

CHAPTER FIVE: ECOLOGICAL SPECIALIST ASSESSMENT

5.1 INTRODUCTION

This chapter of the report presents the findings of the Aquatic Specialist Assessment conducted by Mr Brian Colloty (Scherman Colloty & Associates (SC&A)), as well as the Vegetation Specialist Assessment undertaken by Ms Marisa Jacoby (Public Process Consultants). The respective specialist assessments aim to assess the potential impact of the proposed rezoning of Phase 5 and 6, Erf 1082 Fairview, NMBM, from Residential 2 (Private Open Space and Transportation (access)) to Special Purposes (High Tech/ Industrial Business Park and Transportation (roads)). In particular the advantages and disadvantages which the proposed amendment would have on the biophysical environment. The specialists have also included measures to ensure avoidance, management and mitigation of impacts associated with the proposed change, where applicable.

5.2 TERMS OF REFERENCE

With consideration to impacts on the biophysical environment, the EIA Amendment Application Process requires that the following aspects be considered from an aquatic and vegetation perspective:

- Assessment of all impacts related to the proposed change of land use;
- Advantages and disadvantages associated with the proposed change; and
- Measures to ensure avoidance, management and mitigation of impacts associated with the proposed change.

The Aquatic Specialist Assessment to Include:

The following scope of work was used as the basis of this study, to fulfil the above requirements:

- An Aquatic Specialist Assessment of the study area. This covers the site footprint in relation to the wetland and riparian ecosystems functioning within the region.
- A site visit regarding present state assessment of surface water bodies in the area.
- A map demarcating the relevant local drainage area of the respective wetland/ s, i.e. the wetland, its respective catchment and other wetland areas within a 500m radius of the study area. This will demonstrate, from a holistic point of view the connectivity between the site and the surrounding regions, i.e. the zone of influence.
- The maps depicting demarcated riparian areas delineated to a scale of 1:10 000, following the methodology described by the DWAF (2005), together with a classification of said areas, according to the methods contained in the latest National Wetland Classification System (Ollis *et al.* 2013).
- The determination of the ecological state of any watercourses, estimating their biodiversity, conservation and ecosystem function importance with regard ecosystem services and linkages to other systems, as well as the impacts of the proposed change in rezoning on these systems.
- Identify the advantages and disadvantages of potential environmental impacts, as a result of the proposed project changes in terms of acceptable impact assessment methodology provided by Public Process Consultants.
- Provide mitigations regarding project related impacts (proposed changes), including engineering services that could negatively affect demarcated wetland/ riverine areas.
- Supply the client with geo-referenced GIS shape files of the wetland/ riverine areas.
- Provide one Draft Report for comment, with a maximum of two rounds of comments addressed.

The primary aim of the aquatic assessment is to assess the impacts that the proposed rezoning changes would have on a tributary associated with the Baakens River. (Figure 5.1). The tributary is located immediately north of Phase 5 and 6 and eventuates into the Baakens River. In May 2008,

the 1:100-year floodline for this tributary was determined by the project engineers, Hatch, and all development was proposed outside of the 1:100-year floodline.



Figure 5.1: Development boundary (red) and the delineated systems, inclusive of the defined buffers.

The proposed changes to Phase 5 and 6 must be addressed through an Amendment Application made in terms of Sections 31 and 32 of the NEMA EIA Regulations 2014 (as amended). SC&A was tasked to assess the advantages and disadvantages of the proposed change in rezoning on the aquatic environment, specifically on the riverine corridor associated with the Baakens River.

Present Ecological State (PES) of any natural aquatic systems outside of the development footprint, as well as within a 500m radius of the site needs to be determined. This was based on information collected during a site visit conducted in July 2018. This report would also form part of any documentation for a Water Use License Application (WULA) as required, by the National Department of Water and Sanitation (DWS). *A WULA would be required only if any of the proposed activities are located within the 1:100-year flood line and or riparian zones.*

The Vegetation Specialist Assessment to Include:

- Conduct a review of the previous vegetation assessment conducted during the Environmental Impact Assessment.
- Conduct a site visit to determine any changes to the state of the environment since the EIA was undertaken and present.
- Provide relevant site photographs and mapping to depict the vegetation on site.
- Review the impacts previously identified and identify the advantages and disadvantages of potential environmental impacts, as a result of the proposed project changes in terms of acceptable impact assessment methodology provided by Public Process Consultants.
- Provide mitigations regarding project related impacts (proposed changes) that could negatively affect the biophysical environment.

5.3 PROJECT DESCRIPTION

The project applicant, Fairview Suburban Estates Co. (Pty) Ltd, proposes to rezone Phase 5 and 6, Erf 1082, Fairview, which is currently zoned as Residential 2 (Private Open Space and Transportation (access)), to Special Purposes (~7.23ha) and Transportation (roads; ~0.96ha). The area proposed for rezoning measures ~8.19ha (~81993m²). The Special Purposes rezoning would allow for the construction of, inter alia, retail, offices, warehousing incidental to retail and high-tech industrial use – no noxious use. The Amendment Application is to proceed in line with Metroplan drawing number 16007_Fai – 08 Rev3, 02/11/2018 (see Figure 5.2 below).

As part of the Amendment Application, the area that is currently zoned Private Open Space of ~0.52ha, will be lost. In addition, as part of the Town Planning Application, a request has been submitted to relax 30% of the area to be set aside for landscaping, and to relax the rear and side 5m building line to 2.5m. Internal roads are proposed to be 12 to 15m wide. Thus, it is anticipated, that based on the proposed changes there will be an increase in the hard surfaces and, therefore, some increase in stormwater runoff. The management thereof will be critical in mitigating the impact on the adjacent riverine system associated with the Baakens River.

As per Figure 5.2 below, the Residential 2 zoning provided three (3) discharge points north of Phase 5 and 6, two (2) of which would discharge into the Open Space Area north of Phase 5 and 6, and immediately adjacent to the 1:100-year floodline of the riverine corridor associated with the Baakens River, the third (3rd) would discharge at the north eastern corner of the site.



Figure 5.2: Locality map indicating Phase 5 and 6 (purple outline; Residential 2 zoning), in relation to the 1:100-year floodline (blue outline).

In terms of the current approved zoning, all of the existing vegetation on the site (Phase 5 and 6) would be cleared to allow for the construction of the houses, roads and Private Open Space areas. **This would still be the case, should the zoning of the site be changed as proposed.**

The project engineers have indicated that the rezoning of Phase 5 and 6 would entail the following changes to the onsite stormwater management:

- “The rezoning of the area from residential to special purposes will increase the hard surfaces which will result in shorter times of concentration in major storm events, thus increasing the stormwater runoff from the area under consideration.
- The minimal additional flows generated from the rezoning will not noticeably affect the 1:100-year flood line previously determined.
- ...an additional 0.7 m³/s will be generated for both the 1:50 and 1:100-year storm events.

- *The rezoning will have no effect on the 1:00 year floodline previously determined as the additional runoff is negligible.*
- *The stormwater system will be designed such that minor storms (1 in 2-year event) will be piped (maximum pipe size 450mm) and major storms will be accommodated in the road reserves and through open spaces.*
- *Stormwater generated from erven 1 to 10 inclusive (28,266m²) will discharge directly into the adjacent water course thus reducing the concentration of stormwater runoff at the proposed stormwater outlet situated in the road reserve between erven 10 and 11.*
- *The outlet from the piped system and stormwater accommodated within the road reserves, will be provided with scour protection measures to prevent erosion.”*

The following biophysical impacts were previously identified and assessed as part of the previous EIA for the whole of Erf 1082. Only those impacts which are deemed to possibly have had relevance to Phase 5 and 6 are indicated below:

Construction Phase Direct Impacts

Direct Loss of Riparian Vegetation along Baakens River Drainage Lines

Nature of the Impact	The proposed development is unlikely to directly affect the riparian zone and Baakens Forest Thicket since no development is planned for the area within the Baakens River valley.
Extent	Localised (site)
Duration	Temporary
Intensity	Low
Probability	Probable
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Low Positive (+)
Mitigation	<ul style="list-style-type: none"> • No construction activities to occur in riparian areas. • Open Space area must be demarcated and retained. • An Alien Clearing Plan must be implemented along the Baakens River banks. • An Open Space Management Plan to be implemented.
Significance and Status (with mitigation)	Medium Positive (+)
Residual Impact	None, if riparian areas are avoided.

Destruction of Habitat for Plant Species of Special Concern (SSC) within the Development Footprints

Nature of the Impact	Vegetation clearing will take place within the proposed development footprints and construction areas (roads, material lay-down area, soil stockpiles), and vegetation disturbance may occur due to increased pedestrian and vehicle traffic. These activities will destroy potential habitat for plant SSC. Development will result in loss of habitat containing SCC in Lorraine Transitional Grassy Fynbos, where development will occur.
Extent	Site specific (footprint) - The impact will be limited to the actual development footprints and designated construction area on site. Existing areas of indigenous vegetation and drainage lines outside the development footprint will not be cleared.
Duration	Permanent - The vegetation cleared for the development footprints will be permanent. The vegetation will be replaced by development infrastructure and ornamental gardens.
Intensity	High - The development footprint will be completely altered.
Probability	Definite - The clearing of vegetation for the development footprints will definitely occur.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	High Negative (-) - The transformed portions of the site represent important natural habitat for SCC.

Mitigation	<ul style="list-style-type: none"> • Conserve intact indigenous vegetation outside the development footprints as habitat for SSC. • Demarcate No-Go and Open Space areas and fence off before construction commences. • Limit disturbance to intact natural habitat by clearly demarcating and signposting construction areas; including access roads, haul roads, materials lay-down areas, soil stockpile areas, site office and workers rest areas. • Clearly demarcate the No-Go areas for development on affected even prior to construction commencing. • The construction lay-down area for the individual stands should be contained within the demarcated areas and not encroach onto Open Space areas. • Undertake environmental education of workers and personnel to notify them of the need to avoid disturbance to natural vegetation on site, as well as erect informative signage.
Significance and Status (with mitigation)	Medium Negative (-) - The long-term management of Open Space areas is more likely to sustain the vegetation unit, than in its current unmanaged state with runaway exotic invasion and excessive fire.
Residual Impact	Habitat lost to development will be permanent; intact habitat retained will be managed, via an Open Space Management Plan and exotic invasive plants removed, increasing the conservation value and ecological connectivity of the habitat.

Direct Loss of plant SSC due to vegetation clearing and disturbance

Nature of the Impact	Vegetation clearing will take place within the site for roads, infrastructure and residential units and will result in the loss of SSC.
Extent	Site specific - The impact will be limited to the actual development footprints and designated construction areas.
Duration	Permanent - The vegetation cleared for the development footprints will be permanent.
Intensity	High - All vegetation including plant SCC will be removed from the footprint areas.
Probability	Definite - The clearing of vegetation for the development footprints will definitely occur.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-) - The transformed portions of the site earmarked for development do not harbour large numbers of plant SSC. However, an abundance of SSC are present in the intact Grassy Fynbos vegetation units.
Mitigation	<ul style="list-style-type: none"> • Designated Open Space areas on the site must be excluded from all development activities. • Before development commences, the development footprints should be surveyed for plant SSC by a suitably qualified botanist and a search and rescue operation undertaken. • Permits for the removal and translocation of plant SCC should be obtained from the appropriate authorities. • Plant SCC should be translocated to the remaining patches of intact vegetation or buffer areas on the property, or stored in a suitably prepared nursery area during construction and used later in rehabilitation.
Significance and Status (with mitigation)	Moderate (-)
Residual Impact	Some individuals SCC are likely to be missed during relocation and will be destroyed; some species are not conducive for relocation and survival rates may be poor, dependant on water availability.

Disruption of Ecological Corridors, Patterns and Processes

Nature of the Impact	The Baakens River forms a critical ecological process area, and the entire site is designated as a Critical Biodiversity Area. Development of the site may disrupt ecological corridors, patterns and processes up- and down-stream along the Baakens River corridor.
Extent	Localised - The impact will be limited to the property but will have influence on the Baakens River corridor - hence up- and down-stream processes may be disrupted.
Duration	Permanent - Disturbance in the ecological connectivity will be permanent.
Intensity	Medium
Probability	Probable
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	High Negative (-) - Any disturbance in the ecological corridor on site may lead to a loss of ecosystem functioning and impact negatively on ecological patterns and processes at the site and surrounding areas along the Baakens River corridor. The retention of an Open Space corridor along the Baakens River will reduce the overall impact of this disruption.
Mitigation	<ul style="list-style-type: none"> • Exclude riparian area and designated Open Space areas from development. • Employ internal road designs that will allow both surface and subsurface water flow to continue unimpeded. • An Alien Clearing Plan must be implemented along the Baakens River banks <i>before</i> construction commences. • Degraded and transformed areas must be restored and rehabilitated before and parallel to the construction phase to compensate for the disruption of ecological processes. • An Open Space Management Plan to be implemented
Significance and Status (with mitigation)	Moderate Negative (-) The amended project layout effectively avoids these sensitive areas. The riparian areas associated with the Baakens River and its tributary have been retained in the Open Space system for the development and are excluded from development.
Residual Impact	Some permanent loss of ecological corridors, patterns and processes is likely to remain, with an associated migration, predominantly of fauna associated with the habitat but an equilibrium will be attained once construction is completed.

