

FRESHWATER ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF ERF 511, WETTON IN CAPE TOWN

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EXECUTIVE SUMMARY

It is proposed to construct 20 residential units on Erf 511, Wetton. There is an isolated sand fynbos depression wetland on the erf. This wetland is considered to be largely modified and of low ecological sensitivity and importance. The wetland attenuates flooding and captures sediment, phosphates, nitrates and toxicants to a moderate extent.

In order to maintain the ecosystem services provided by the wetland area as well as offset the loss of wetland habitat in the proposed development, an open area for storm water attenuation that will incorporate wetland features is proposed. The area of the new proposed storm water open area is approximately 500 m² while the exiting wetland is ~1400m². Although the loss of the wetland will not be completely offset, the loss in habitat is not deemed a significant impact due to the existing wetland's modified state and low ecological importance. The supply of ecosystem services of the wetland will however not be reduced by the reduction in the wetland size.

*It is recommended that the wetland area should be kept clear of *P. clandestinum* grass as well as woody invasive plants which are abundant in the area, such as *Acacia saligna*. Control of these species should be done in conjunction with the planting of indigenous aquatic and facultative aquatic plants, such as *Psoralea pinnata*, *Wachendorphia paniculata*, *Juncus capensis*, *Pycnus polystachyos*, *Schoenoplectus scirpoides*, *Zantedeschia aethiopica* and *Cynodon dactylon*. The seasonal wetland should aid with the attenuation of larger storm flows. The wider seasonal wetland should be managed as a wetland area and not mowed to establish a lawn as this will facilitate the dominance of *P. clandestinum*.*

Prevention of any contaminated arising from the construction activities from impacting on the aquatic features should be managed in terms of the Environmental Management Plan for the Project. The construction should take place in the drier summer seasons as this will reduce the runoff from the construction site into the adjacent wetland areas.

The mitigation of the impacts of the storm water arising from the proposed developed area should be mitigated through onsite storm water management. In addition the increased intensity of the runoff from the site that would result from the hardening of surfaces within the site should be mitigated by encouraging infiltration where possible within the developed site.

The risk of the proposed activities is considered to be moderate to low provided the mitigation measures are implemented.

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2. TERMS OF REFERENCE

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

Task 1: Freshwater Impact Assessment

- 1.1 Literature survey and initialisation
- 1.2 Site assessment to determine the impact on freshwater resources and meeting with DWS staff
- 1.3 Compile freshwater assessment opinion report
- 1.4 Wetland offset
- 1.5 Rehabilitation plan
- 1.6 DWS site meeting
- 1.7 Review of report and liaison with client

Task 2: Water use authorisation support

- 2.1. Collate relevant information
- 2.2. Compile section 21 c and i supplementary form
- 2.3. Submit WULA (section 21 c and i)
- 2.4. Liaison and review

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 site. The site was visited in January 2016, during the dry summer months. Despite the dry period, significant water was present within the site as a result of storm water discharge to the site.

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 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 water 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:

- Analysis of the freshwater ecosystems was undertaken at a rapid level and did not involve detailed habitat and biota assessments;
- 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 wetland areas. According to the delineation procedure, the wetlands were delineated by considering the following wetland indicators: terrain unit indicator; Soil form indicator; Soil wetness indicator; and vegetation indicator.

- The wetlands were subsequently classified according to their hydro-geomorphic determinants based on a classification system devised by Kotze *et al* (2004) and SANBI (2009). Notes were made on the levels of degradation in the wetlands based on field experience and a general understanding of the types of systems present.
- A Present Ecological State (PES) assessment was conducted for each hydro-geomorphic wetland unit identified and delineated within the study area. For the purpose of this study, the tool WET-Health as defined in the WET Health Series developed for the Water Research Commission was used to assess the present ecological state of each wetland unit. Each hydro-geomorphic (HGM) unit was thus assessed based on four modules, namely hydrology, geomorphology, water quality and vegetation.
- The functional wetland assessment technique, WET-EcoServices, developed by Kotze *et al* (2009) was used to provide an indication of the ecological benefits and services provided by delineated wetland habitat. This technique consists of assessing a combination of desktop and infield criteria in order to identify the importance and level of functioning of the wetland units within the landscape.
- The 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 the wetlands/river's functioning and 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. OVERVIEW OF STUDY AREA

