuaries. There are no river FEPA's mapped on or directly adjacent to the site of the proposed development (Figure 14).

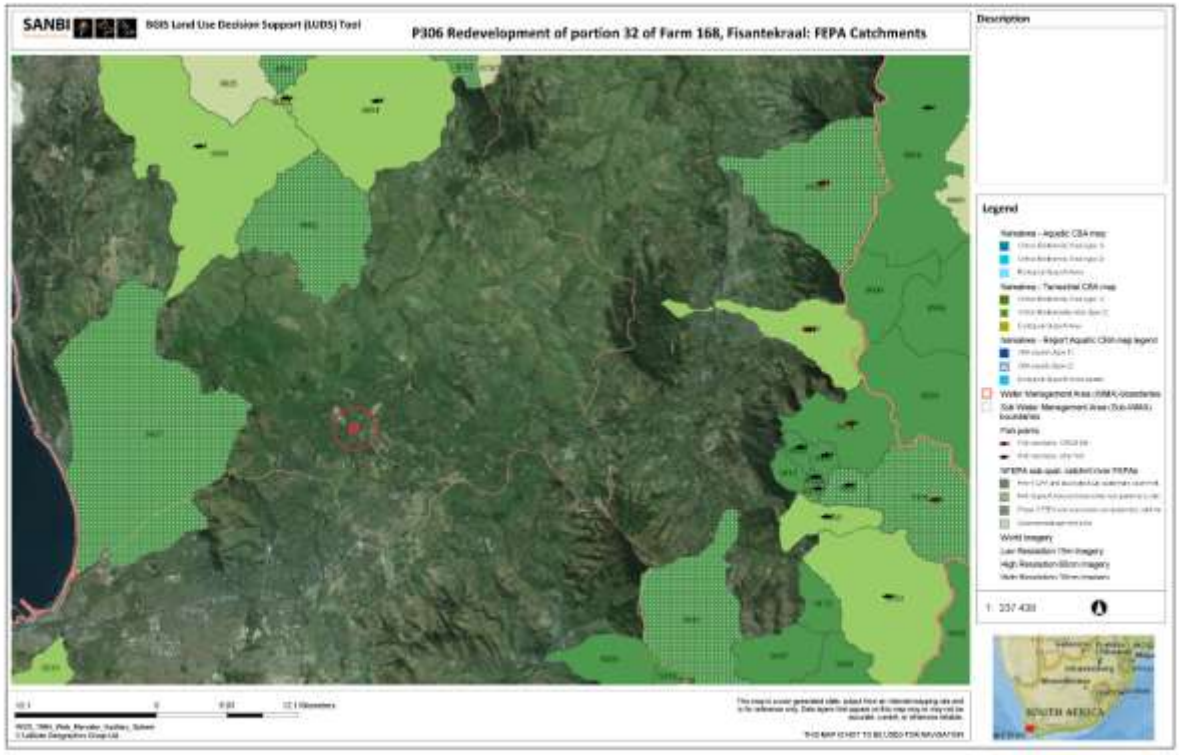

Figure 14. FEPA map for the area surrounding the study site

In terms of the City's Biodiversity Network, Critical Biodiversity Areas (CBAs) have been mapped that represent the minimum amount of terrestrial and freshwater habitat that is required to meet the City's biodiversity conservation targets. Wetland prioritization was analysed separately by specialist consultants (Snaddon et al. 2009). Priority wetlands occurring on natural remnants were included *post-hoc* into the BioNet as CBA wetlands. Wetland ground-truthing indicated that priority wetlands located in transformed areas were degraded and in practice would be difficult to restore and conserve. The latter were assigned Ecological Support Area (ESA) status based on level of transformation. Wetland ground-truthing has continued since the 2009 BioNet re-analysis and the wetland layer updated accordingly.

A number of areas in the wider area of the study site are mapped as CBAs, but there are no CBAs mapped on the study site itself (Figure 15). The City's wetland mapping for the site however indicates two wetlands within the site. Neither of the wetlands are considered significant for the conservation of habitat or the supply of ecosystem services. This is as a result of extensive to complete modification of these features. The wetlands are briefly in Section 7.

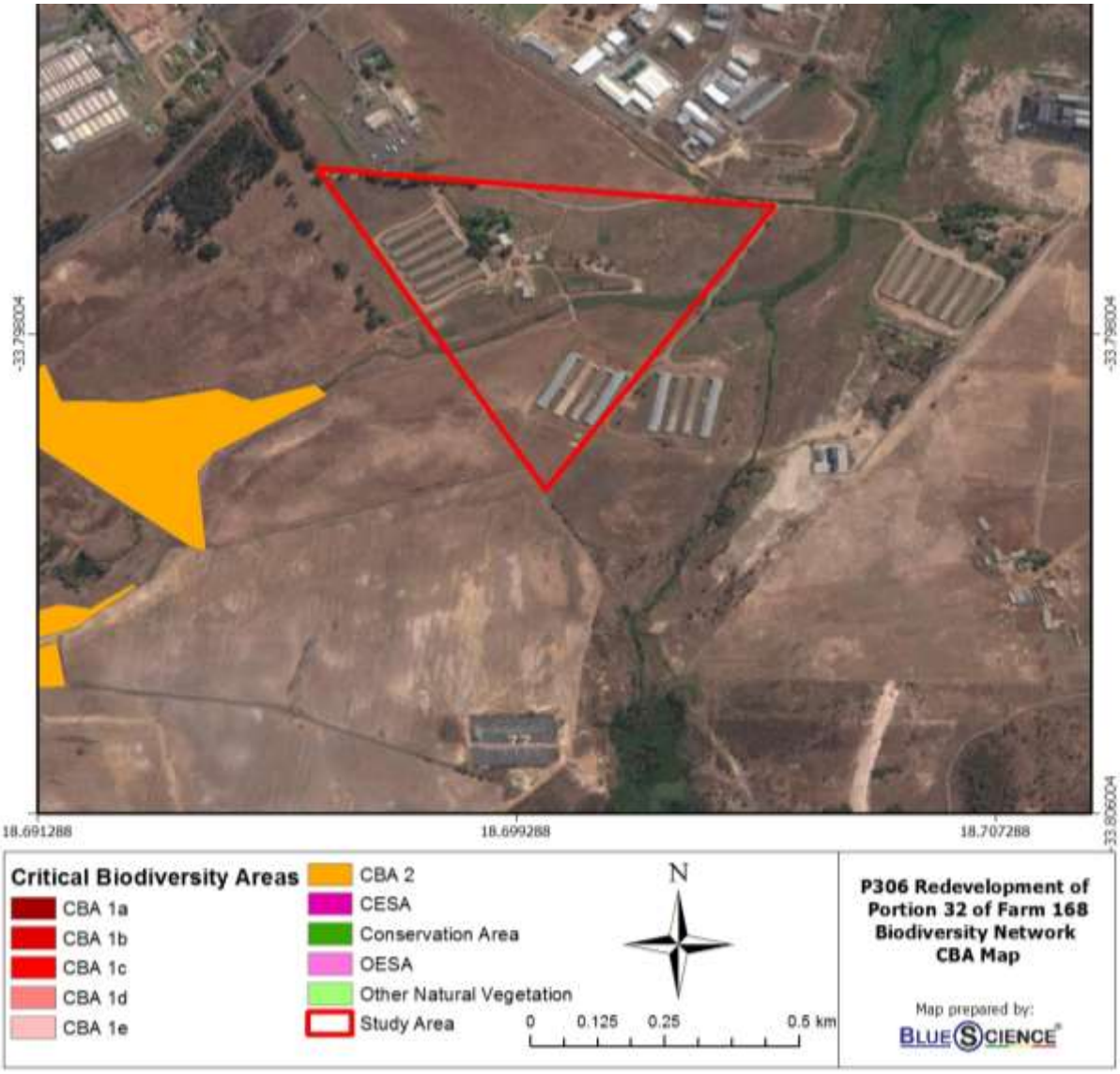

Figure 15. City of Cape Town Biodiversity Network for the area where:

Critical Biodiversity Area Category	Critical Biodiversity Area Name
Protected: In Perpetuity	Protected Area that is Proclaimed in Perpetuity
Protected: Not In Perpetuity	Protected Area that is Proclaimed for a Limited Period
Conservation Area	Conservation Area that is not Yet Proclaimed
CBA 1a	Irreplaceable Core Flora site
CBA 1b	Irreplaceable High & Medium Condition site
CBA 1c	Minset (Minimum Set C-plan algorithm) High & Medium Condition site
CBA 1d	Irreplaceable Consolidation site
CBA1e	Connectivity Site
CBA 2	Restorable Irreplaceable site
CESA	Unselected Natural Vegetation of Conservation Significance
OESA	Transformed Site of Conservation Significance
Other Natural vegetation	Unselected Natural Vegetation in high, medium or restorable condition
No Natural Habitat	Unselected Transformed Site

7. ASSESSMENT OF FRESHWATER FEATURES AND THEIR SIGNIFICANCE

7.1. HISTORICAL MODIFICATION OF THE FRESHWATER FEATURES WITHIN THE SITE

The photographs from aerial surveys of the area show that in 1944 the unnamed tributary followed a very similar course to its current one. Furthermore the site of the two City wetlands on the property appears to be on the site of a larger wetland associated with the braided channel of the unnamed tributary. In its natural state these wetlands would have been an important ecological unit, however due to the completely modified state of the remaining fragmented wetland areas, restoration and conservation is not considered feasible.

Historical land use shows that the land to south of the unnamed tributary was cultivated in 1944, but that the land immediately north of the tributary appears to have still been natural (Figure 16).

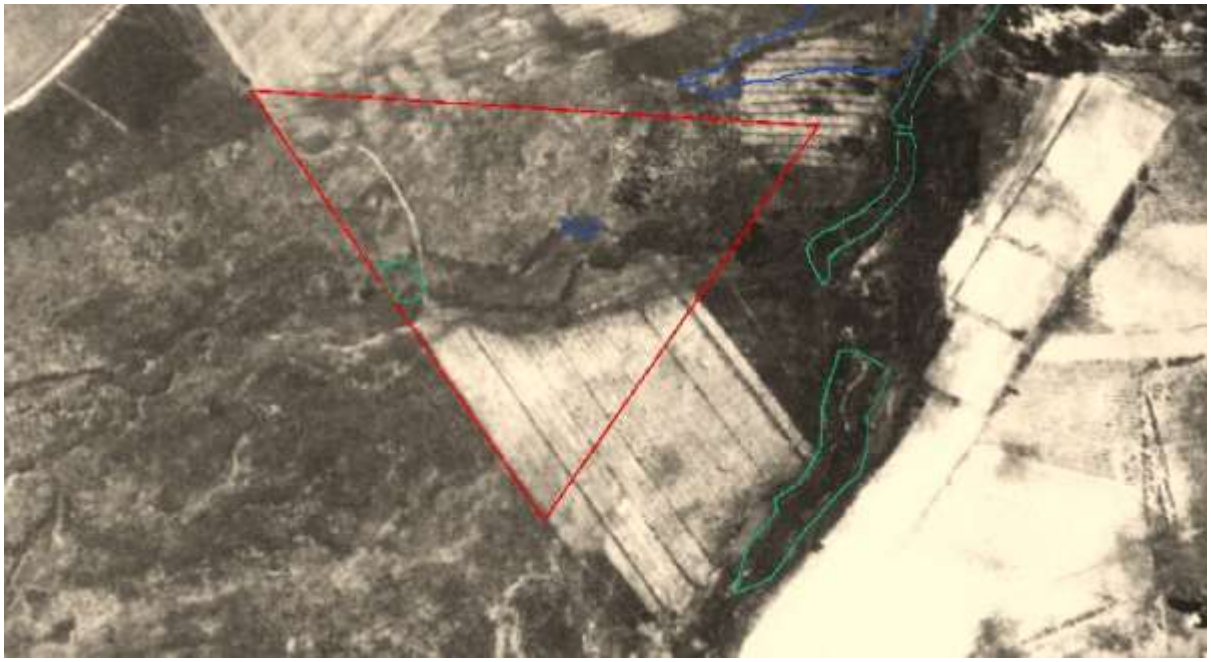

Figure 16. Aerial photograph of the site taken in 1938 showing the City of Cape Town wetlands (blue and green polygons)

7.2. DESCRIPTION OF FRESHWATER FEATURES

Freshwater features on the site include the two smaller wetland areas mapped by the City of Cape Town wetland mapping, an unnamed tributary of the Mosselbank River and drainage trenches carrying run-off to the unnamed tributary. Neither of the wetlands nor the trenches are considered significant for the conservation of habitat or the supply of ecosystem services. This is as a result of extensive to complete modification of these features. The unnamed tributary is however considered an important aquatic ecological feature and is the focus of this section.

The unnamed tributary is a seasonal stream with a sandy substrate. The channel is dominated by *P. australis* while *C. dactylon*, *C. textilus* and *B. maritimus* were abundant. The gradient of the tributary is flat and the channel is relatively wide; approximately 5-10 meters. The most significant modifications to the channel include invasion of the riparian zone by *A. saligna* and *P. clandestinum*.

The former grows densely along the channel just upstream of the site, reducing the flow into the site.

The surrounding land-use has encroached in places up to the top of bank of the river. This includes the recent disturbance of the area when buildings on the river's southern bank were removed. The rubble and disturbed soil is evident up to the edge of the watercourse. This increases sediment loads of the stream and decreases water quality of run-off. It also facilitates further invasion of the site by *A. saligna* and *P. clandestinum*. The tributary is crossed by two roads on the site, one in the middle of the site and a second on the property's eastern boundary.

Figure 17. The unnamed tributary on the site showing the dominance of *P. australis*. *C. textilus* can also be seen and *A. saligna* is visible in the background.

Figure 18. Disturbance up till the top of bank of the unnamed tributary

Figure 19. The pipe culverts under the road across the unnamed tributary in the middle of the property

7.3. ASSESSMENT OF UNNAMED TRIBUTARY OF MOSSELBANK RIVER

The present ecological status of the unnamed tributary was determined using a Habitat Integrity (HI) Assessment and Site Characterisation. The ecological importance and sensitivity of the stream was also assessed.