Increased Erosion Risk and Topsoil Loss due to Vegetation Clearing and Disturbance

Nature of the Impact	Vegetation clearing; topsoil stripping; earthworks; increased pedestrian and vehicle traffic may lead to increased soil erosion risk, increased runoff velocities due to clearing operations may exacerbate existing erosion features on site. Particularly in areas of runoff concentration and increased flow velocities (e.g. vehicle tracks, roads and pathways).
Extent	Site specific - The impact will be limited to the property, possibly downstream along the Baakens River, should severe erosion occur.
Duration	Temporary - The impact will only take place during the construction phase.
Intensity	Medium - Without mitigation extensive soil erosion could cause a severe alteration of natural processes at the site and downstream areas.
Probability	Highly Probable - Without mitigation there is a high likelihood that soil erosion will occur during construction.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Moderate Negative (-) Erosion and topsoil loss can have a major impact on the local environment but soils on site, especially along drainage lines, are not conducive to severe erosion.
Mitigation	<ul style="list-style-type: none"> • Limit disturbance to vegetated areas by clearly demarcating and signposting construction areas; including access roads, haul roads, materials lay-down areas, soil stockpile areas, site office, workers rest areas, and No-Go areas for development. • Avoid blanket clearing at the site, and rather clear footprints in a phased manner on (e.g. only clear vegetation and topsoil from erven once these are to be developed). • Avoid vegetation clearing on steep slopes.

	<ul style="list-style-type: none"> Design and implement a Stormwater Management Plan for the construction and operational phase of the development. The top 10 - 30cm of topsoil should be removed from the construction footprint and stockpiled appropriately. Initiate erosion countermeasures on the property in parallel with the construction phase.
Significance and Status (with mitigation)	Low Negative (-) - The prevention of erosion and the rehabilitation of existing erosion features at the site can be considered to have a net positive impact.
Residual Impact	Residual impact likely to be insignificant after construction

Destruction of Exotic plants (weeds and invaders) during Site Clearing for Construction

Nature of the Impact	During vegetation clearing for the construction of infrastructure or residential footprints, exotic vegetation will also be removed.
Extent	Local
Duration	Permanent - Vegetation will be removed from the development footprints permanently.
Intensity	Low
Probability	Highly Probable - The high density of some exotics on the site suggests that at least some of the vegetation removed will include exotic weeds and invaders.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Positive (+)
Mitigation	<ul style="list-style-type: none"> Exotic plant material removed must be exported from the site or destroyed so that seeds and propagating material does not remain at the site. An Alien Clearing Plan to be implemented for Open Space areas. Follow-up clearing for weeds and exotics should take place.
Significance and Status (with mitigation)	High Positive (+)
Residual Impact	Introduction of exotic species into the site will persist and ongoing action will be required.

Destruction of Bird Habitat – Eucalyptus Tree Removal, Baakens Thicket and Overhang Altering

Nature of the Impact	The removal of the <i>Eucalyptus</i> trees, vegetation and disturbing the overhangs.
Extent	Site specific - The impact will be limited to the development footprints and designated construction area. Existing areas of intact indigenous habitat and wetlands will remain outside the development footprint and will not be cleared.
Duration	Permanent - Permanent vegetation clearing and habitat destruction will take place in the proposed development footprint areas.
Intensity	High - The development area will be completely altered.
Probability	Definite - The development footprint will be cleared of most of its vegetation cover and faunal habitat.
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Moderate Negative (-) The habitat will be altered completely and the removal of the <i>Eucalyptus</i> trees will alter the breeding grounds for birds such as Black Sparrow Hawks. Transforming the overhangs will permanently destroy the habitat for the otters.
Mitigation	<ul style="list-style-type: none"> Avoid construction in designated Open Space Areas Demarcate the construction areas clearly before construction takes place. Clearly demarcate the No-Go areas for development prior to construction commencing. Large buffer zones must be in place between the construction and protected areas to prevent accidental negative impacts. Nesting sites not to be disturbed/ removed during the nesting season.

	<ul style="list-style-type: none"> Identify certain <i>Eucalyptus</i> trees which may have bird breeding potential and do not remove during nesting season. A phased approach should be employed to allow birds to find alternative roost and nesting sites. Reduce the size of the construction areas around the development areas in this zone, use the least space possible for the construction activities.
Significance and Status (with mitigation)	Low Negative (-)
Residual Impact	Loss of nesting sites will be permanent.

Disturbance and Damage to Riparian Zone and Riparian Biota at the Site, as a result of Indirect Activities (Amphibians)

Nature of the Impact	Activities associated with construction and altering of the riparian zone, will harm the amphibians.
Extent	Site specific - The impact will be limited to the actual site and designated construction area. However, pollutants may also come into contact with the water body and poison amphibians.
Duration	Temporary - Increased amphibian mortality will only be likely during the construction phase.
Intensity	Low – If the water body is kept clean, the amphibians will not be affected.
Probability	Improbable - Some amphibians are “trapped” in the river and cannot escape from it if it is polluted.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Negative (-) – With the correct mitigating circumstances, the impacts can be kept to a minimum.
Mitigation	<ul style="list-style-type: none"> Maintain a minimum no development buffer on either side of riparian zone on the property. Demarcate and exclude all development activities or footprints from the riparian zone and buffer areas. No water used for or during construction may be abstracted from or released into drainage lines on the site. Only chemical toilets to be used on site during construction. Educate the workers/ contractors about water pollution. Rehabilitate riparian zone on site by removing exotic invasive vegetation from these areas and introducing indigenous flora. Use the environmental induction process to educate employees and contractors regarding the need to avoid polluting the river. Measure to be in place to deal with accidental spills.
Significance and Status (with mitigation)	Low (-)
Residual Impact	A residual risk to riparian areas from pollutants will persist during operational phase.

Deterioration in Surface Water Quality due to Runoff, as a result of Construction Activities

Nature of the Impact	Surface runoff may be polluted by oil or fuel leaks or spills, concrete mixing and spillage on soils, waste dumping and storage, littering and improper sanitation, chemical spills, discharge of water with high sediment load into water courses. Water pollution may also reach groundwater sources.
Extent	Site specific/ Local - The impact will be largely limited to the property but could extend further if pollution reaches groundwater.
Duration	Temporary - The impact will only take place during the construction phase.
Intensity	High - The Baakens River in close proximity to the site and even minor spills could have a significant impact on downstream areas, depending on the nature of the pollution source.
Probability	Probable - It is likely that some form of pollution will occur if unmitigated.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Medium Negative (-) The pollution of water sources could have far field and off-site impacts if left unmanaged. However, these impacts can be managed provided that appropriate mitigation measures are employed.

Mitigation	<ul style="list-style-type: none"> • Stormwater management must be designed to give preference to the minimization of contamination of stormwater, the control of stormwater over exposed ground, dispersal of runoff from roads, and measures to limit erosion and pollution potential. • In the event of any contamination of groundwater coming to light, appropriate operational adjustments are to be implemented to address such contamination, and both the Department of Water Affairs and Forestry and DEDEA are to be consulted in relation to appropriate remediation measures. • Generators and fuel supply during construction must be placed on trays, which rest on clean sand. Once construction is complete this must be removed from the site and disposed of at an appropriately registered waste disposal facility. • No cement/ concrete mixing is to take place on the soil surface. Cement mixers are to be placed on large trays to prevent accidental spills from coming into contact with the soil surface; • Vehicles and construction equipment should not be serviced at the site. • Ensure secure storage of materials on site particularly hazardous materials e.g. chemicals and fuels. • Suitable portable toilets must be provided and maintained on the site for the duration of construction activities. • No waste from construction or otherwise, may be disposed of anywhere on site.
Significance and Status (with mitigation)	Very Low (-)
Residual Impact	A residual risk of pollutants affecting water quality will persist.

The Introduction of Inappropriate Vegetation or Trees

Nature of the Impact	The introduction of non-indigenous flora onto the site, especially in close proximity to the Open Space areas, could result in the introduction of weedy and invasive species into the system.
Extent	Site specific - The impact will be limited to the property.
Duration	Long Term - Vegetation within erven will remain for the project lifetime.
Intensity	Low - Only important on erven directly adjacent to Open Space areas.
Probability	Highly Probable
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> • Residents should be encouraged to utilise indigenous trees. • Restrictions regarding, especially seed-bearing exotic species must be promoted during landscaping activities • No kikuyu or other invasive exotic grass species should be permitted. • No dumping of garden refuse over back walls should be permitted, and a mowed buffer to be retained between boundary walls and Open Space areas, to be kept free of rubble and garden refuse.
Significance and Status (with mitigation)	Low (-)
Residual Impact	The risk of introducing exotic species will always be present.

Disruption of Flow into Riparian Areas

Nature of the Impact	Construction of roads and infrastructure may result in the alteration of surface and sub-surface flow that may impact on riparian functioning.
Extent	Site specific - The impact will be limited to the property.
Duration	Long Term - roads and infrastructure will remain for the project lifetime.
Intensity	Medium - An extensive road and stormwater network is not proposed for the site.
Probability	Improbable
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Medium Negative (-)

Mitigation	<ul style="list-style-type: none"> • Ensure that infrastructure design takes cognizance of the surface water flow and facilitates the maintenance of the flow regime. • Employ internal road designs that will allow subsurface flow to continue unimpeded. • No water used for or during construction may be abstracted from or released into wetlands and drainage lines on the site. • Adequate stormwater control measures to be implemented.
Significance and Status (with mitigation)	Low Negative (-)
Residual Impact	Flow disruptions will be permanent but managed.

Construction Phase Indirect Impacts

Increased Exotic Plant Invasion due to Disturbance of Soils and Vegetation

Nature of the Impact	Vegetation disturbance and clearing in the development footprints, as well as disturbance in the portions of indigenous vegetation on site, may create opportunities for weeds and exotic plants to invade the site.
Extent	Site specific - The impact will be limited to property.
Duration	Temporary - The impact will only take place during the construction phase.
Intensity	Medium - Exotic plant invasion will lead to a notable alteration of natural patterns and processes at the site.
Probability	Highly Probable
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	High Negative (-)
Mitigation	<ul style="list-style-type: none"> • Eradicate weeds and invasive vegetation on the property in parallel with the construction phase. • Control their spread to disturbed portions of the site. • Destroy weeds and invasive plants before they reach seed formation stage. • Limit disturbance to intact indigenous vegetation on site by demarcating and signposting sensitive areas and controlling access to these areas. • Consolidate internal transport routes and haul roads on the site and demarcate and signpost access roads.
Significance and Status (with mitigation)	Medium Positive (+)
Residual Impact	Introduction of exotic species into the site will persist and ongoing action will be required.

Operational Phase Direct Impacts

Deterioration in Surface Water Quality due to Polluted Stormwater Runoff

Nature of the Impact	Polluted stormwater runoff from roads may be released into the wetlands and water bodies on site.
Extent	Local
Duration	Long Term - During lifetime of the development.
Intensity	Low
Probability	Probable - It is likely that some form of pollution will occur if unmitigated.
Degree of Confidence	Medium
Status and Significance of Impact (no mitigation)	Low Negative (-) The pollution of water sources in the operational phase is not likely to be very severe and can be managed providing that suitable mitigation measures are employed.
Mitigation	<ul style="list-style-type: none"> • Stormwater management must be designed to give preference to the minimization of contamination of stormwater, the control of stormwater over exposed ground, dispersal of runoff from roads, and measures to limit erosion and pollution potential. • In the event of any contamination of groundwater coming to light, appropriate operational adjustments are to be implemented to address such contamination, and both the Department of Water Affairs and Forestry and DEDEA are to be consulted in relation to appropriate remediation measures.

	<ul style="list-style-type: none"> Stormwater management structures must be constructed in such a way as to trap solid waste and litter before water is released into the environment. Vegetated swales or detention ponds may be used to slow stormwater down and allow the settling of suspended sediments before stormwater is released into the environment.
Significance and Status (with mitigation)	Very Low (-)
Residual Impact	Pollution risk will persist.