Erf 511 lies on the outskirts of the suburb of Wetton and at the edge of the Philippi Horticultural area in Cape Town. The site is 4361 m² in extent and is currently undeveloped but is surrounded by residential development. The area lies within the wider Cape Flats District that is characterised by a low lying and relatively flat area. The wider area consists of numerous canals and water bodies. Access to the property is via Blomhof Road, off the Old Strandfontein Road.

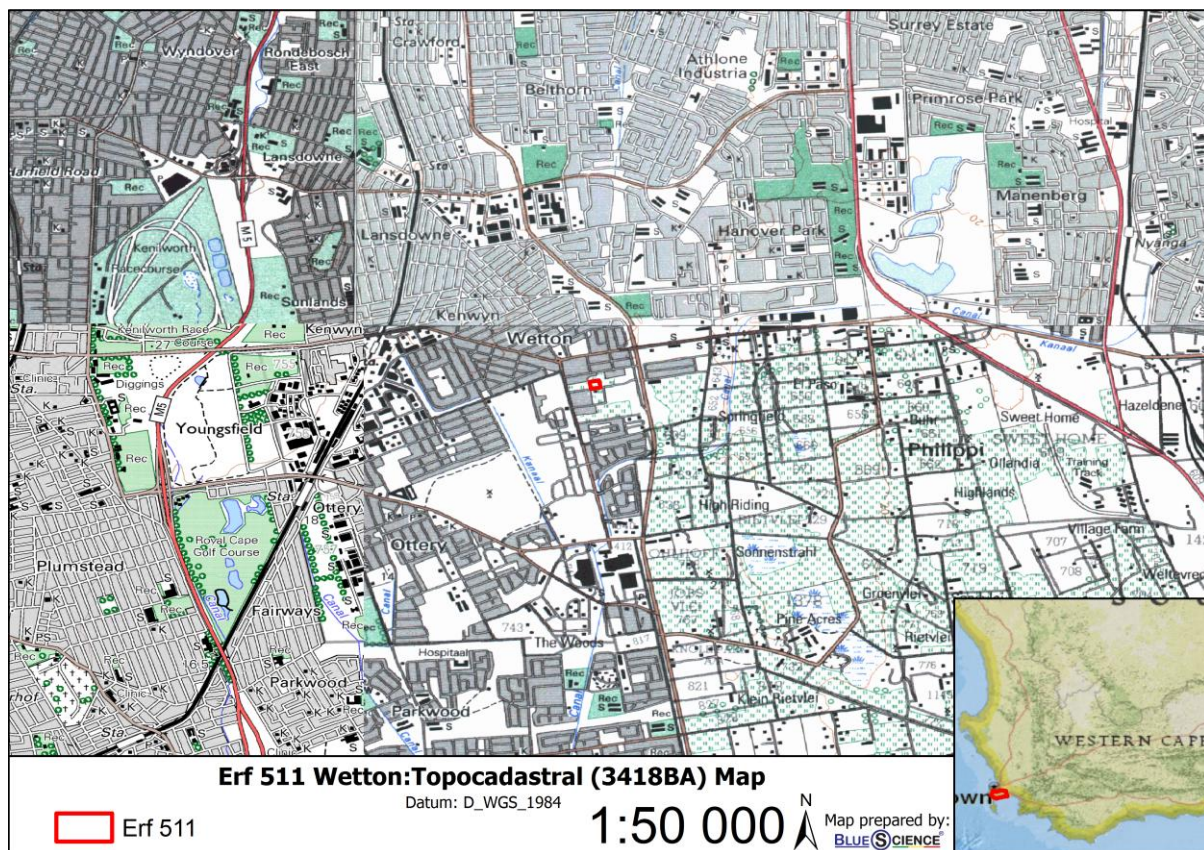


Figure 2. Topography map (3418 AB&BA) showing the location of Erf 511 in Wetton

5.2. ACTIVITY DESCRIPTION

It is proposed to construct 20 residential units on Erf 511, Wetton. These units will take up 1600m² and 37% of the erf's area (Figure 3). Furthermore the development will include a circulatory road network (770m²), open space which will also account for storm water flow from and through the site (382m²) and a refuse room (16m²). The open space and storm water servitude will be located in the north-eastern corner of the site and will consist of a channel and storm water pond that will also accommodate a wetland offset area.



Figure 3. The proposed layout of the development on Erf 511, Wetton

6. PHYSICAL CHARACTERISTICS OF THE STUDY SITE

6.1. VISUAL CHARACTERISTICS