7.3.1. RIVER CLASSIFICATION

In order to assess the condition and ecological importance and sensitivity of the stream, it is necessary to understand how the stream might have appeared under unimpacted conditions. This is achieved through classifying a river or stream according to its ecological characteristics, in order that it can be compared to ecologically similar rivers.

River typing or classification involves the hierarchical grouping of rivers into ecologically similar units so that inter- and intra-river variation in factors that influence water chemistry, channel type, substratum composition and hydrology are best accounted for. Any comparative assessment of river condition should only be done between rivers that share similar physical and biological characteristics under natural conditions. Thus, the classification of rivers provides the basis for assessing river condition to allow comparison between similar river types. The primary classification of rivers is a division into Ecoregions. Rivers within an ecoregion are further divided into sub-regions.

Ecoregions: groups of rivers within South Africa, which share similar physiography, climate, geology, soils and potential natural vegetation. For the purposes of this study, the ecoregional classification presented in DWAF (1999), which divides the country's rivers into ecoregions, was used. The unnamed tributary of the Mosselbank River falls within the Southern Coastal Belt Ecoregion (Table 2).

Sub-regions: sub-regions (or geomorphological zones) are groups of rivers, or segments of rivers, within an ecoregion, which share similar geomorphological features, of which gradient is the most important. The use of

geomorphological features is based on the assumption that these are a major factor in the determination of the distribution of the biota. Table 3 provides the geomorphological features of the unnamed tributary.

Table 2. Characteristics of the Southern Coastal Belt Ecoregion:

Main Attributes	Characteristics
Terrain Morphology:	Plains with low and moderate relief
Vegetation types	Variety of thicket, fynbos and renosterveld types,
Altitude	0-600 (m a.m.s.l)
MAP	200 to 1200 (mm)
Rainfall seasonality	winter
Mean annual temp.	16 to 20 (°C)
Median annual simulated runoff	150 to >250 (mm) for quaternary catchment

7.3.2. SITE CHARACTERISATION

From the Site Characterisation assessment, the geomorphological and physical characteristics of the stream can be classified as follows:

Table 3. Geomorphological and Physical features of the unnamed tributary of the Mosselbank River.

Geomorphological Zone	Lower foothill/Lowland stream
Lateral mobility	Moderately confined to unconfined
Channel form	Simple single channel – historically was a braided channel
Channel pattern	Single channel, moderate sinuosity (historically consisted of a wide multi-channel)
Channel type	Alluvial with dominant bed material being sand
Channel modification	Large scale modification as a result of surrounding land-use
Hydrological type	Seasonal
Ecoregion	Southern Coastal Belt
DWA catchment	G21E
Vegetation type	Cape Flats Sandstone Fynbos
Rainfall region	Winter

7.3.3. HABITAT INTEGRITY

The evaluation of Habitat Integrity provides a measure of the degree to which a river has been modified from its natural state. The methodology (DWAF, 1999) involves a qualitative assessment of the number and severity of anthropogenic perturbations on a river and the damage they potentially inflict upon the system. These disturbances include both abiotic and biotic factors, which are regarded as the primary causes of degradation of a river. The severity of each impact is ranked using a six-point scale with 0 (no impact), 1 to 5 (small impact), 6 to 10 (moderate impact), 11 to 15 (large impact), 16 to 20 (serious impact) and 21 to 25 (critical impact).

The Habitat Integrity Assessment is based on assessment of the impacts of two components of the river, the riparian zone and the instream habitat. Assessments are made separately for both components, but data for the riparian zone are interpreted primarily in terms of the potential impact on the instream component.

The estimated impact of each criterion is: *Rating for the criterion/maximum value (25) x weight (percent)*

The estimated impacts of all criteria calculated in this way are summed, expressed as a percentage and subtracted from 100 to arrive at an assessment of habitat integrity for the instream and riparian components

respectively. The total scores for the instream and riparian zone components are then used to place the habitat integrity of both in a specific habitat category (Table 5).

Table 4. Results for the Habitat Integrity assessment

Criteria	Score	Criteria	Score
Water Abstraction	7	Vegetation Removal	23
Flow Modification	12	Exotic Vegetation	22
Bed Modification	10	Bank Erosion	4
Channel Modification	12	Channel Modification	11
Water Quality	15	Water Abstraction	5
Inundation	5	Inundation	3
Exotic Macrophytes	5	Flow Modification	5
Exotic Fauna	1	Water Quality	9
Rubbish Dumping	14		
Instream Habitat Integrity Score	**57**	**Riparian Zone Habitat Integrity Score**	**25**
Integrity Class	**C/D**	**Integrity Class**	**E**

Table 5. Habitat Integrity categories (From DWAF, 1999)

CATEGORY	DESCRIPTION	SCORE (% OF TOTAL)
A	Unmodified, natural.	90-100
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-90
C	Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.	60-79
D	Largely modified. Large loss of natural habitat, biota and basic ecosystem functions has occurred.	40-59
E	The loss of natural habitat, biota and basic ecosystem functions is extensive.	20-39
F	Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In worst instances, basic ecosystem functions have been destroyed and changes are irreversible.	0

The instream habitat integrity of the stream is moderately to largely modified, while the riparian habitat integrity is seriously modified. A riparian strip along the banks of the river has been almost completely lost as a result of disturbances up to the top of bank of the stream. Where a riparian zone does exist, it comprises of alien *A. saligna* woodland.

7.3.4. ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The EIS assessment considers a number of biotic and habitat determinants surmised to indicate either importance or sensitivity. The determinants are rated according to a four-point scale (Table 6). The median of the resultant score is calculated to derive the EIS category (Table 7). The results of the EIS assessment are shown in Table 8.

Table 6. Definition of the four-point scale used to assess biotic and habitat determinants presumed to indicate either importance or sensitivity

Scale	Definition
1	One species/taxon judged as rare or endangered at a local scale.
2	More than one species/taxon judged to be rare or endangered on a local scale.
3	One or more species/taxon judged to be rare or endangered on a Provincial/regional scale.
4	One or more species/taxon judged as rare or endangered on a National scale

Table 7. Ecological importance and sensitivity categories (DWAF, 1999).

EISC	General description	Range of median
Very high	Quaternaries/delineations that are considered to be unique on a national and international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use.	>3-4
High	Quaternaries/delineations that are considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.	>2-≤3
Moderate	Quaternaries/delineations that are considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are not usually very sensitive to flow modifications and often have substantial capacity for use.	>1-≤2
Low/ marginal	Quaternaries/delineations that are not unique on any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

Table 8. Results of the EIS assessment

Biotic Determinants	Score
Rare and endangered biota	1
Unique biota	1
Intolerant biota	0.5
Species/taxon richness	1
Aquatic Habitat Determinants	
Diversity of aquatic habitat types or features	1
Refuge value of habitat type	2
Sensitivity of habitat to flow changes	1.5
Sensitivity of flow related water quality changes	1.5
Migration route/corridor for instream & riparian biota	2
National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs	0
EIS CATEGORY	**Moderate/low**

The ecological importance and sensitivity of the unnamed tributary is considered to be moderate to low. Although the stream is dominated by tolerant and common aquatic plant species, it does provide refuge habitat and a corridor into less developed agricultural areas. This corridor also eventually links up to the Diep River System.