Operational Phase Indirect Impacts

General Habitat Degradation in the Open Space Areas (Vegetation Disturbance & Trampling, Waste Dumping)

Nature of the Impact	Lack of formal management in the sensitive portions of the site could result in general habitat degradation in these areas (loss of species, loss of ecological function, loss of ecosystems services, increased erosion).
Extent	Site specific - The impact will be limited to property.
Duration	Long Term - During lifetime of the development.
Intensity	Medium - Could result in a loss of ecosystem functioning
Probability	Probable
Degree of Confidence	Low
Status and Significance of Impact (no mitigation)	Medium Negative (-)
Mitigation	<ul style="list-style-type: none"> The Open Space areas and buffer zones must be excluded from all development activities. House-rules for the Eco-Estate development associated with the intact Lorraine Transitional Fynbos vegetation must be implemented. Erect informative signage with information regarding fire hazard in Open Space areas and prohibition of dumping, poaching, or plant collection. Designated pathways to be maintained in Open Space areas.
Significance and status (with mitigation)	Very Low (-)
Residual Impact	Problem areas may change throughout the lifetime of the development and continued action will be required.

Introduction of Exotic Flora and Risk of Alien Plant Invasion

Nature of the Impact	Increased number of ornamental gardens associated with the development may result in exotic invasive species becoming established in the natural vegetation.
Extent	Site specific - The impact will be limited to property.
Duration	Long Term - During lifetime of the development.
Intensity	Medium - Exotic plant invasion could cause a notable alteration on ecosystem functioning in retained open space areas
Probability	Probable
Degree of Confidence	Low
Status and Significance of Impact (no mitigation)	Moderate Negative (-)
Mitigation	<ul style="list-style-type: none"> The site should be monitored routinely for alien plant invasion. Regular clearing of weeds and invasive plants should be implemented, preferably before the plants have reached seed formation stage.
Significance and Status (with mitigation)	Moderate positive (+) An active alien clearing program will have a net positive impact.
Residual Impact	Risk of introduction of exotic flora will persist.

Impact of Construction of the Sewer Infrastructure Located Outside the Residential Commercial Footprints on Wetland/ Riparian Areas

Nature of the Impact	A sewer line crosses the drainage line/ riparian area in the west of the site for a distance of ~125 meters, to tie into collector sewer line east of the water course. All wetland/ watercourse habitat is considered Critically Endangered (33°57'45.91"S, 25°31'40.91"E to 33°57'42.71"S, 25°31'43.29"E).
Extent	Localised (site)
Duration	Temporary
Intensity	High
Probability	Definite
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	High Negative (-)
Mitigation	<ul style="list-style-type: none"> • Authorisation must be obtained from DWS for the construction through the watercourse/ wetland. • Keep construction corridor as narrow as possible. • Demarcate the construction corridor with marked pegs, chevron tape or barrier mesh. • Stockpiled excavated material must be limited to the construction corridor and may not be allowed to spill or encroach on the adjacent areas outside the construction corridor. • Complete construction through the watercourse/ wetland in a short a timeframe as possible. • Appropriate erosion protection must be implemented in the disturbed portion of the watercourse. • Haul roads and lay down areas must be rehabilitated in the same way as the construction footprints. • The construction footprint must be rehabilitated immediately after construction on the section of pipeline is completed: topography restored, topsoil horizon replaced where relevant, indigenous vegetation established. • Implement an alien clearing plan along the disturbed area within the riparian zone. • Sewer lines must be checked for leaks/ spills on a regular basis and corrective action taken immediately.
Significance and Status (with mitigation)	Low Negative (-)
Residual Impact	None.

Impact of Construction of Stormwater Infrastructure Located Outside the Residential/ Commercial Footprints

Nature of the Impact	Stormwater outfall points will discharge stormwater into the following areas: <ul style="list-style-type: none"> ○ Drainage line in the western portion of the site (Transformed) (33°57'50.07"S, 25°31'34.80"E & 33°57'48.98"S, 25°31'37.27"E). ○ Central PoS area (Transformed) (33°57'46.51"S, 25°31'43.53"E). ○ Edge of the valley (degraded Lorraine Transitional Grassy Fynbos with a Low sensitivity) (33°57'38.67"S, 25°31'55.01"E).
Extent	Localised (site)
Duration	Temporary
Intensity	High
Probability	Definite
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	Low Negative (-) (Transformed Areas/ Low Sensitivity)
Mitigation	<ul style="list-style-type: none"> • Discharge points must be constructed with scour protection measures (e.g. reno mattresses, dissipater structures) to prevent erosion at the point of discharge. • Vegetation disturbance downstream of discharge points must be avoided.

	<ul style="list-style-type: none"> • Routes should be surveyed for Species of Special Concern (SCC) by a qualified botanist, and a search and rescue operation for plant SCC must be conducted. • Keep construction corridors as narrow as possible. • Demarcate the construction corridor with marked pegs, chevron tape or barrier mesh. • Stockpiled excavated material, construction materials and equipment must be limited to the construction corridor and may not be allowed to spill or encroach on the adjacent areas outside the construction corridor. • Implement adequate erosion protection along disturbance footprints, particularly along sloped portions of alignments. • Haul roads and lay down areas must be rehabilitated in the same way as the construction footprints. • The construction footprints must be rehabilitated immediately after construction on the section of pipeline is completed: topography restored, topsoil horizon replaced where relevant, indigenous vegetation established. • The colonisation of disturbed areas by exotic plants must be controlled until natural / indigenous vegetation has become established.
Significance and Status (with mitigation)	Very Low Negative (-)
Residual Impact	None.

5.3.1 Limitations to this Assessment

The impacts outlined above were assessed for the project as a whole and not specifically for only Phase 5 and 6 of the development. Therefore, some of these impacts may have limited applicability to the proposed change in zoning.

5.4 STUDY APPROACH

5.4.1 Aquatic Study

This study will follow the approaches of several national guidelines with regards to aquatic assessments. These have been modified by the author, to provide a relevant mechanism of assessing the present state of the study systems, applicable to the specific environment and in a clear and objective means assess the potential impacts.

Current water resource classification systems make use of the Hydrogeomorphic (HGM) approach, and for this reason, the National Wetland Classification System approach will be used in this study, which includes the determination of riverine versus wetland habitat assessments.

5.4.2 Vegetation Study

Given the transformed nature of the site, a detailed vegetation assessment was not considered necessary. Thus, the vegetation study took the form of a desktop study, although it did include a site visit in order to verify the current conditions of the vegetation. In addition, the findings of the previous assessment, including the relevance and applicability of the previously identified impacts and mitigations, were investigated. The assessment is further supported by the conclusions of the State of Environment Report (dated 23 July 2018) prepared by the Environmental Control Officer for the development, Mr Mark Marshall of Sandula Conservation, as per the requirements of condition 3.1.6 of the current Environmental Authorisation.

Given that all of the existing vegetation on the site (Phase 5 and 6) would be cleared to allow for the development thereof, regardless of the zoning, the abovementioned approach was deemed to be

sufficient to address the advantages and disadvantages of the proposed amendment and provide any additional mitigation, if necessary.

5.5 WETLAND AND AQUATIC CLASSIFICATION SYSTEMS

Since the late 1960's, wetland classification systems have undergone a series of international and national revisions. These revisions allowed for the inclusion of additional wetland types, ecological and conservation rating metrics, together with a need for a system that would allude to the functional requirements of any given wetland (Ewart-Smith *et al.*, 2006). Wetland function is a consequence of biotic and abiotic factors, and wetland classification should strive to capture these aspects.

The South African National Biodiversity Institute (SANBI), in collaboration with a number of specialists and stakeholders, developed the newly revised and now accepted National Wetland Classification Systems (NWCS) (Ollis *et al.*, 2013). This system comprises a hierarchical classification process of defining a wetland based on the principles of the hydrogeomorphic (HGM) approach at higher levels, with including structural features at the finer or lower levels of classification (Ollis *et al.*, 2013).

Wetlands develop in a response to elevated water tables, linked either to rivers, groundwater flows or seepage from aquifers (Parsons, 2004). These water levels or flows then interact with localised geology and soil forms, which then determines the form and function of the respective wetlands. Water is thus the common driving force, in the formation of wetlands (DWAF, 2005). It is significant that the HGM approach has now been included in wetland classification as the HGM approach has been adopted throughout the water resources management realm with regards to the determination of the Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) and Integrated Health assessments for aquatic environments. All of these systems are then easily integrated using the HGM approach in line with the Eco-classification process of river and wetland reserve determinations used by the Department of Water Affairs. The Ecological Reserve of a wetland or river is used by DWS to assess the water resource allocations when assessing water use license applications (WULA).

The NWCS process is provided in more detail in the methods section of the report, but some of the terms and definitions used in this document are present below:

Definition Box

Present Ecological State is a term for the current ecological condition of the resource. This is assessed relative to the deviation from the Reference State. Reference State/Condition is the natural or pre-impacted condition of the system. The reference state is not a static condition, but refers to the natural dynamics (range and rates of change or flux) prior to development. The PES is determined per component - for rivers and wetlands this would be for the drivers: flow, water quality and geomorphology; and the biotic response indicators: fish, macroinvertebrates, riparian vegetation and diatoms. PES categories for every component would be integrated into an overall PES for the river reach or wetland being investigated. This integrated PES is called the EcoStatus of the reach or wetland.

EcoStatus is the overall PES or current state of the resource. It represents the totality of the features and characteristics of a river and its riparian areas or wetland that bear upon its ability to support an appropriate natural flora and fauna and its capacity to provide a variety of goods and services. The EcoStatus value is an integrated ecological state made up of a combination of various PES findings from component EcoStatus assessments (such as for invertebrates, fish, riparian vegetation, geomorphology, hydrology and water quality).

Reserve: The quantity and quality of water needed to sustain basic *human needs* and *ecosystems* (e.g. estuaries, rivers, lakes, groundwater and wetlands) to ensure ecologically sustainable development and utilisation of a water resource. The *Ecological Reserve* pertains specifically to aquatic ecosystems.

Reserve requirements: The quality, quantity and reliability of water needed to satisfy the requirements of basic human needs and the Ecological Reserve (inclusive of instream requirements).

Ecological Reserve determination study: The study undertaken to determine Ecological Reserve requirements.

Licensing applications: Water users are required (by legislation) to apply for licenses prior to extracting water resources from a water catchment.

Ecological Water Requirements: This is the quality and quantity of water flowing through a natural stream course that is needed to sustain instream functions and ecosystem integrity at an acceptable level as determined during an EWR study. These then form part of the conditions for managing achievable water quantity and quality conditions as stipulated in the **Reserve Template**

Water allocation process (compulsory licensing): This is a process where all existing and new water users are requested to reapply for their licenses, particularly in stressed catchments where there is an over-allocation of water or an inequitable distribution of entitlements.

Ecoregions are geographic regions that have been delineated in a top-down manner on the basis of physical/abiotic factors. • NOTE: For purposes of the classification system, the 'Level I Ecoregions' for South Africa, Lesotho and Swaziland (Kleynhans *et al.* 2005), which have been specifically developed by the Department of Water Affairs & Forestry (DWAFF) for rivers but are used for the management of inland aquatic ecosystems more generally, are applied at Level 2A of the classification system. These Ecoregions are based on physiography, climate, geology, soils and potential natural vegetation.

5.5.1 National Wetland Classification System Method

During this study, due to the nature of the wetlands and watercourses observed, it was decided that the newly accepted National Wetlands Classification System (NWCS) be adopted. This classification approach has integrated aspects of the HGM approach used in the WET-Health system, as well as the widely accepted eco-classification approach used for rivers.

The NWCS (Ollis *et al.*, 2013) as stated previously, uses hydrological and geomorphological traits to distinguish the primary wetland units, i.e. direct factors that influence wetland function. Other wetland assessment techniques, such as the DWAFF (2005) delineation method, only infer wetland function based on abiotic and biotic descriptors (size, soils & vegetation) stemming from the Cowardin approach (OLLIS *et al.*, 2013).

The classification system used in this study is thus based on Ollis *et al.* (2013) and is summarised below:

The NWCS has a six-tiered hierarchical structure, with four spatially nested primary levels of classification (Figure 5.3). The hierarchical system firstly distinguishes between Marine, Estuarine and Inland ecosystems (**Level 1**), based on the degree of connectivity the particular system has with the open ocean (greater than 10m in depth). Level 2 then categorises the regional wetland setting using a combination of biophysical attributes at the landscape level, which operate at a broad bioregional scale.