Erf 511 is located in an urban area and is fringed by vibracrete walls of residential perimeters on the north, west and south, while an open erf (Erf 509) lies on its eastern side. The site is flat with storm water draining into and off of the site. The property is currently undeveloped and consists largely of grasses and rushes (Figure 4). The open site to the east receives significant volumes of storm water from the surrounding developed areas.



Figure 4. Erf 511 surrounded by residential properties

6.2. CLIMATE

The area has a Mediterranean climate and is characterized by higher rainfall and lower temperatures in winter than in summer. This trend can be seen in Figure 5. Higher rainfall and the associated higher run-off are important considerations for the timing of construction activities. Prevailing winds are south-easterly during the summer and north-westerly during the winter.

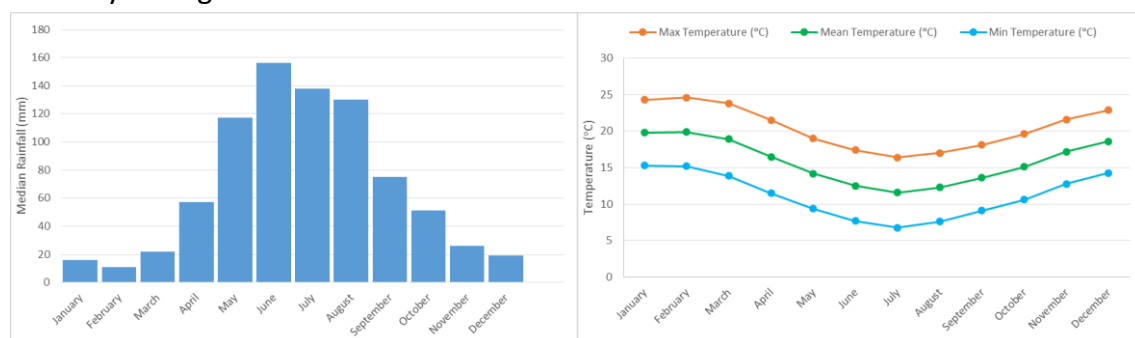


Figure 5. Average monthly rainfall and temperatures for the study area (Cape Farm Mapper, 2016)

6.3. GEOLOGY AND SOIL

The predominant geology of most of the Cape Flats is Sandveld Group Sands, formed from the deposition of aeolian sands. The soils at the study site are sandy in texture and typically leached with a subsurface accumulation of organic matter and aluminium (olive green area Figure 6).