8. LEGISLATIVE AND CONSERVATION PLANNING REQUIREMENTS

The construction of the proposed development needs to take cognizance of the legislative requirements, policies, strategies, guidelines and principals of the relevant regulatory documents of the City of Cape Town area, such as the Spatial Development Framework (Figure 13), the City of Cape Town's Biodiversity Network Plan (Figure 11), the River Corridor and Floodplain Management and Management of Urban Stormwater Impacts Policies, as well as the National Water Act (NWA) and the National Environmental Management Act (NEMA).

8.1. NEMA AND ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

NEMA is the overarching piece of legislation for environmental management in South Africa and includes provisions that must be considered in order to give effect to the general objectives of integrated environmental management. These provisions are contained in Section 24 (4)(a)(b) of the Act, and will be considered during the EIA process. Activities listed in terms of Chapter 5 of NEMA in Government Notice No. R. 983, 984 and 985, dated 4 December 2014, as amended, trigger a mandatory Basic Assessment, or even a full scoping EIA process, prior to development.

8.2. NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The purpose of the National Water Act, 1998 (NWA) is to provide a framework for the equitable allocation and sustainable management of water resources. Both surface and groundwater sources are redefined by the Act as national resources which cannot be owned by any individual, and rights to which are not automatically coupled to land rights, but for which prospective users must apply for authorisation and register as users. The NWA also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources.

The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21 of the NWA), which may impact on water resources through the categorisation of 'listed water uses' encompassing water abstraction and flow attenuation within catchments as well as the potential contamination of water resources, where the DWS is the administering body in this regard. Defined water use activities require the approval of DWS in the form of a General Authorisation or Water Use Licence authorisation. There are restrictions on the extent and scale of listed activities for which General Authorisations apply.

Section 22(3) of the National Water Act allows for a responsible authority (DWS) to dispense with the requirement for a Water Use Licence if it is satisfied that the purpose of the Act will be met by the grant of a licence, permit or authorisation under any other law.

GENERAL AUTHORISATION IN TERMS OF SECTION. 39 OF THE NWA

Government Notice R1199 was issued as a revision of the General Authorisations (No. 1191 of 1999) for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the NWA. The revision was published and came into effect on 2009/12/18. According to the preamble to Part 6 of the NWA, "*This Part establishes a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette...*"

The DWS should be approached for comment on the requirement that the water use aspects of the proposed activities may need to be authorised. The proposed works within wetland areas may be deemed to be changing the characteristics of the associated freshwater ecosystems and may therefore require authorization. The regulation relating to General Authorisations for Section 21 (c) and (i) water uses is currently being revised such that in future any water use activity that has a moderate to high risk of impacting on water resources will be required to apply for a water use

licence while those with a low risk of impact can be authorised in terms of the new General Authorisation. A risk assessment is undertaken in Section 10 to inform the water use authorisation process.

REGULATIONS REQUIRING THAT A WATER USER BE REGISTERED, GN R.1352 (1999)

Regulations requiring the registration of water users were promulgated by the Minister of DWA in terms of provision made in section 26(1)(c), read together with section 69 of the National Water Act, 1998. Section 26(1)(c) of the Act allows for registration of all water uses including existing lawful water use in terms of section 34(2). Section 29(1)(b)(vi) also states that in the case of a general authorisation, the responsible authority may attach a condition requiring the registration of such water use. The Regulations (Art. 3) oblige any water user as defined under section 21 of the Act to register such use with the responsible authority and effectively to apply for a Registration Certificate as contemplated under Art.7(1) of the Regulations.

8.3. CITY OF CAPE TOWN MANAGEMENT OF URBAN STORMWATER IMPACTS POLICY AND FLOODPLAIN AND RIVER CORRIDOR MANAGEMENT POLICY

In May 2009 the City of Cape Town approved policy (Management of Urban Stormwater Impacts Policy) intended to minimise the undesirable impacts of stormwater runoff from developed areas by introducing Water Sensitive Urban Design principles to urban planning and stormwater management in the Cape Town metropolitan area. In order to reduce impacts of urban stormwater systems on receiving waters, all stormwater management systems must be planned and designed in accordance with best practice criteria and guidelines laid down by Council, to support Water Sensitive Urban Design principles and the following specific sustainable urban drainage system objectives:

- Improve quality of stormwater runoff;
- Control quantity and rate of stormwater runoff; and
- Encourage natural groundwater recharge.

Also in May 2009, the City of Cape Town approved policy (Floodplain and River Corridor Management Policy) that outlines the procedure for managing development adjacent to watercourses and wetlands taking cognisance of the flood regime, aquatic and riparian ecology as well as socio-economic factors. The policy is applicable to land use, development or building or activity proposals adjacent to watercourses or wetlands. The principles regarding flood management can however also be applied to development in the vicinity of formal stormwater management systems. The objectives of this policy are to manage development in a manner that;

- Limits or reduces exposure to flood risk by avoiding hazardous, uneconomic or unwise use of floodplains, thereby protecting life, property and community infrastructure.
- Protects the natural flood carrying capacity of watercourses and wetlands.
- Protects and enhances the intrinsic value and the environmental goods and services provided by watercourses, wetlands and associated riparian areas and floodplains.

- Facilitates the beneficial integration of watercourses into the urban landscape by creating an aesthetically pleasing public resource which will ultimately allow for the social and economic up-liftment of communities adjacent to watercourses and wetlands.
- Provides an effective decision making tool for officials, developers and consultants by introducing an element of predictability with regard to applications for development along watercourses / river corridors and adjacent to wetlands.
- Promotes sustainable development from engineering, environmental and socio-economic perspectives.

9. FRESHWATER IMPACT ASSESSMENT

This section provides an assessment of the overall potential impacts to freshwater ecosystems that are likely to be associated with the proposed redevelopment of Portion 32 of Farm 168.

IMPACT - LOSS OF AQUATIC HABITAT AND ASSOCIATED BIOTA

Some loss of aquatic habitat can be expected as a result of the proposed development. In the current proposed layout plan, the river corridor and associated wetland areas will fall largely within the public open space (Figure 3).

SIGNIFICANCE OF IMPACTS WITHOUT MITIGATION: A localised negative impact of **Medium to Low** significance could be expected if without mitigation. This is due to the fact that limited construction activities are likely to take place within the stream corridor as it is set aside as public open space. Significant rehabilitation works will however need to take place in the corridor.