This is opposed to specific attributes such as soils and vegetation. **Level 2** has adopted the following systems:

- Inshore bioregions (marine)
- Biogeographic zones (estuaries)
- Ecoregions (Inland)

Level 3 of the NWCS assess the topographical position of inland wetlands as this factor broadly defines certain hydrological characteristics of the inland systems. Four landscape units based on topographical position are used in distinguishing between Inland systems at this level. No subsystems are recognised for Marine systems, but estuaries are grouped according to their periodicity of connection with the marine environment, as this would affect the biotic characteristics of the estuary.

Level 4 classifies the hydrogeomorphic (HGM) units discussed earlier. The HGM units are defined as follows:

- (i) Landform – shape and localised setting of wetland.
- (ii) Hydrological characteristics – nature of water movement into, through and out of the wetland.
- (iii) Hydrodynamics – the direction and strength of flow through the wetland.

These factors characterise the geomorphological processes within the wetland, such as erosion and deposition, as well as the biogeochemical processes.

Level 5 of the assessment pertains to the classification of the tidal regime within the marine and estuarine environments, while the hydrological and inundation depth classes are determined for the inland wetlands. Classes are based on frequency and depth of inundation, which are used to determine the functional unit of the wetlands and are considered secondary discriminators within the NWCS.

Level 6 uses six descriptors to characterise the wetland types on the basis of biophysical features. As with Level 5, these are non-hierarchical in relation to each other and are applied in any order, dependent on the availability of information. The descriptors include:

- (i) Geology;
- (ii) Natural vs. Artificial;
- (iii) Vegetation cover type;
- (iv) Substratum;
- (v) Salinity; and
- (vi) Acidity or Alkalinity.

It should be noted that where sub-categories exist within the above descriptors, hierarchical systems are employed, and these are thus nested in relation to each other.

The HGM unit (Level 4) is the **focal point of the NWCS**, with the upper levels (Figure 5.4 – Inland systems only) providing means to classify the broad bio-geographical context for grouping functional wetland units at the HGM level, while the lower levels provide more descriptive detail on the particular wetland type characteristics of a particular HGM unit. Therefore Level 1 – 5 deals with functional aspects, while Level 6 classifies wetlands on structural aspects.

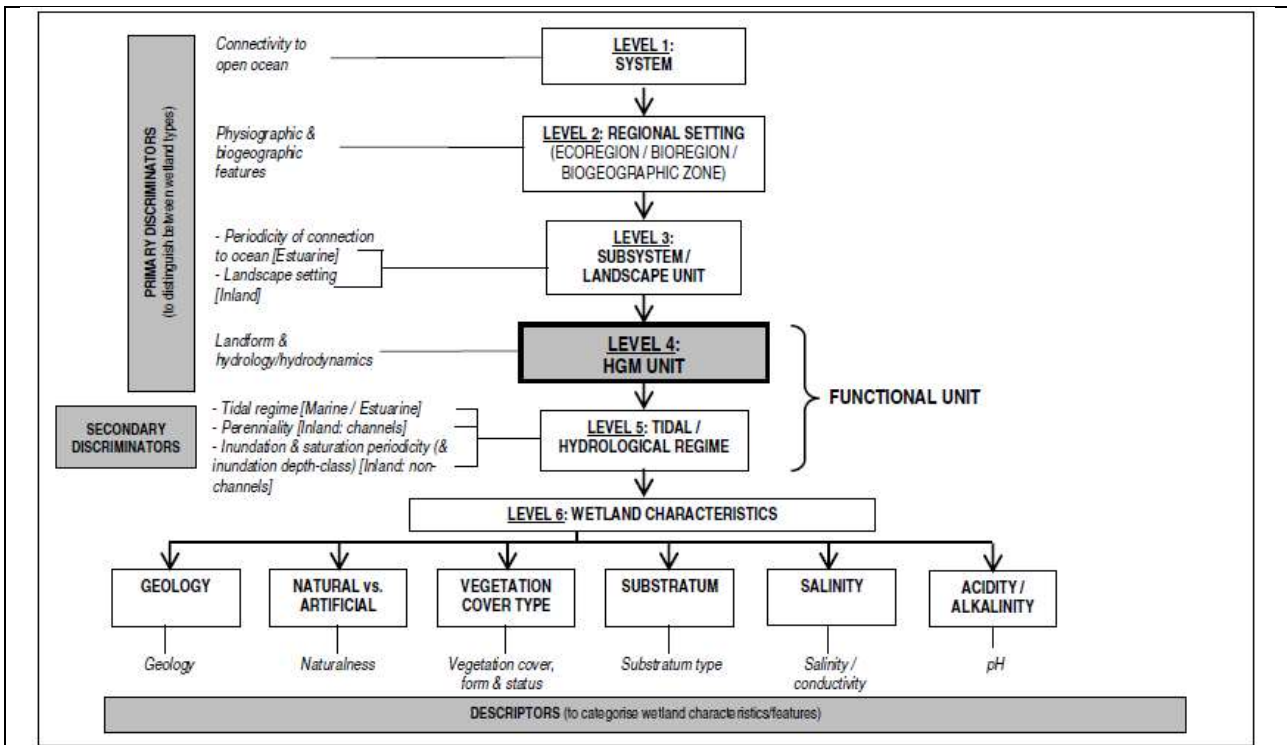


Figure 5.3: Basic structure of the National Wetland Classification System, showing how ‘primary discriminators’ are applied up to Level 4 to classify Hydrogeomorphic (HGM) Units, with ‘secondary discriminators’ applied at Level 5 to classify the tidal/ hydrological regime, and ‘descriptors’ applied at Level 6 to categorise the characteristics of wetlands classified up to Level 5 (From Ollis et al., 2013).

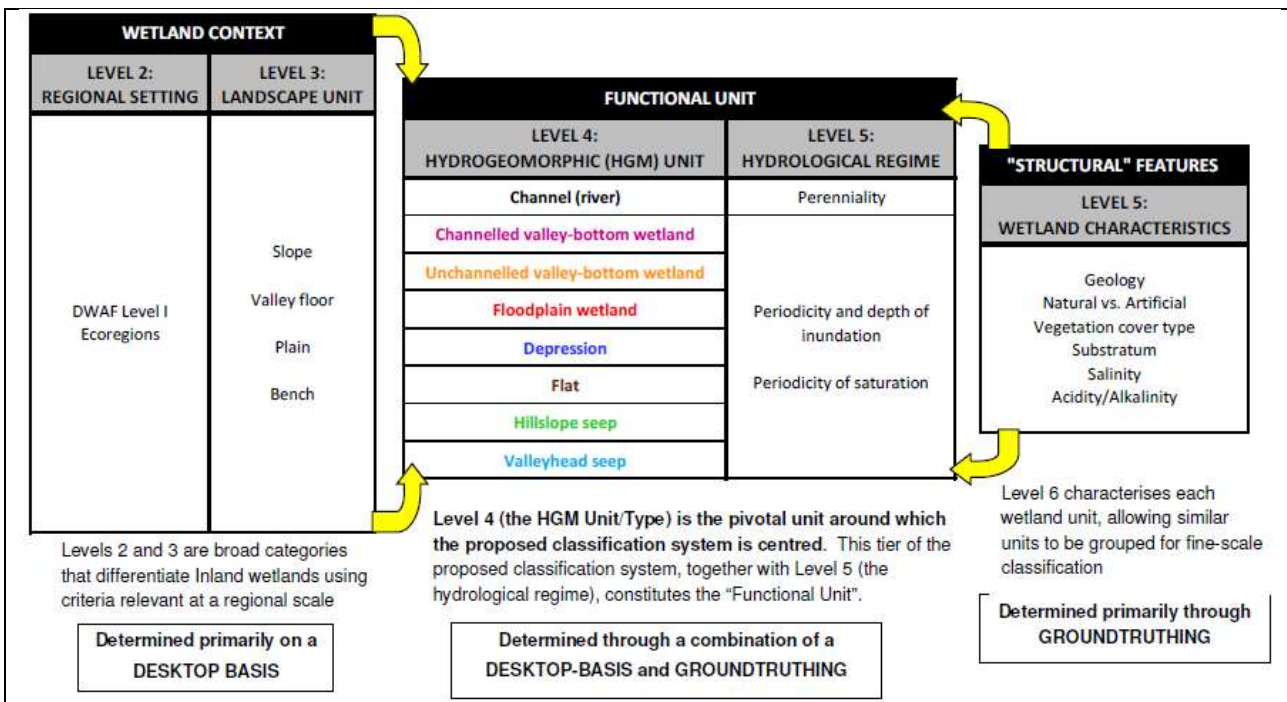


Figure 5.4: Illustration of the conceptual relationship of HGM Units (at Level 4) with higher and lower levels (relative sizes of the boxes show the increasing spatial resolution and level of detail from the higher to the lower levels) for Inland Systems (from Ollis et al., 2013).

5.6 AQUATIC ECOSYSTEM CONDITION

To assess the Present Ecological State (PES) or condition of the observed systems, a modified Index of Habitat Integrity (DWAf, 2007) was used. The Index of Habitat Integrity (IHI) is a tool developed for use in the National Aquatic Ecosystem Health Monitoring Programme (NAEHMP), formerly known as the River Health Programme (RHP). The output scores from the IHI model are presented in the standard DWAf A-F ecological categories (Table 5.1) and provide a score of the Present Ecological State of the habitat integrity of the riverine system being examined.

Table 5.1: Description of A – F ecological categories based on Kleynhans et al., (2005).

ECOLOGICAL CATEGORY	ECOLOGICAL DESCRIPTION	MANAGEMENT PERSPECTIVE
A	Unmodified, natural.	Protected systems; relatively untouched by human hands; no discharges or impoundments allowed
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.	Some human-related disturbance, but mostly of low impact potential
C	Moderately modified. Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.	Multiple disturbances associated with need for socio-economic development, e.g. impoundment, habitat modification and water quality degradation
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	
E	Seriously modified. The loss of natural habitat, biota and basic ecosystem functions is extensive.	Often characterized by high human densities or extensive resource exploitation. Management intervention is needed to improve health, e.g. to restore flow patterns, river habitats or water quality
F	Critically / Extremely modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	

The IHI model is composed of four modules. The “Hydrology”, “Geomorphology” and “Water Quality” modules all assess the contemporary driving processes behind wetland formation and maintenance. The last module, “Vegetation Alteration”, provides an indication of the intensity of human land use activities on the wetland surface itself and how these may have modified the condition of the wetland. The integration of the scores from these 4 modules provides an overall Present Ecological State (PES) score for the wetland system being examined. The IHI model is an MS Excel-based model, and the data required for the assessment are generated during a rapid site visit.

Additional data may be obtained from remotely sensed imagery (aerial photos; maps and/ or satellite imagery) to assist with the assessment. The interface of the IHI has been developed in a format which is similar to DWA’s River EcoStatus models which are currently used for the assessment of PES in riverine environments.

5.7 AQUATIC ECOSYSTEM IMPORTANCE AND FUNCTION

Conservation importance of the individual aquatic ecosystems was based on the following criteria:

- Habitat uniqueness
- Species of conservation concern

- Habitat fragmentation with regard ecological corridors
- Ecosystem service (social and ecological)

The presence of any or a combination of the above criteria would result in a HIGH conservation rating if the wetland was found in a near natural state (high PES). Should any of the habitats be found modified the conservation importance would rate as MEDIUM, unless a Species of Conservation Concern was observed, in which case it would receive a HIGH rating. Any system that was highly modified (low PES) or had none of the above criteria, received a LOW conservation importance rating. Wetlands with HIGH and MEDIUM ratings should thus be excluded from development with incorporation into a suitable open space system, with the maximum possible buffer being applied. Natural systems that resemble some form of the past landscape but receive a LOW conservation importance rating, could be included into stormwater management features and should not be developed so as to retain the function of any ecological corridors. The proposed development is not located in any of these areas (See Section 1.2 for detailed description of project components).