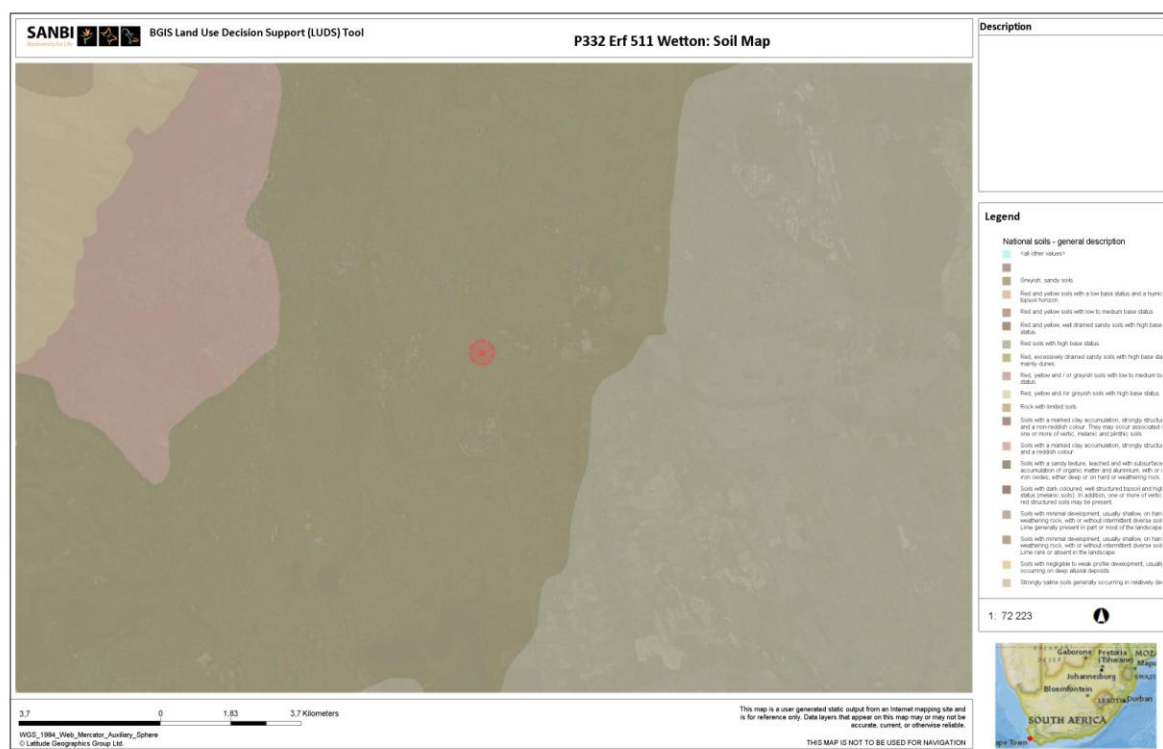


Figure 6. Soil map for the area (SANBI Biodiversity GIS, 2016)

6.4. FLORA

The natural vegetation which is thought to have once occurred in the study area is mapped as Cape Flats Sand Fynbos (pale purple area in Figure 7). This vegetation type is mapped as critically endangered. None of this vegetation type is still intact within the study area. Only a mix of grasses (invasive alien kikuyu grass in the drier areas and indigenous kweek grass in the wetter areas) occur with rushes and sedges (*Typha capensis* bulrushes in the permanently inundated areas and *Pycreus polystachyos* sedges in the seasonally inundated areas) in the wetland areas.