PROPOSED MITIGATION:

- An ecological stream corridor through the development that is approximately 75 to 80m wide which allows for the stream with a 30m buffer on either side (Figure 20) and is primarily vegetated with local indigenous vegetation (Appendix D) should be established and maintained within the development that allows for the protection of aquatic habitat within the site;
- As part of the redevelopment of the site, the rubble from demolished buildings on the property should not be dumped in the riparian/ buffer zone. The building rubble should be crushed and the levelled within the footprint of the old building. Any hazardous waste (should any still be found on the site), metal or plastic should be removed from the site and appropriately disposed of at an approved waste disposal site. The site should be covered with top soil. Disturbed areas or areas where the soil is left bare are typically invaded by alien vegetation. These areas should be revegetated with appropriate indigenous vegetation. Alien vegetation which recruits in the disturbed area should be removed;
- The stream and its ecological corridor/buffer zone should be treated as “no-go” areas during the construction phase and appropriately demarcated as such. No vehicles, machinery, personnel, construction material, spoil material, fuel, oil, bitumen or waste should be allowed into these areas except for the approved rehabilitations work in these areas as well as the construction of

infrastructure associated with the proposed and approved development – these works should be undertaken according to an approved method statement and under the supervision of the ECO;

- Drainage of water through the site is largely via the lowest point which is located along the river corridor. It is thus recommended that adequate stormwater management measures (such as the use of swales and permeable surfaces to encourage infiltration) should be put into place as far as possible to reduce the water quality impacts of the stormwater on the downstream aquatic ecosystems. The potential exists that a functional wetland area could be created within the stormwater management areas to offset any loss of aquatic habitat as well as enhance the mitigation of the stormwater before it is potentially discharged into the stream. The stormwater pond feature could be incorporated into ecological/stream corridor through the development;
- The site office and construction camp; fuel storage, refuelling, vehicle maintenance or vehicle depots; or toilets should be allowed within should be located at least 50 m from the stream;
- Freshwater ecosystems located in close proximity to the site should be inspected on a regular basis (but especially after rainfall) by the ECO for signs of disturbance, sedimentation and pollution – these inspections should form part of every site inspection carried out by the ECO. If signs of disturbance, sedimentation or pollution are noted, immediate action should be taken to remedy the situation and, if necessary, a freshwater ecologist should be consulted for advice on the most suitable remediation measures; and
- The buffer and the aquatic habitat should be kept clear of alien vegetation.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION: With mitigation measures the above should result in a **Low Negative** impact over the long term.

Nature	Loss of aquatic habitat and associated biota		Status	-
Impact source(s)	Construction of site and longer term activities on-site			
Impacted aquatic ecosystem	Water course and riparian zone of unnamed tributary of the Mosselbank River			
Magnitude	*Extent*	Local		
	Intensity	Medium		
	Duration	Short to long term		
	Reversibility	Irreversible		
	Probability	Definite		
Significance	*Without mitigation*	Medium to low		M/L
	With mitigation	Low		L
Confidence	High			

IMPACT – FACILITATED INVASION OF RIPARIAN HABITAT

Disturbance within the riparian zone of the unnamed tributary could facilitate the further invasion of the site by alien vegetation such as *A. saligna*, *P. clandestinum* and *E. plantagineum*.

SIGNIFICANCE OF IMPACTS WITHOUT MITIGATION: A localised negative impact of **Medium** to **Low** Significance could be expected if without mitigation.

PROPOSED MITIGATION:

- A buffer zone of 30 meters from the top of each bank of the stream should be maintained. This ecological corridor should be kept clear of alien vegetation using recommended alien vegetation

clearing methods as provided by the Working for Water Programme and landscaped and revegetated with appropriate vegetation; indigenous to the catchment (See Appendix D).

SIGNIFICANCE OF IMPACTS AFTER MITIGATION: With mitigation measures the above should result in a **Low** positive impact over the long term.

Nature	Facilitated invasion of riparian habitat		Status	-
Impact source(s)	Construction of site and longer term activities on-site			
Impacted aquatic ecosystem	Water course and riparian zone of unnamed tributary of the Mosselbank River.			
Magnitude	*Extent*	Local		
	Intensity	Medium		
	Duration	Short to long term		
	Reversibility	Reversible		
	Probability	Likely		
Significance	*Without mitigation*	Medium to Low		M/L
	With mitigation	Low positive		L +
Confidence	High			

IMPACT - FLOW MODIFICATION

The hardening and infilling of the surfaces within the proposed development has the potential to increase the intensity and pattern of the surface water flow within and leaving the site. Any infrastructure associated with the proposed development also have a potential to impact on the flow/hydraulics within the stream.

SIGNIFICANCE WITHOUT MITIGATION: This potential impact is of **Low** significance

PROPOSED MITIGATION:

- The intensity of the stormwater runoff should be reduced within the development as per City policy before it is discharged into the upper Mosselbank River System. There should thus be no direct point source discharge of stormwater into the stream. The buffer zone could potentially be used to incorporate stormwater management measures that would capture run-off and regulate flow into the unnamed tributary and eventually into the Mosselbank River as recommended in the mitigation measures for potential aquatic habitat loss; and
- If possible, the existing low-level crossings should be utilised and should not be significantly changed in order to minimise disturbance of the water courses bed and banks. The current drainage through the crossings comprises of 12 pipe culverts each with a diameter of ~1m. If the crossings need to be upgraded then the new drainage through the crossing should not allow less flow than the current culvert structures. No additional crossings should be constructed.

SIGNIFICANCE AFTER MITIGATION: **Low Negative** significance.

Nature	Modification of flow		Status	-
Impact source(s)	Construction of site and longer term activities on-site			
Impacted aquatic ecosystem	Unnamed tributary on the site			
Magnitude	*Extent*	Local		
	Intensity	Medium		

	Duration	Long term	
	Reversibility	Partially reversible	
	Probability	Highly Probable	
Significance	*Without mitigation*	Low	L
	With mitigation	Low	L
Confidence	Medium to high		

IMPACT - WATER QUALITY IMPAIRMENT

There is a potential during the construction phase of the light industrial development for some impairment of the surface water quality to occur. Longer term water quality impacts could occur that are associated with runoff from the proposed development.

SIGNIFICANCE OF IMPACTS WITHOUT MITIGATION: **Medium** to **Low** negative impact

PROPOSED MITIGATION:

- Construction activities should preferably take place during the drier, low rainfall months to reduce the potential for contaminated runoff from the construction activities on the site. Should this not be possible measures should be put in place (such as the construction of a berm) to prevent runoff from the construction activities from discharging directly into downstream aquatic features. Monitoring and management of the on-site construction activities should be according to an approved Environmental Management Plan for the project.
- After the construction phase, the proposed buffer area should be established. On-site stormwater management measures (such as the use of swales and permeable surfaces to encourage infiltration) should be put into place as far as possible to reduce the water quality impacts of the stormwater on the downstream aquatic ecosystems. A pre-treatment area should also be included in the stormwater management area to reduce the sediment and remove litter in the stormwater before it is discharged into the stream. These pre-treatment areas should be regularly maintained.
- No discharge of effluents or polluted water shall be allowed into the stream;
- Sediment trapping measures (e.g. silt curtains, cut-off trenches and/or settlement sumps) should be placed down-slope of areas that are cleared, to minimise sediment runoff into freshwater ecosystems. The use of sediment-trapping measures is particularly important for construction activities undertaken during the wet season (i.e. May – October). A Method Statement should be drawn up before construction begins, setting out the exact measures that are proposed to be used. This Method Statement should be subject to the approval of the ECO and should be implemented under the guidance of the ECO; and
- If construction areas are to be pumped of water (e.g. after rains), this water must be pumped into an appropriate settlement area, and not allowed to flow into the stream.

SIGNIFICANCE OF IMPACTS AFTER MITIGATION: Provided that the mitigation measures are effectively implemented the water quality impacts of the development should be a **Low Negative** significance.