5.8 RELEVANT LEGISLATION AND POLICY

Locally the South African Constitution, seven (7) Acts and two (2) international treaties allow for the protection of wetlands and rivers. These systems are protected from destruction or pollution by the following:

- Section 24 of The Constitution of the Republic of South Africa;
- Agenda 21 – Action plan for sustainable development of the Department of Environmental Affairs and Tourism (DEAT) 1998;
- The Ramsar Convention, 1971 including the Wetland Conservation Programme (DEAT) and the National Wetland Rehabilitation Initiative (DEAT, 2000);
- National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) inclusive of all amendments, as well as the NEM: Biodiversity Act;
- National Water Act, 1998 (Act No. 36 of 1998);
- Conservation of Agricultural Resources Act, 1983 (Act No. 43 of 1983); and
- Minerals and Petroleum Resources Development Act, 2002 (Act No. 28 of 2002).
- Nature and Environmental Conservation Ordinance (No. 19 of 1974)
- National Forest Act (No. 84 of 1998)
- National Heritage Resources Act (No. 25 of 1999)

NEMA and the Conservation of Agricultural Resources Act (CARA), 1983 (Act No. 43 of 1983) would also apply to this project. These Acts have categorised a large number of invasive plants together with associated obligations of the land owner. A number of Category 1 & 2 plants were observed in several areas of the site under investigation, thus the contractors must take extreme care to ensure the further spread of these plants doesn't occur. This should be done through proper stockpile management (topsoil) and suitable rehabilitation of disturbed areas after construction.

5.9 DESCRIPTION OF THE POTENTIALLY AFFECTED ENVIRONMENT

5.9.1 Aquatic Description

The proposed project site falls within the Quaternary catchment of the Baakens River, (M20A) (Figure 5.5). This within a highly transformed, predominantly urban environment adjoining open space areas associated with the Baakens River valley. The area between the site and the watercourse is largely covered by alien invasive stands of *Acacia* and Blue gum (Plate 5.2). Furthermore, no aquatic environments fall directly within Phase 5 and 6 of the development site. This was also confirmed in Version 5.2 (2018) of the National Wetland Inventory (Figure 5.6) with regards to wetlands, as well as observations made during the site visit.

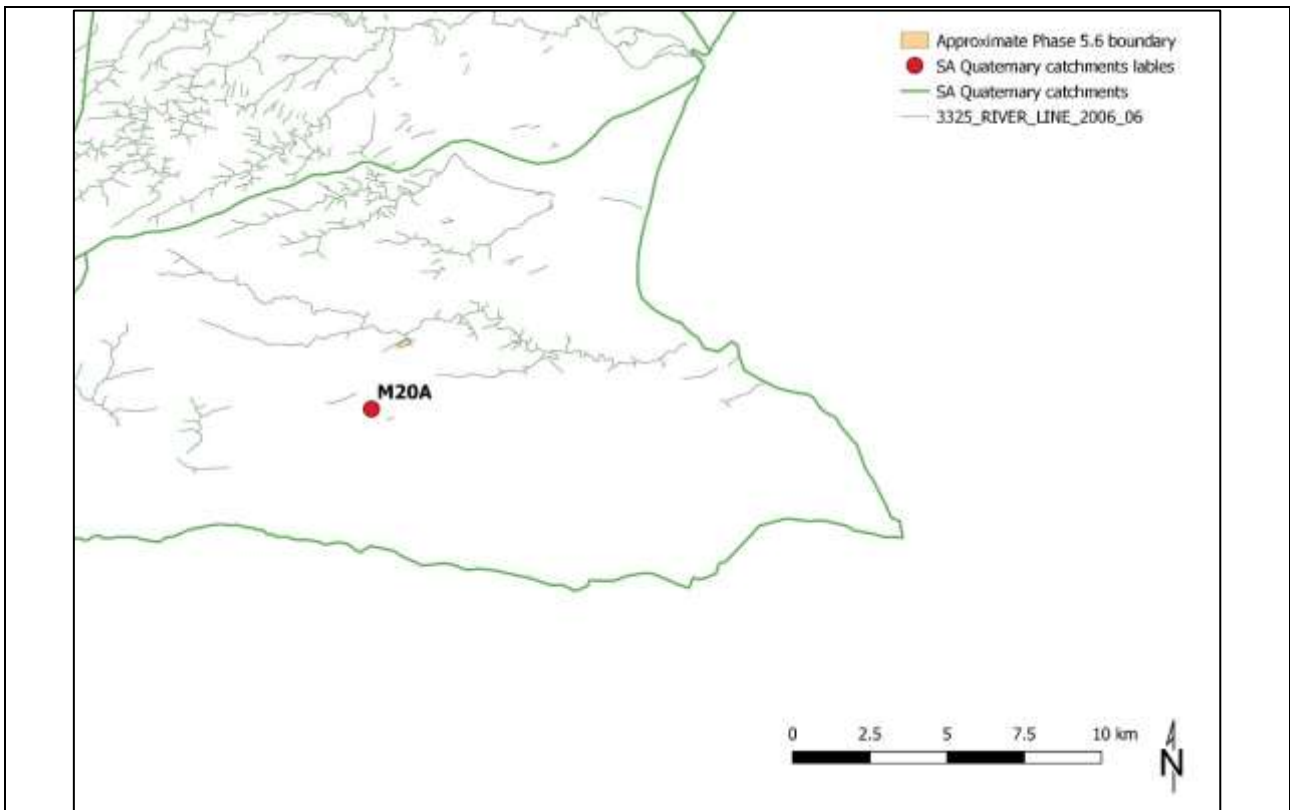


Figure 5.5: Project locality map indicating the M20A quaternary catchment boundary (green line) (Source DWS and NGI).

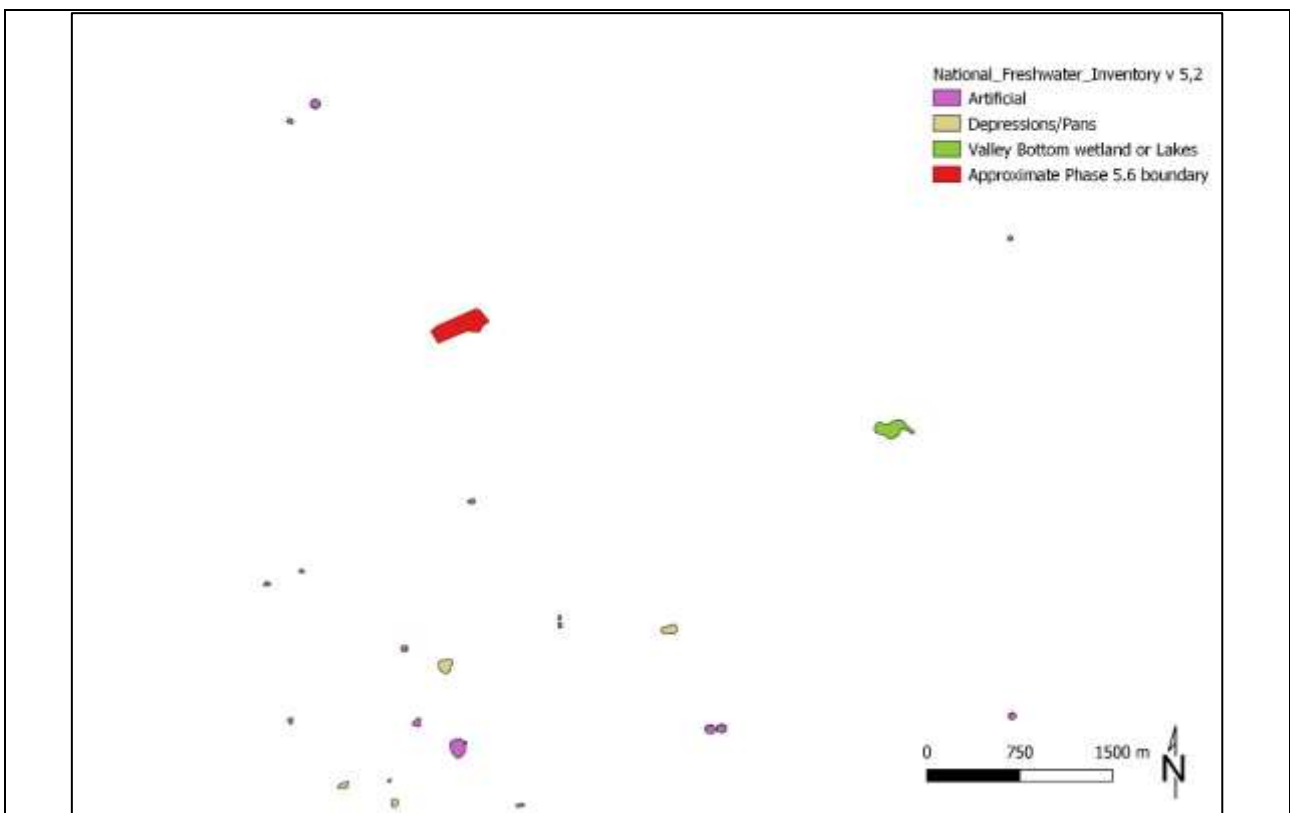


Figure 5.6: The waterbodies identified by the National Wetland Inventory V5.2 (2018) in relation to the site.



Plate 5.1: A view of the typical transformation that has taken place in the surrounding environment, showing high levels of sedimentation in the current storm water drains.



Plate 5.2: A view of main tributary, consisting mainly of rock pools and a series of waterfalls, with little to no riparian habitat or habitat invaded by alien trees.

Minor aquatic plant species were associated with the very narrow riparian zones located within the observed water courses. This was either related to the steep topography (rocky riverbanks) or due to the presence of dense alien vegetation. Indigenous species was thus limited to the following:

- *Ficinia lateralis*
- *Juncus spp* (grazed)
- *Phragmites australis*
- *Cyperus obtusiflorus var. obtusiflorus*
- *Centella asiatica*
- *Typha capensis*

Alien Invasive Plant Species observed included amongst others:

- *Cortaderia selloana*
- *Eucalyptus spp.*
- *Lantana camara*
- *Acacia saligna*
- *Acacia longifolia*
- *Acacia cyclops*
- *Pennisetum clandestinum*
- *Pinus spp.*

The buffer model as described Macfarlane *et al.*, 2017 for rivers, indicated that any systems within the region should receive a buffer as follows:

1. Construction phase 29 m
2. Operational phase 20 m
3. **Final buffer – 25 m**

No wetlands (natural or artificial) were observed within 500m of the proposed development site.

5.9.1.1 Present Ecological State and Conservation Importance

In this study, several other sources of information were also considered, which included the National Freshwater Ecosystems Priority Areas project completed by the CSIR (Nel *et al.*, 2011), regional and national biodiversity assessments, and the latest being the National Biodiversity Assessment released by SANBI (Driver *et al.*, 2012). Note these are being updated for the 2018 National Biodiversity Assessment due later this year, but spatial information being used for the update was interrogated for this assessment.

The Department of Water and Sanitation, as part of a Water Research Commission (WRC) project has initiated the revision of the 1999 Present Ecological State (PES) assessment of all rivers and riparian systems on a national basis.

A team lead by the SC&A has completed the assessment of the Sub-Quaternary Catchment found in the study region. Their assessment has indicated that the systems found in the study area all have a PES of C (Moderately modified). This is due to current estimates that between 15 – 30% of the natural catchment remains within the Sub-quaternary Catchment associated within the study area. However, based on the high degree of transformation within the study area systems the PES was rated as D (Largely Modified)

In this assessment, the natural systems which are modified was assigned a MODERATE Ecological Importance and Sensitivity Score. This was substantiated both by the NMBM Conservation Action Plan assessment (Figure 5.7) and the Eastern Cape Biodiversity Conservation Plan (Figure 5.8), i.e. the study area still retain Ecological Importance as corridors are were thus rated as Critical Biodiversity Areas respectively.