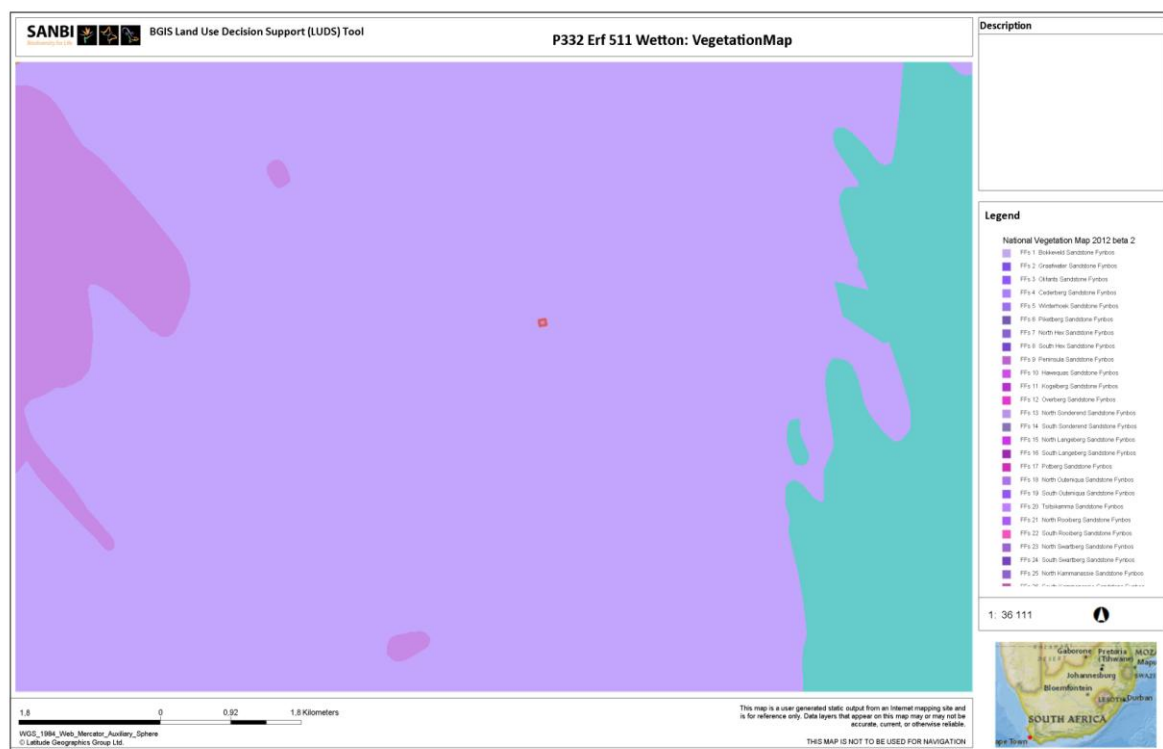


Figure 7. Vegetation types for the study area (SANBI Biodiversity GIS, 2016)

6.5. AQUATIC FEATURES

The proposed development site lies within the catchment of the Zeekoe/Lotus River and Zeekoevlei System which are situated in the Cape Flats District of the City of Cape Town (Quaternary catchment G22D). The catchment is in general on the low-lying Cape Flats and a large portion is underlain by the Cape Flats Aquifer. As a result there are a large number of vleis within the catchment, including Rondevlei, Princessvlei and Zeekoevlei. The Zeekoe/Lotus River consists largely of a number of artificially created canals which serve to drain this low lying area. Due to the amount of high density residential development in the upper to middle reaches of the catchment, the water quality as well as ecosystem health of this system is poor to very poor.

Wetland areas were detected within the site during the site visit. Storm water flows in a channel through the site's north eastern corner, draining towards the south east (Figure 8). The wetland areas are associated with this channel. The wetland is further discussed in Section 7.



Figure 8. A Google Earth Image of the wetland features on Erf 511, Wetton

6.6. THE CITY OF CAPE TOWN'S BIODIVERSITY NETWORK AND FRESHWATER ECOSYSTEM PRIORITY AREAS

Two biodiversity mapping initiatives are of relevance to the study area in terms of aquatic ecosystems, the City of Cape Town Biodiversity Network mapping and the national Freshwater Ecosystem Priority Areas (FEPA) mapping.

The City of Cape Town Biodiversity Network was established to enable the conservation of Critical Biodiversity Areas (CBA) which represents the minimum amount of terrestrial and freshwater habitat that is required to meet the City's biodiversity conservation targets. 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 to either Critical Ecological Support Areas (ESA) or Other ESA status based on level of transformation. Wetland ground-truthing has continued since the 2009 BioNet re-analysis and the wetland layer updated accordingly.