Nature	Impairment of water quality in the runoff from the development site	Status	-
Impact source(s)	Construction of site and longer term activities on-site		
Impacted aquatic ecosystem	Unnamed tributary of the Mosselbank River.		
Magnitude	*Extent*	Local	
	Intensity	Medium	

	Duration	Short to long term	
	Reversibility	Reversible	
	Probability	Probable	
Significance	*Without mitigation*	Medium to Low	M/L
	With mitigation	Low	L
Confidence	Medium to high		

CUMULATIVE IMPACTS

The unnamed tributary within the site as well as the larger upper reaches of the Mosselbank River have in general already been significantly modified state as a result of past and ongoing land use activities that has been largely of an agricultural nature. This area is rapidly becoming urbanised and the larger river system has changed from being seasonal to becoming permanently flowing as a result of treated wastewater and stormwater discharges. As a result, it is important that at least the River Corridor and Floodplain Management and Management of Urban Stormwater Impacts Policies (2009) of the City of Cape Town are implemented within the development sites in the catchment.

In particular, it is important that a river corridor be allowed for within the developments adjoining the river system and its tributaries that will both buffer the river from the surrounding impacts and facilitate the movement of water and biota. This aspect has been taken up in the proposed layout for the development. It can however be expected that even with the implementation of the recommended mitigation measures, there will be some localised negative impacts that cumulatively are of a medium to low significance over the short and long term.

Nature	Overall ecological integrity of aquatic ecosystems		Status	-
Impact source(s)	Cumulative impact from the construction and operation of site			
Impacted aquatic ecosystem	Unnamed tributary of the Mosselbank River			
Magnitude	*Extent*	Local		
	Intensity	Medium		
	Duration	Short and longer term		
	Reversibility	Irreversible		
	Probability	Definite		
Significance	*Without mitigation*	Medium		M
	With mitigation	Medium to Low		M/L
Confidence	Medium to high			

10. RISK ASSESSMENT

The DWS is in the process of finalising a “Risk Assessment Matrix” to determine the risks associated with each respective water use. The Risk Assessment Matrix has been developed with identified State Owned Companies to assist with the determination of risks associated various proposed water use activities. Based on the outcome of the Risk Assessment Matrix, LOW risk activities will be generally authorised with conditions, while moderate to high risk activities will be required to go through a Water Use Licence Application Process. Water use activities that are authorised in terms of the General authorisations will still need to be registered with the DWS.

The Risk Assessment Matrix as distributed in December 2014 by the DWS has been used in the assessment of the risk posed to the aquatic ecosystems for the proposed road upgrade. The full Risk Assessment Matrix is attached in Appendix C. The proposed activities pose the following risks to the aquatic ecosystems for each of the activities:

Table 9. Risk assessment for the proposed development on the freshwater features in the area

Phases	Activity	Aspect	Impact	Significance	Risk Rating
Construction	Construction works associated with the development	Construction/upgrading of the bridge through river	Loss of biodiversity & habitat; impeding the flow; water quality impacts	36	L
		Construction phase activities associated with development adjacent to river		72	M
Operation	Operational activities associated with the development	Maintenance of infrastructure through stream and ongoing disturbance associated with development		72	M

*Low risk rating = Significance score of ≤55; Moderate risk rating = Significance score of 56-169

The risk associated with the shorter term construction and longer term maintenance related activities is thus deemed to be moderate to low provided that the mitigation measures as recommended in the freshwater report and included in the attached risk assessment matrices (Appendix C) are implemented. It is however highly likely that even with mitigation some permanent impact on the stream could be expected. The instream habitat is currently in a moderately to largely modified ecological state while that of the riparian habitat is critically modified. There is the potential, given the current ecological state, that the riparian habitat could be slightly improved such that the overall ecological state of the stream remains in a largely modified ecological condition.

11. RECOMMENDATIONS FOR MAINTENANCE AND MANAGEMENT

Maintenance and management of the unnamed tributary of the Mosselbank River within the property can be divided into that which is required immediately to rehabilitate the river corridor and minimise the impact of the proposed development of the site on the stream and the longer term maintenance activities.

SHORT TERM MAINTENANCE AND MANAGEMENT ACTIVITIES:

Short term maintenance and management of unnamed tributary of the Mosselbank River that are associated with the proposed project consist of the following:

- Rehabilitation of the riparian zone and buffer area within the site;
- Establishment of an ecological stream corridor through the development that is approximately 75 to 80m wide which allows for the stream with a 30m buffer on either side;
- and
- Upgrade to the existing road crossing through the stream.

Recommended Methods:

Rehabilitation of the riparian zone and proposed buffer areas:

- An ecological stream corridor through the development that is approximately 75 to 80m wide which allows for the stream with a 30m buffer on either side should be established within the site in which no hard structures should be constructed.
- Any rubble from demolished buildings on the property should not be dumped in the riparian/ buffer zone and the existing rubble should be removed from this area.
- The disturbed riparian zone/buffer area should be covered with top soil and shaped to resemble ground levels of the surrounding stream banks and then revegetated with appropriate indigenous vegetation as listed in Appendix D of this report.
- Alien vegetation which recruits in the disturbed area, and in particular *Acacia saligna, Echium plantagineum* and *Pennisetum clandestinum*, should be removed/weeded according to acceptable alien vegetation control methods such as those provided by the Working for Water Programme.
- Larger machinery, such as diggers or bulldozers, should not be operated within the buffer zone to remove alien vegetation.

Road crossings:

- The existing low-level crossing should preferably be utilised and upgraded but should not be significantly changed in order to minimise disturbance of the water courses bed and banks.
- The upgraded crossing should not allow less flow through the structure than the current one.
- No additional crossings should be constructed.

LONG TERM MAINTENANCE AND MANAGEMENT ACTIVITIES:

Longer term maintenance and management activities associated with the proposed project includes the regular monitoring and maintenance of unnamed tributary of the Mosselbank River within the property to ensure that:

- The river channel does not become blocked with sediment, debris or nuisance vegetation growth;
- No erosion of the upgraded river channel occurs;
- The vegetation within the river channel and riparian zone is properly established and remains clear of invasive alien plants; and
- Weeds, alien species and undesirable species such as *Typha* do not grow within wetland area.

Recommended Methods:

- The disturbance of aquatic habitats associated with the maintenance works should be limited (both temporal and spatial extents) as far as possible.
- Care should be taken to minimize the sedimentation that would be caused downstream of the works.

- Work should preferably be undertaken by hand with no machinery driven into aquatic habitats.
- Activities associated with the maintenance work should be undertaken during the low flow period before the onset of the winter high flows.
- Soil, debris and nuisance plant growth removed from the river channel and associated areas should not be dumped within the immediate areas surrounding the aquatic habitats or any indigenous vegetation removed from the site. Removed soil could be used to fill eroded areas.