The results are summarised below:

RESULTS SUMMARY - PHASE 5 AND 6, ERF 1082, FAIRVIEW					
Hydrology			WMA 7 - Mzimvubu Tsitsikamma		
Quaternary Catchment	M20A		Survey timing July 2018		
Flow type	Perennial (river),		Sampling season Winter		
Feature Number	Hydrogeomorphic Classification (applicable Sub-quaternary Catchment)	Present Ecological State	Ecological Importance	Ecological Sensitivity	Buffer Model results (m)
1	Baakens River tributaries	D	Moderate	Moderate	25

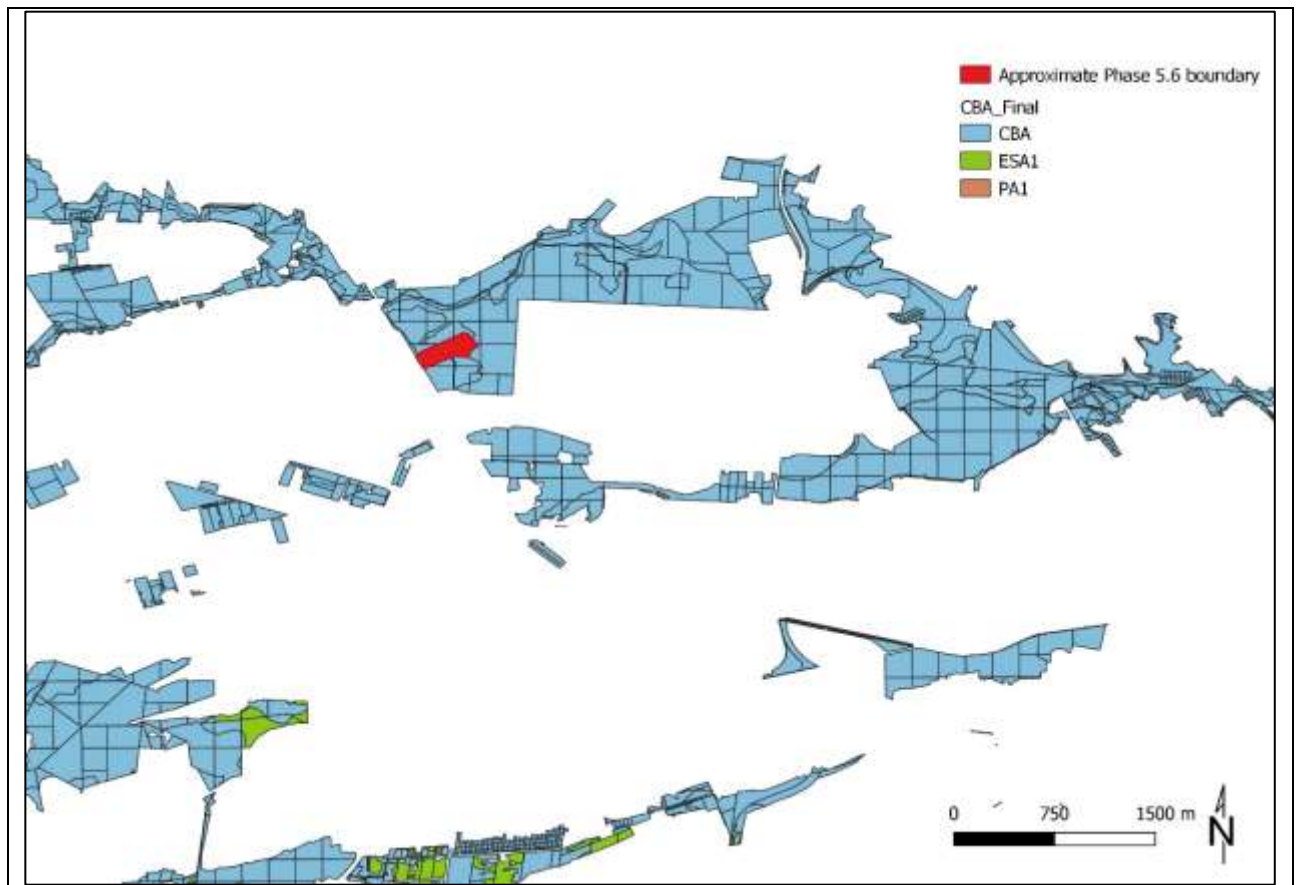


Figure 5.7: Critical Biodiversity Areas as per the NMBM CAP.

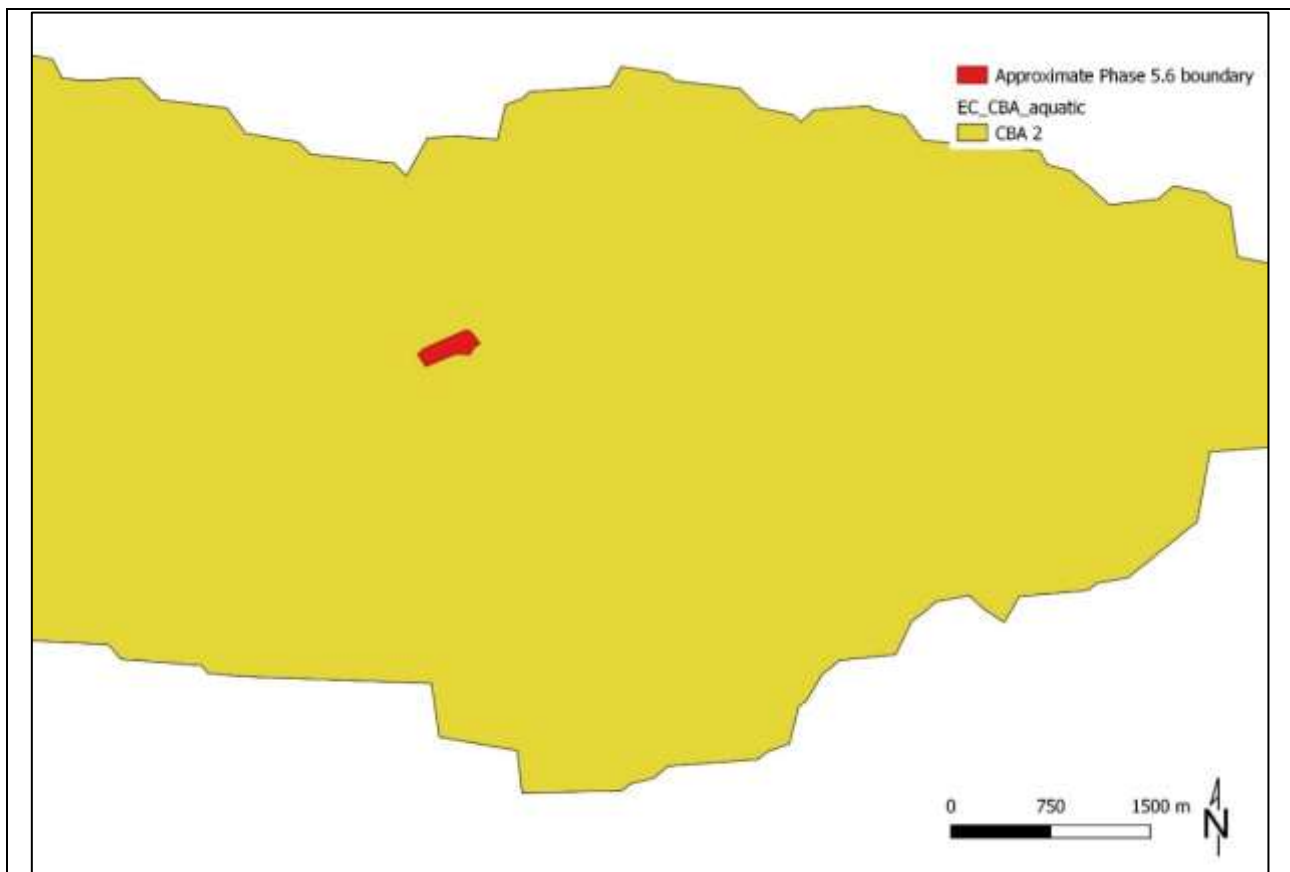


Figure 5.8: Critical Biodiversity Area spatial data as per Eastern Cape Biodiversity Conservation Plan (Berliner & Desmet, 2007).

5.9.2 Terrestrial Vegetation Description

The biodiversity planning frameworks which would have the most applicability to the terrestrial vegetation of the site and which were consulted at the time of the previous vegetation assessment, are the NMBM Bioregional Plan (SRK Consulting, 2014) and the associated NMBM Conservation Assessment and Plan (SRK Consulting, 2010; CAP) mapping resources. The terrestrial vegetation anticipated to occur on the site (Phase 5 and 6) in terms of the NMBM CAP mapping resources is Lorraine Transitional Grassy Fynbos (see Figure 5.9) or possibly Baakens Grassy Fynbos, which are both classified as *Critically Endangered*. However, the landcover data from the NMBM CAP mapping resources indicates that much of the site is covered with High Density Alien Plants.

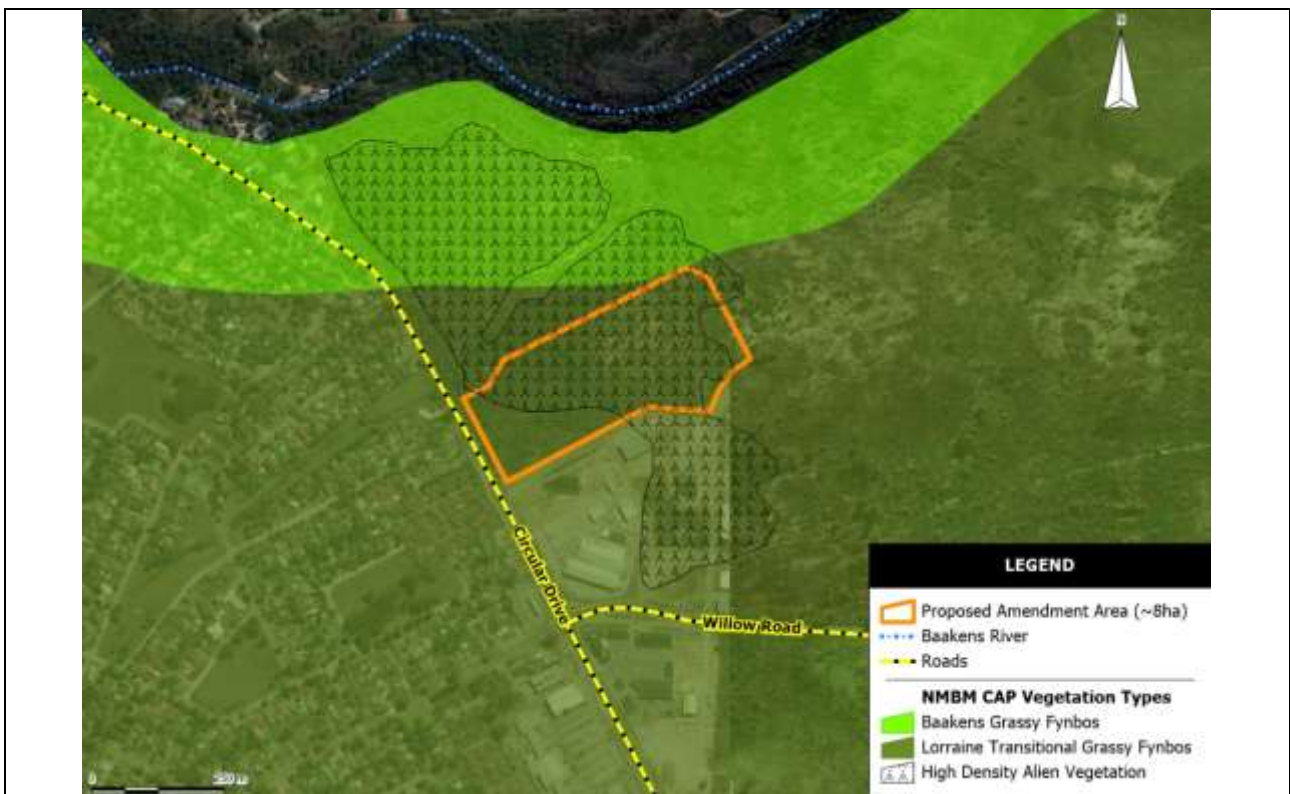


Figure 5.9: NMBM CAP Vegetation types and distribution at the study site.

The transformed nature of the site was verified on site by the vegetation specialist at the time of the previous assessment (see Figure 5.10).

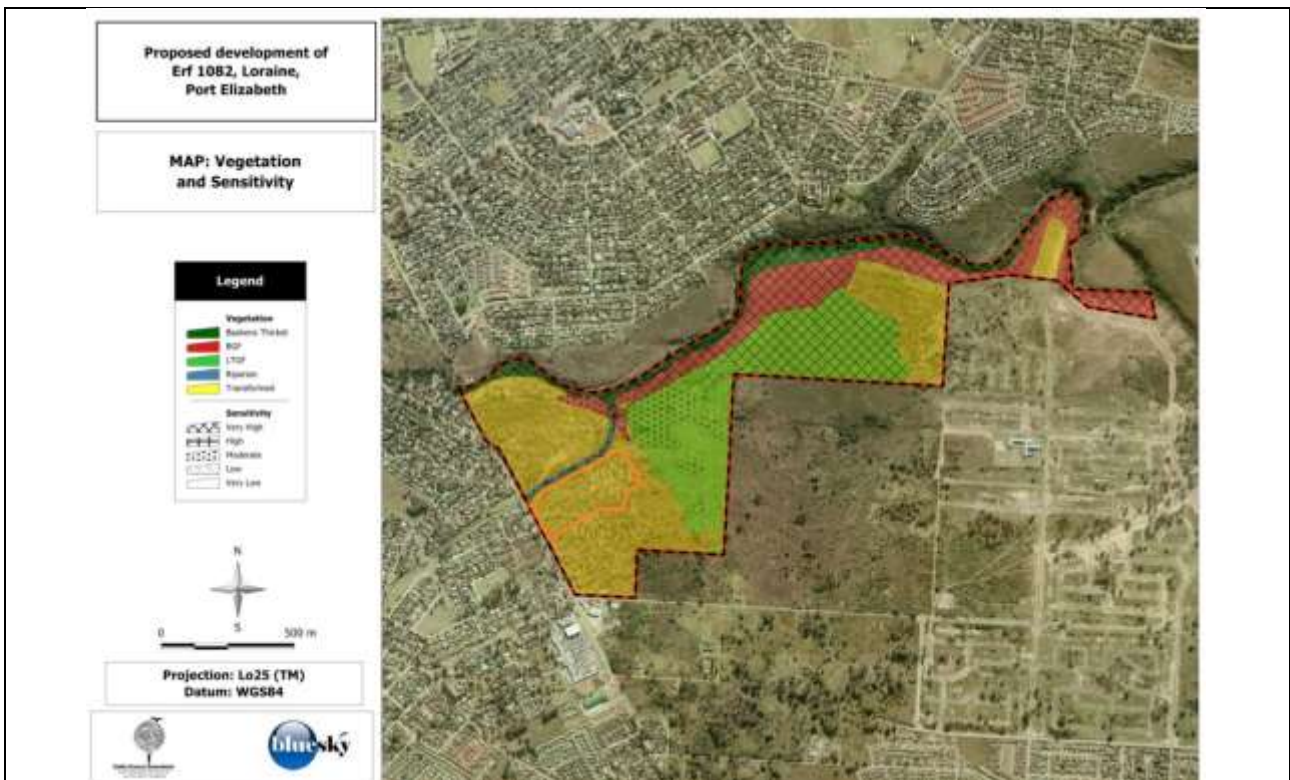


Figure 5.10: Vegetation types and distribution at the study site as per the previous vegetation assessment (Pote, 2010, pg. 6.6), Phase 5 and 6 outlined in orange.

The following is an excerpt from the aforementioned vegetation assessment compiled by Mr Jamie Pote in 2010, which has relevance to the portion of the site which is proposed for rezoning, although these descriptions are not necessarily limited to this portion:

“Historical land use appears to include predominantly a Eucalyptus plantation in the western portion, with dense to moderate alien infestation by *Acacia saligna*.” (Pote, 2010, pg.6.3).

“Eucalyptus dominated exotic tree stands with indigenous groundcover remnants

The transformed areas in the site tend to have a low biodiversity (predominantly grasses and some herbs) often with a moderate to high density of alien species (Acacia spp. & Eucalyptus spp.) and are thus of limited conservation importance and most suited to be used for development. Typical grass species include Digitaria sp., Pennisetum clandestinum, Stenotaphrum clandestinum and Themeda triandra. Some protected species were noted within the disturbed area. The protected species within the disturbed areas are however mostly conducive to relocation.

The areas adjacent to the drainage lines are however important in terms of drainage and ecological connectivity and the ecological corridor and buffer areas should be retained even if transformed.”

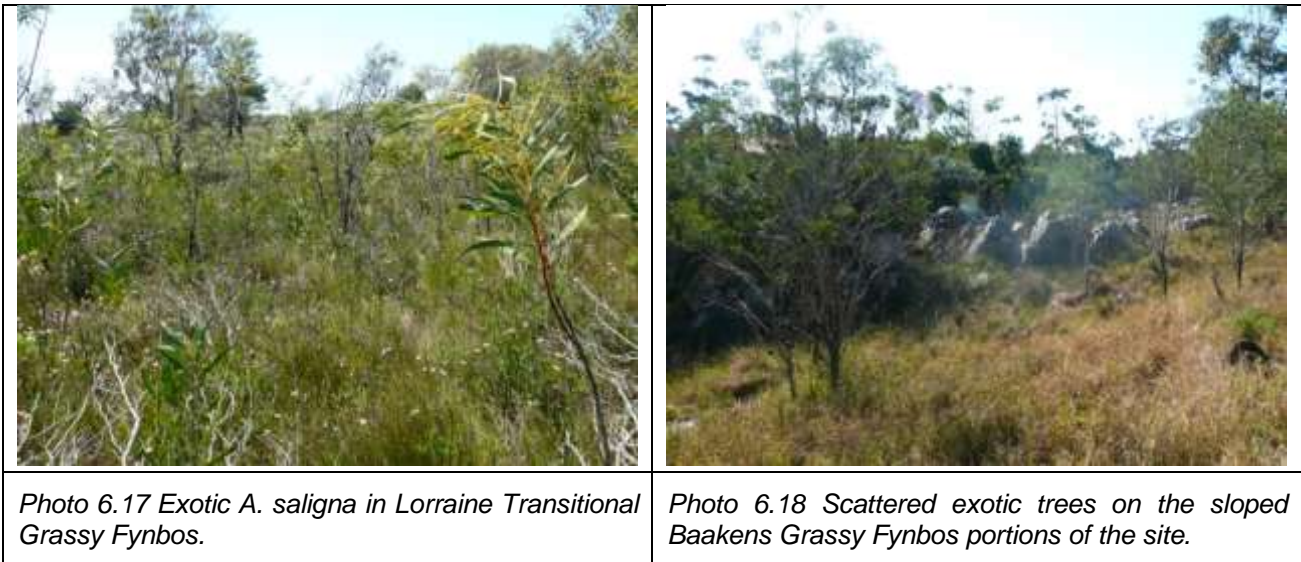


Photo 6.15 Virtually no understory vegetation was present under the Eucalyptus canopy.

Photo 6.16 Eucalyptus stand on the site.

“Dense scattered pockets of exotic trees (Acacia saligna)

The exotic trees stands on the site include Acacia saligna, Acacia longifolia, Acacia mearnsii, Eucalyptus sp., Hakea sp., Leptospermum laevigatum and Pinus sp. These exotics are present as extensive stands in the western and central portions of the site, and as isolated smaller stands or scattered individuals on various other localities on the property, including along the slope adjacent to the Baakens River. The understory vegetation in the dense exotic tree stands was limited to sparse grass cover (Cynodon dactylon, Pennisetum clandestinum) and weeds.”



(Pote, 2010, pg.6.9-6.10)

A site visit conducted on 26 July 2018 revealed that the portion of the site proposed for rezoning is still covered largely by exotic trees, predominantly *Eucalyptus* and *Acacia* species and sparse grass cover (see Plate 5.3 below).



Plate 5.3: Photos of the present vegetation cover of the portion of the site proposed for rezoning taken in the southern (left) and eastern (right) portions of the site, indicating the transformed nature of the site.

The above findings are further supported by the conclusions of the State of Environment Report (dated 23 July 2018) prepared by the Environmental Control Officer for the development, Mr Mark Marshall of Sandula Conservation, as per the requirements of condition 3.1.6 of the current Environmental Authorisation. In his description of the affected environment he notes the following regarding the alien vegetation occurring on Erf 1082:

*“Alien vegetation exists throughout the study area but is advanced in certain areas, where it is well established and reproducing. Even though this habitat is alien and not natural in terms of biodiversity, it nevertheless allows for faunal species to exist, thus creating habitat. This plant community consists of alien vegetation such as Rooikrants (*Acacia cyclops*), Port Jackson (*Acacia saligna*) and Black wattle (*Acacia mearnsii*). Due to the presence of alien vegetation, vertebrate presence are mainly limited to birds nesting in the trees, mammals traversing through the vegetation. Reptiles are also*

limited to arboreal snakes, lizards and geckos. Invertebrates make use of this habitat for feed and shelter.” (Marshall, 2018, pg.7)

5.9.2.1 Biodiversity Patterns and Processes (Ecological Corridors & Critical Biodiversity Areas)

The NMBM Bioregional Plan makes provision for biodiversity corridors through Critical Ecological Process areas and Critical Biodiversity Areas. The NMBM CAP mapping resources indicate that the entire site is designated Critical Biodiversity Area, and a portion thereof as Critical Ecological Process area (Riverine Corridor) (see Figure 5.11).

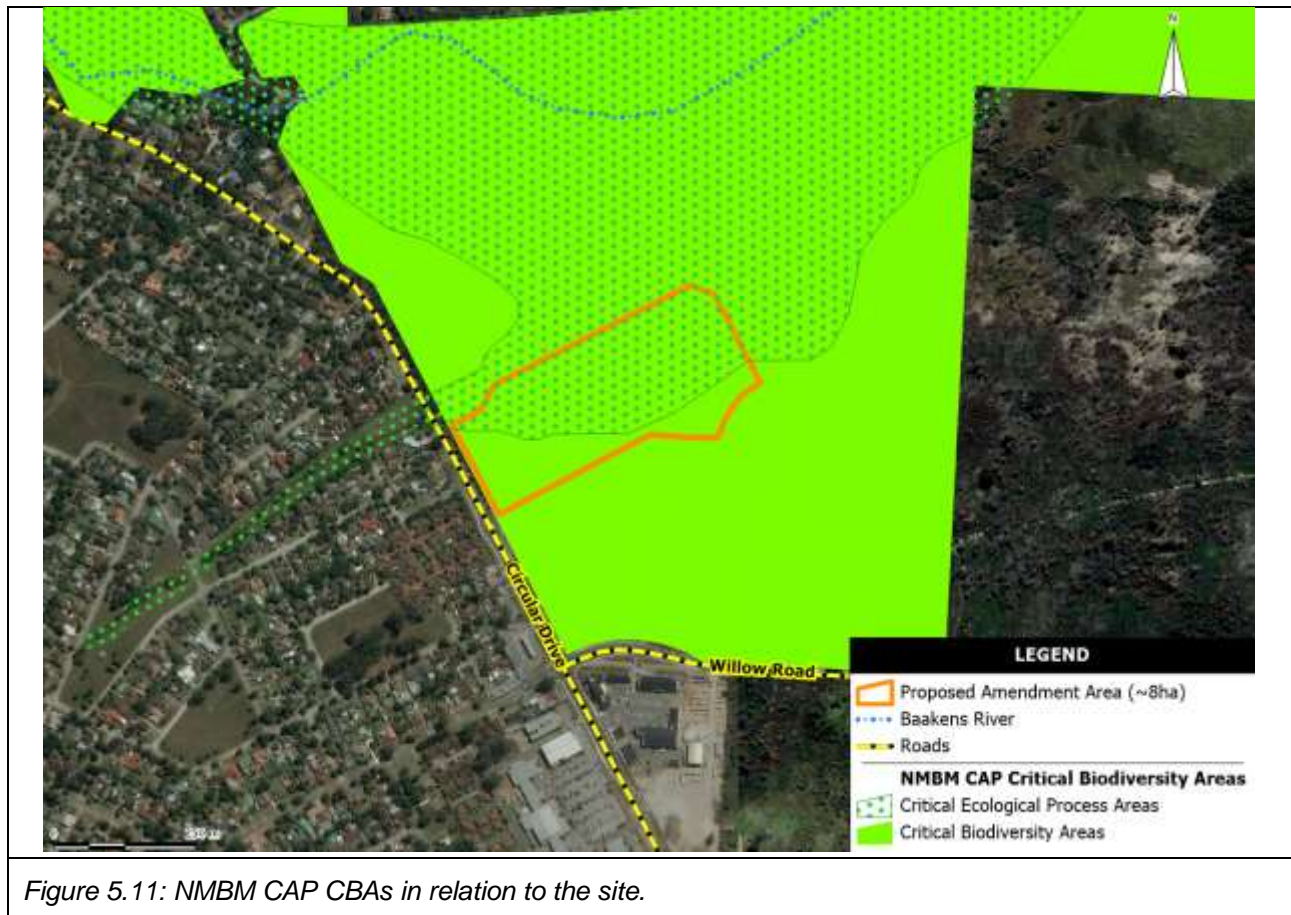


Figure 5.11: NMBM CAP CBAs in relation to the site.

At the time of the previous vegetation assessment the NMBM CAP CBA mapping resources were also included in the report. However, the following was noted by the previous author regarding the assigned CBA status of the portion proposed for rezoning:

“The NMBM CAP indicates that the entire site is designated Critical Biodiversity Area. However the site visit and specialist investigation has revealed that the CBA area within the western portion of the site is in fact an exotic eucalyptus tree stand with some scattered individuals of indigenous species.” (Pote, 2010, pg.6.17)

The following conclusion was made by the specialist regarding risks posed by the development (whole of erf 1082) to Critical Ecological Process Areas:

“The proposed development does not pose any significant risk to NMBM Critical Ecological Process Areas, as they will be retained as Open Space.” (Pote, 2010, pg.6.17)

Given the persisting transformed nature of the site as verified on 26 July 2018, the above conclusions are still deemed appropriately applied to the portion that is proposed for rezoning.