12. CONCLUSIONS AND RECOMMENDATIONS

The instream habitat of the unnamed tributary of the Mosselbank River is considered to be in a moderately to largely modified ecological state whilst the riparian habitat is considered to be in a critically modified state. The stream is still however considered to be of a moderate ecological importance and sensitivity due to the fact that it still provides a link / corridor to the larger Mosselbank and Diep River System. The potential impacts of the proposed activity are the facilitated invasion by alien flora, modification to flow and impaired water quality. These can be mitigated by the following proposed measures:

Buffer along the unnamed tributary: The primary concern of the proposed development, from a freshwater ecology perspective, is potential impact of the development on the unnamed tributary of the Mosselbank River which transects the property and its reduced ecological integrity. It is proposed that this stream be given a minimum buffer of 30m from the top of each bank of the river which equates to an ecological stream corridor through the development of approximately 75 to 80m wide. This buffer represents an area which should be suitably vegetated and where no hard structures should be constructed. No soil, rubble or any other material should be moved, disturbed or dumped within the buffer zone. Existing rubble within the buffer area should also be removed. Areas within the proposed buffer zone where soil/material has already been disturbed should be revegetated with appropriate indigenous vegetation. The aim of the buffer zone is to maintain an ecological corridor and protect the water course from the impacts of surrounding industrial development. The buffer zone should also be kept free of alien vegetation and in particular Acacia saligna, Echium plantagineum and Pennisetum clandestinum. Larger machinery, such as diggers or bulldozers, should not be operated within the buffer zone to remove alien vegetation.

Figure 20. Proposed buffer of 30m from the top of the each bank of the unnamed tributary

Appropriate decommissioning of existing infrastructure and site rehabilitation: As part of the redevelopment of the site, the rubble from demolished buildings on the property should not be dumped in the riparian/ buffer zone and the existing rubble should be removed from this area. The building rubble should be crushed and the levelled within the footprint of the old building. Any hazardous waste, metal or plastic should be removed from the site and appropriately disposed of at an approved waste disposal site. The site, outside of the development footprint, should be covered with top soil. Disturbed areas or areas where the soil is left bare are typically invaded by alien vegetation. These areas should be revegetated with appropriate indigenous vegetation. Alien vegetation which recruits in the disturbed area should be removed or weeded.

Road crossings: A road crossing is proposed across the unnamed tributary within the property. If possible, the existing low-level crossing should be utilised and upgraded but should not be significantly changed in order to minimise disturbance of the water courses bed and banks. The current drainage through the crossing comprises of 12 pipe culverts each with a diameter of ~1m. The upgraded crossing should not allow less flow through the structure than the current one. No additional crossings should be constructed.

The Department of Water and Sanitation will need to be approached with regards to the need for a water use authorisation for upgrading the crossings within the site. The risk associated with the shorter term construction and longer term maintenance related activities are deemed to be moderate to low provided that the mitigation measures are implemented. It is however highly likely that even with mitigation some permanent impact on the stream could be expected. The instream habitat is currently in a moderately to largely modified ecological state while that of the riparian habitat is critically modified. There is the potential, given the current ecological state, that the riparian habitat could be slightly improved such that the overall ecological state of the stream remains in a largely modified ecological condition.

13. REFERENCES

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APPENDIX A: DECLARATION OF INDEPENDENCE

I, Antonia Belcher, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act;
- have and will not have no vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favorable to the applicant or not; and
- am aware that a false declaration is an offence.

Signature of the specialist: 

Date: 22 December 2015

APPENDIX B: BACKGROUND AND QUALIFICATIONS OF SPECIALIST CONSULTANT

Contact details: PO Box 455, Somerset Mall, 7137

Name: Antonia Belcher

Profession: Aquatic Scientist (Pr. Nat. Sc. 400040/10)

Fields of Expertise: Specialist in river and wetland monitoring and reporting

Relevant work experience:

Due to my involvement in the development and implementation of the River Health Programme as well as the Resource Directed Measures directorate of the Department of Water Affairs in the Western Cape, I have been a key part of the team that has undertaken six catchment or area wide 'state-of-river' assessments as well as routine monitoring and specialized assessments of rivers and wetlands in all the major catchments for the Western Cape. In the past eight years, I have undertaken numerous freshwater assessments as input into both the environmental authorization and water use authorization process throughout the Western Cape as well as greater Southern Africa.

Papers and Publications:

More than 200 publications, papers and posters relating mostly to water resource quality and river health assessments in South African rivers and their management.

Recent projects that she has been involved in are:

- Classification of Water Resources in the Olifants-Doorn Water Management Areas, Department of Water Affairs;
- Development and piloting of a National Strategy to Improve Gender Representation in Water Management Institutions, where the focus is on improving the capacity to participate in water related decision making, Department of Water Affairs and Forestry;
- Compilation of a background document as well as a framework management plan towards the development of an integrated water resources management plan for the Sandveld;
- Specialist on the City of Cape Town project: Determination of additional resources to manage pollution in storm water and river systems;
- River Health Programme monitoring for the Free State Region, Department of Water Affairs; and
- Framework for Education and Training in Water (FETWATER), Resource Directed Measures Network partner which has undertaken training initiatives on environmental water requirements in the SADC region.

APPENDIX C: RISK ASSESSMENT MATRIX FOR THE PROPOSED PROJECT

ASPECTS AND IMPACT REGISTER/RISK ASSSESSMENT FOR WATERCOURSES INCLUDING RIVERS, PANS, WETLANDS, SPRINGS,DRAINAGE LINES
COMPILED BY: Toni Belcher, BlueScience
PROJECT: FISANTEKRAAL INDUSTRIAL DEVELOPMENT

					Severity																
Nr.	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+ Vegetation)	Biota	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures	Borderline LOW MODERATE Rating Classes	Type Watercourse
1	Construction	Construction works associated with the development	Construction/upgrading of the bridge through river	Loss of biodiversity & habitat; impeding the flow; water quality impacts	1	1	1	1	1	1	1	3	1	4	5	2	12	36	L	If possible, the existing low-level crossings should be utilised and should not be significantly changed in order to minimise disturbance of the water courses bed and banks. The current drainage through the crossings comprises of 12 pipe culverts each with a diameter of ~1m. If the crossings need to be upgraded then the new drainage through the crossing should not allow less flow than the current culvert structures. No additional crossings should be constructed.		
			Construction phase activities associated with development adjacent to river		2	2	2	2	2	2	2	6	1	4	5	2	12	72	M	Construction activities should preferably take place during the drier, low rainfall months to reduce the potential for contaminated runoff from the construction activities on the site. Should this not be possible measures should be put in place (such as the construction of a berm) to prevent runoff from the construction activities from discharging directly into downstream aquatic features. Monitoring and management of the on-site construction activities should be according to an approved Environmental Management Plan for the project. An ecological stream corridor through the development that is approximately 75 to 80m wide and primarily vegetated with local indigenous vegetationshould be established and maintained within the development that allows for the protection of aquatic habitat within the site. The buffer zone could potentially be used to incorporate stormwater management measures that would capture run-off and regulate flow into the unnamed tributary and eventually into the Mosselbank River as recommended in the mitigation measures for potential aquatic habitat loss. The stream and its ecological corridor/buffer zone should be treated as "no-go" areas during the construction phase and appropriately demarcated as such. No vehicles, machinery, personnel, construction material, spoil material, fuel, oil, bitumen or waste should be allowed into these areas except for the approved rehabilitations work in these areas as well as the construction of infrastructure associated with the proposed and approved development – these works should be undertaken according to an approved method statement and under the supervision of the ECO. As part of the redevelopment of the site, the rubble from demolished buildings on the property should not be dumped in the riparian/ buffer zone. The building rubble should be crushed and the levelled within the footprint of the old building. Any hazardous waste, metal or plastic should be removed from the site and appropriately disposed of at an approved waste disposal site. The site should be covered with top soil. Disturbed areas or areas where the soil is left bare are typically invaded by alien vegetation. These areas should be revegetated with appropriate indigenous vegetation. Alien vegetation which recruits in the disturbed area should be removed. The site office and construction camp; fuel storage, refuelling, vehicle maintenance or vehicle depots; or toilets should be allowed within should be located at least 50 m from the stream. Freshwater ecosystems located in close proximity to the site should be inspected on a regular basis	It is highly likely that even with mitigation some permanent impact on the stream could be expected. The instream habitat is currently in a moderately to largely modified ecological state while that of the riparian habitat is critically modified. There is the potential, given the current ecological state, that the riparian habitat could be slightly improved such that the overall ecological state of the stream remains in a largely modified ecological condition.	Stream
	Operation	Operational activities associated with the development	Maintenance of infrasture through stream and ongoing disturbance associated with development		1	1	1	1	1	1	4	6	4	1	5	2	12	72	M	After the construction phase, the proposed buffer area should be established. The buffer and the aquatic habitat should be kept clear of alien vegetation. On-site stormwater management measures (such as the use of swales and permeable surfaces to encourage infiltration) should be put into place as far as possible to reduce the water quantity and quality impacts of the stormwater on the downstream aquatic ecosystems. A pre-treatment area should also be included in the stormwater management area to reduce the sediment and remove litter in the stormwater before it is discharged into the stream. These pre-treatment areas should be regularly maintained. No discharge of effluents or polluted water shall be allowed into the stream.		