The above conclusions are further supported by the findings of the State of Environment Report (dated 23 July 2018). In his assessment of the impacts of the proposed development of Erf 1082 as a whole, the following is highlighted regarding potential future impacts on ecological corridor/ habitat continuity:

“When examining the development footprint it is noted that the future development will not negatively affect the corridor/habitat continuity of the study area. Certain amphibian species may only make use of water sources for breeding and spend the rest of their existence away from water. These amphibians will not migrate to the development footprint as it is too far from the existing water source. Amphibians which rely permanently on water will not be affected as the water source is not disturbed in terms of the above impact.” (Marshall, 2018, pg.9)

5.9.2.2 Terrestrial Vegetation Conservation Value

Given the above observations made in 2010 and again in 2018, the initial conclusions regarding the Conservation Value of the vegetation located within the portion which is proposed for rezoning can still be drawn, namely:

*“The **transformed vegetation** on the site is of Low Conservation Value:*

- *The eucalyptus plantation vegetation on the site represents largely transformed habitat, with a very low density of indigenous species and high density invasion by exotic trees and grasses. It does provide some unique faunal habitat for nesting species and contain isolated individuals that belong to protected plant groups. The conservation of this vegetation would provide limited benefits.*

*The **exotic tree stands** on the site are considered to be of Low Conservation Value:*

- *Dense exotic tree stands contribute to fire risk and erosion; do not provide particularly good habitat for indigenous fauna; and generally do not harbour unique faunal or floral taxa; it would therefore not provide significant benefits to conserve this vegetation.”* (Pote, 2010, pg.6.15)

5.10 PERMIT REQUIREMENTS

5.10.1 Aquatic

The following documents (amongst others) could be required during the Water Use License Application, as required by the Department of Water and Sanitation (DWS):

- Aquatic assessment with delineation, of wetlands and watercourses on and within 500m of the site, supplied together with an analysis and potential sensitivity identification, i.e. this report.
- Supporting documentation in terms of the activity and applicant.

	Water Use Activity	Applicable to this Development
S21(a)	Taking water from a water resource	Not applicable – water will be supplied by NMBM
S21(b)	Storing water	Possibly, but will be advised by DWS – e.g. rainwater storage tanks
S21(c)	Impeding or diverting the flow of water in a watercourse	Not applicable if no development takes place within water course + buffer or 1:100 year flood line whichever is larger

S21(d)	Engaging in a stream flow reduction activity	Not applicable if no development takes place within water course + buffer or 1:100-year flood line whichever is larger
S21(e)	Engaging in a controlled activity	No
S21(f)	Discharging waste or water containing waste into a water resource through a pipe, canal, sewer or other conduit	No
S21(g)	Disposing of waste in a manner which may detrimentally impact on a water resource	Possibly, but will be advised by DWS
S21(h)	Disposing in any manner of water which contains waste from, or which has been heated in, any industrial or power generation process	No
S21(i)	Altering the bed, banks, course or characteristics of a watercourse	Not applicable
S21(j)	Removing, discharging or disposing of water found underground for the continuation of an activity or for the safety of persons	No
S21(k)	Using water for recreational purposes	No

5.10.2 Terrestrial

The permit requirements identified during the previous assessment are still deemed to apply, namely:

Removal or translocation of species protected in terms of the Provincial Nature Conservation Ordinance No. 19 of 1974 (PNCO) as well as the NEMBA Threatened and Protected Species list (ToPS), require permits from Department of Economic Development, Environmental Affairs and Tourism (DEDEAT). Species protected in terms of the National Forests Act of 1998 (NFA), require permits from the Department of Agriculture Forestry & Fisheries (DAFF).

These species should be removed from the designated construction areas and relocated to designated relocation area. Faunal and floral search and rescue should be conducted within the areas where construction/ vegetation clearing activities are to occur.

Given the transformed nature of the portion proposed for rezoning, however, it is not anticipated that many of such species will be located within the proposed development footprint.

5.11 IMPACT ASSESSMENT

5.11.1 Aquatic Impacts

No direct impact on any natural aquatic systems is anticipated assuming that no activities are located within the 1:100-year floodline or riparian zone and buffer, whichever is larger, i.e. the status quo of the current site should be unaffected.

Based then on this premise, coupled to the fact the stormwater management systems will be consolidated into one discharge point (instead of the previously proposed three (3)), with no direct flow into any natural water course, the impact assessment conducted previously and listed in Section 1.2 of this report were reassessed as follows:

Impacts Ratings that can be Upheld, i.e. No Change

Construction Phase Direct Impacts

- Direct loss of riparian vegetation along the Baakens River drainage line = MEDIUM (+)
- Increase erosion risk and topsoil loss due to vegetation clearing and disturbance = LOW (-)
- Disturbance and damage to riparian zone and riparian biota at the site, as a result of indirect activities (Amphibian) = LOW (-)
- Deterioration in surface water quality due to runoff, as a result of construction activities = VERY LOW (-)
- Disruption in flow into riparian areas = LOW (-)

Construction Indirect Impacts

- None identified

Operational Phase Direct Impacts

- Deterioration in surface water quality due to polluted stormwater runoff = VERY LOW (-)

Operational Phase Direct Impacts

- Impact of construction of the sewer infrastructure located outside the residential commercial footprints on wetland/ riparian areas = LOW (-)
- Impact of construction of the stormwater infrastructure located outside the residential commercial footprints on wetland/ riparian areas = VERY LOW (-)
 - Note this assessment was previously based on there being three (3) stormwater outfalls, which have now been consolidated into one (1), that will discharge into open space, with no direct runoff into the nearby water courses, thus further reducing the risk of the impact

Impact Ratings Amended

Construction phase Direct Impacts

**Disruption of Ecological Corridors, Patterns and Process (Previously MODERATE (-))
(previous comments/ ratings in blue and changes in red)**

Nature of the Impact	The Baakens River forms a critical ecological process area, and the entire site is designated as a Critical Biodiversity Area. Development of the site may disrupt ecological corridors, patterns and processes up- and down-stream along the Baakens River corridor.
Extent	Localised - The impact will be limited to the property but will have influence on the Baakens River corridor - hence up- and down-stream processes may be disrupted. This Amendment Application has taken cognizance of this and has thus removed any Phase 5 and 6 footprints outside of the 1:100-year floodline, as well as any stormwater discharge points from these areas.
Duration	Permanent - Disturbance in the ecological connectivity will be permanent. Temporary
Intensity	Medium Low
Probability	Probable Improbable
Degree of Confidence	High
Status and Significance of Impact (no mitigation)	High Negative (-) - Any disturbance in the ecological corridor on site may lead to a loss of ecosystem functioning and impact negatively on ecological patterns and processes at the site and surrounding areas along the Baakens River Corridor. The retention of an Open Space corridor along the Baakens River will reduce the overall impact of this disruption. Low Negative (-)
Mitigation	<ul style="list-style-type: none"> • Exclude riparian area and designated Open Space from development. Adhered to in the revised layout • Employ internal road designs that will allow both surface and subsurface water flow to continue unimpeded.

	<ul style="list-style-type: none"> An alien clearing plan must be implemented along the Baakens River banks <i>before</i> construction commences Degraded and transformed areas must be restored and rehabilitated before and parallel to the construction phase to compensate for the disruption of ecological processes An open space management plan to be implemented
Significance and Status (with mitigation)	Moderate Negative (-) The amended project layout effectively avoids these sensitive areas. The riparian areas associated with the Baakens River and its tributary have been retained in the Open Space system for the development and are excluded from development. VERY LOW (-)
Residual Impact	Some permanent loss of ecological corridors, patterns and processes is likely to remain, with an associated migration, predominantly of fauna associated with the habitat, but an equilibrium will be attained once construction is completed.

5.11.2 Terrestrial Impacts

Construction Phase Direct Impacts

- Destruction of habitat for plant species of special concern (SSC) within the development footprints = MEDIUM (-)
- Direct Loss of plant SSC due to vegetation clearing and disturbance = MODERATE (-)
- Destruction of exotic plants (weeds and invaders) during site clearing for construction = HIGH (+)
- Destruction of bird habitat – Eucalyptus tree removal, Baakens Thicket and overhang altering. = LOW (-)
- The introduction of inappropriate vegetation or trees. = LOW (-)

Construction Indirect Impacts

- Increased exotic plant invasion due to disturbance of soils and vegetation = MEDIUM (+)

Operational Phase Indirect Impacts

- General habitat degradation in the Open Space Areas (vegetation disturbance & trampling, waste dumping). = VERY LOW (-)
- Introduction of exotic flora and risk of alien plant invasion = MODERATE (+)

In terms of the current approved zoning, all of the existing vegetation on the site (Phase 5 and 6) would be cleared to allow for the construction of the houses, roads and Private Open Space areas. This would still be the case, should the zoning of the site be changed as proposed. The impacts that were previously identified, which relate to the vegetation and associated habitat, are deemed to still be applicable and are not anticipated to change. All mitigation measures previously proposed, as well as the associated conditions in the current Environmental Authorisation are still applicable.

As part of the Amendment Application, the area that is currently zoned Private Open Space of ~0.52ha, will be lost. However, the need to have an area set aside as Private Open Space within the Residential 2 development is a town planning requirement and was not based on the conservation value of the vegetation on the site. As noted above, all of the existing vegetation on the site (Phase 5 and 6) would be cleared to allow for the construction of the housing development and replaced with ornamental gardens and lawns within the Private Open Space areas and private gardens. This would still be the case, should the zoning of the site be changed as proposed.

Impacts associated with the increased risk of introduction of exotic flora and the potential spread thereof into the surrounding indigenous vegetation, in particular the Open Space areas, during the operational phase, might have a slightly lowered significance, should the zoning change. This

opinion is based on the fact that fewer ornamental gardens associated with the proposed rezoning would possibly result in a lower risk of introduction and spread of exotics.

5.12 CONCLUSION AND RECOMMENDATIONS

In this assessment various watercourses were confirmed in the regional and study area landscape, but no natural systems were observed directly within the site. The site is, however, directly adjacent to a tributary of the Baakens River but located outside of the 1:100-year floodline.

These systems, their current state and functionality were evaluated against the previous impact assessment and the proposed layout amendment, and with the exception of 1 impact, all previous impacts related to the riparian/ aquatic environment could be upheld, i.e. the layout revision will not present an increase in the significance of any impacts and post-mitigation would still remain LOW or VERY LOW.

Only one impact, namely **Disruption of Ecological Corridors, Patterns and Process** required revaluation, as the revised layout and alterations to the stormwater management system would result in a lower or reduced impact significance, thus the MODERATE (-) impact was rated as VERY LOW (-) based on the amendment changes.

The stormwater management plan has now consolidated all discharge structures into one area and will no longer discharge into the 1:100-year flood line. In order to prevent issues such as erosion/ sedimentation, and to trap any solid waste from entering any downstream areas it is recommended that the following **additional condition** be included in the amended Environmental Authorisation, should one be granted:

- **An amended layout plan for the roads and wet services for Phase 5 and 6, based on the layout plan titled “Subdivision of Erf 1082, Fairview Stage 3 Preliminary Design of Roads and Wet Services” with drawing number H115868-AS-001 Rev A, by Hatch Africa, is to be submitted to DEDEAT for approval prior to the commencement of construction. The layout should clearly indicate the placement of erosion control and velocity dissipation structures, as well as suitably sized stilling basins into the single discharge point for Phase 5 and 6.**

The EMPr should also be updated to reflect the above mitigatory requirement.

All impacts on the terrestrial vegetation identified during the original EIA are deemed still applicable to the proposed amendment. No significant advantages or disadvantages of the proposed zoning changes have been identified, from a biophysical perspective. All mitigation measures previously proposed, as well as the conditions in the current Amended Environmental Authorisation as well as the requirements of the EMPr are still applicable.

As per the existing Amended Environmental Authorisation, a faunal and floral search and rescue must be undertaken prior to commencement of vegetation clearing on site (Condition 3.3.13 and 3.3.15 of Amendment Notice 2). Also of importance, is the condition to fence off the No-Go (open space areas) area adjacent to the proposed development footprint - to the north and east – prior to commencement of clearing activities to ensure that these areas are not damaged or disturbed during the construction phase (Condition 3.3.3.3 in Amendment Notice 2 and Condition 3.7 in Amendment Notice 4).

5.13 REFERENCES

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