APPENDIX D: PLANT LIST

PLANT LIST FOR REVEGETATION OF THE MOSSELBANK TRIBUTARY

Table D1 provides a list of the plants that could potentially be used for the revegetation of the Mosselbank Tributary. This list is based on an understanding of what would naturally have occurred along the stream banks. The riparian lateral zonal habitats where the plants are most suited is also indicated. Where possible, local seed or cuttings should be utilised to cultivate the plants to prevent translocation of plant species from other catchments.

Table D1. Revegetation of the Mosselbank Tributary

Species	Common name	Riparian Lateral Zone*
Amaryllis belladonna	belladonna lily, march lily	TS, BD, DT
Carpobrotus acinaciformis	strandvy	BD, DT
Chrysanthemoides monilifera	bietou	TS, BD, DT
Cliffortia strobilifera	bog rice bush, kammie-rysbos	WE, WS
Commelina africana	yellow wandering jew, geeleendagsblom	WE
Cynodon dactylon	common couch grass, fynkweek	BD, DT
Cyperus textilis	tall star sedge, matjiesgoed	WE, WS
Euclea racemosa	ghwarrie	TS, BD, DT
Ficinia nodosa	stembract club-rush	WE, WS
Helichrysum patulum	kooigoed	BD, DT
Isolepis prolifera	vleigras	WE
Juncus acutus	spiny rush	WE
Juncus kraussii	matting rush	WE
Juncus lomatophylus	stream sedge	AM, WE
Leonotis leonurus	wild dagga	TS, BD, DT
Passerina corymbosa	common ganna, sand gonnabos	TS, BD, DT
Phragmites australis	fluitjiesriet	WE
Pelargonium capitatum	rose-scented geranium	BD, DT
Salix mucronata ssp *capensis*	Cape bush willow	WE
Salvia africana-lutea	golden sage, bruin salie	BD, DT
Salvia lanceolata	rusty sage, lance-leaf sage, rooisalie	BD, DT
Searsia angustifolia	taaibos	TS, BD, DT
Searsia glauca	taaiblaar	TS, BD, DT
Searsia tomentosa	bicoloured currant	TS, BD, DT
Seriphium plumosum	slangbos	BD, DT
Wachendorfia thyrsiflora	butterfly lily, rooikanol	WE, WS
Watsonia meriana	bulbil or marsh watsonia, suurkanol	WE, WS
Zantedeschia aethiopica	arum lily	WE, WS, TS, BD, DT

* *See Figure D1*

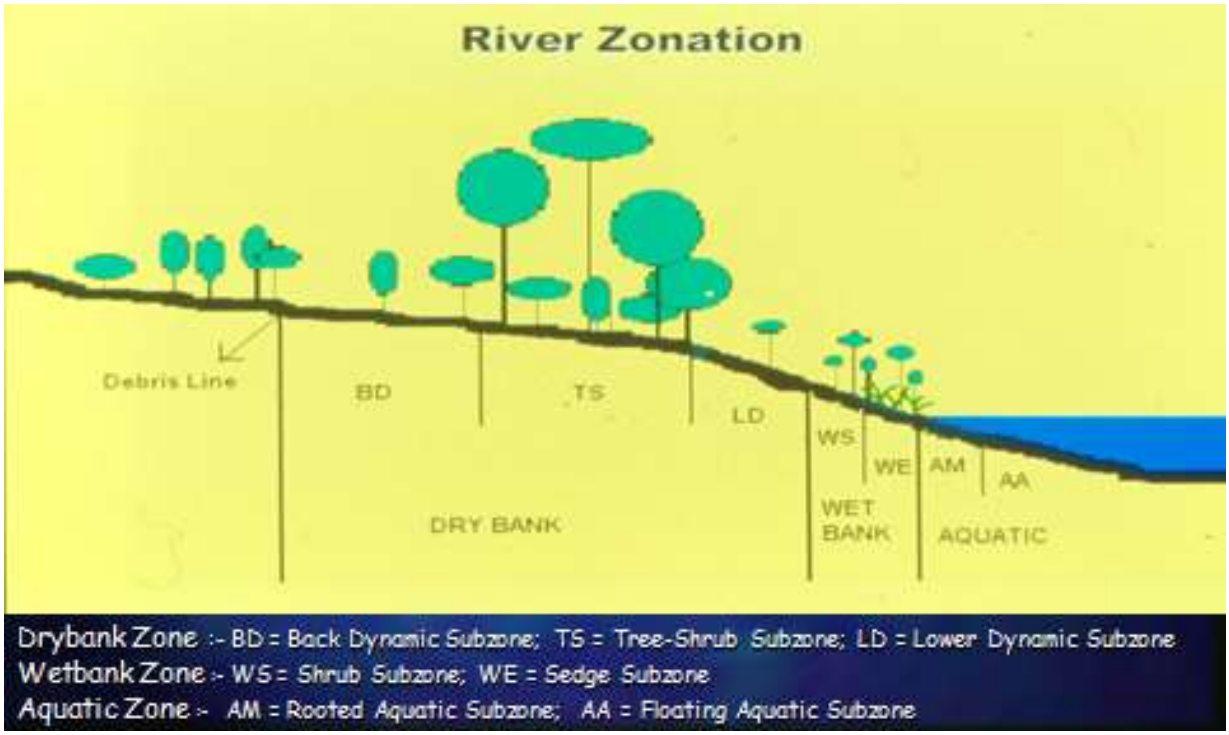

Figure D1. Natural Lateral vegetation zones found in South African rivers (Boucher, 2000)