The aquatic features within the study area are not mapped as aquatic CBAs, however, there are CBAs downstream of the site (Figure 9). These are connected with the Zeekoe /Lotus River system and Zeekoeivlei. Impacts upon the wetlands on Erf 511 should be managed to ensure there are no negative downstream impacts upon these critical biodiversity areas.

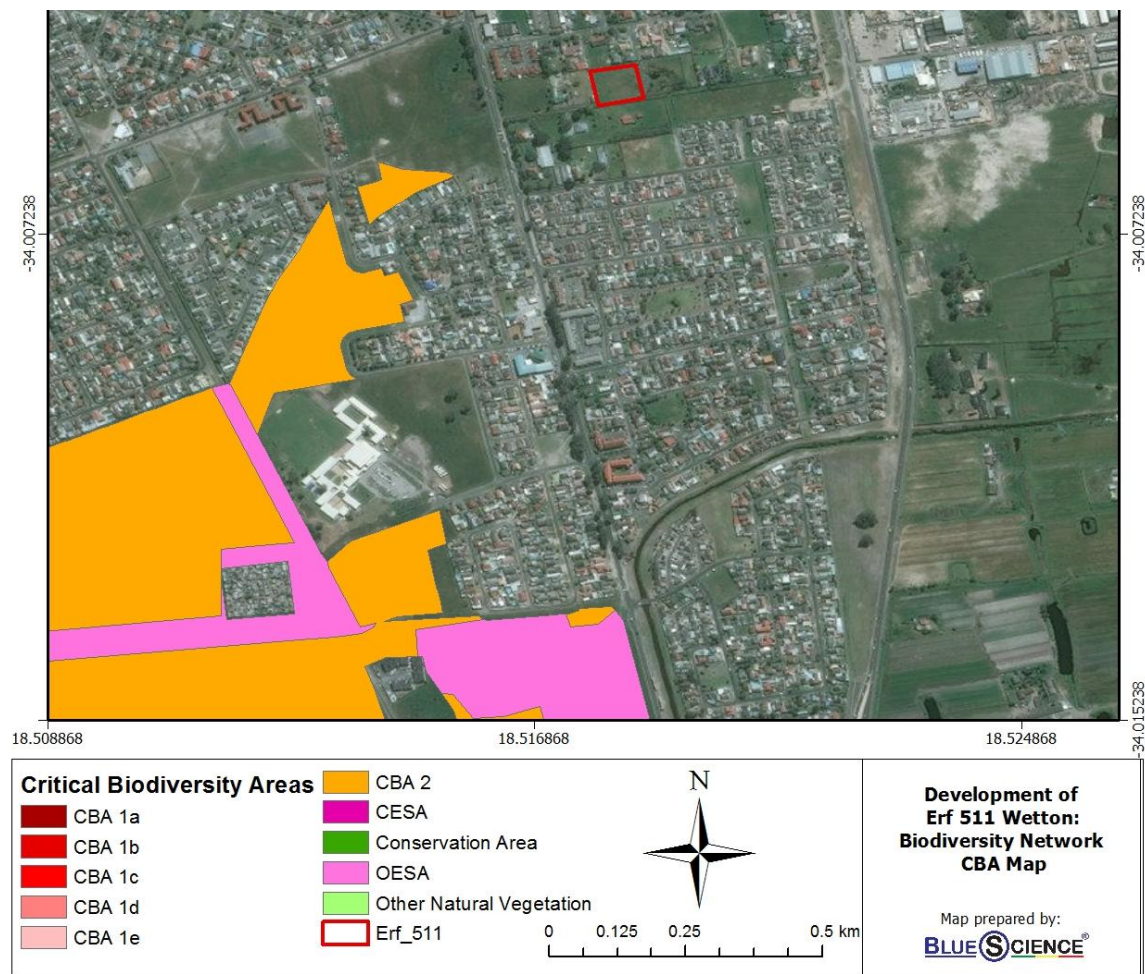


Figure 9. Cape Town Biodiversity Network mapping for the study area (SANBI Biodiversity GIS, 2016)

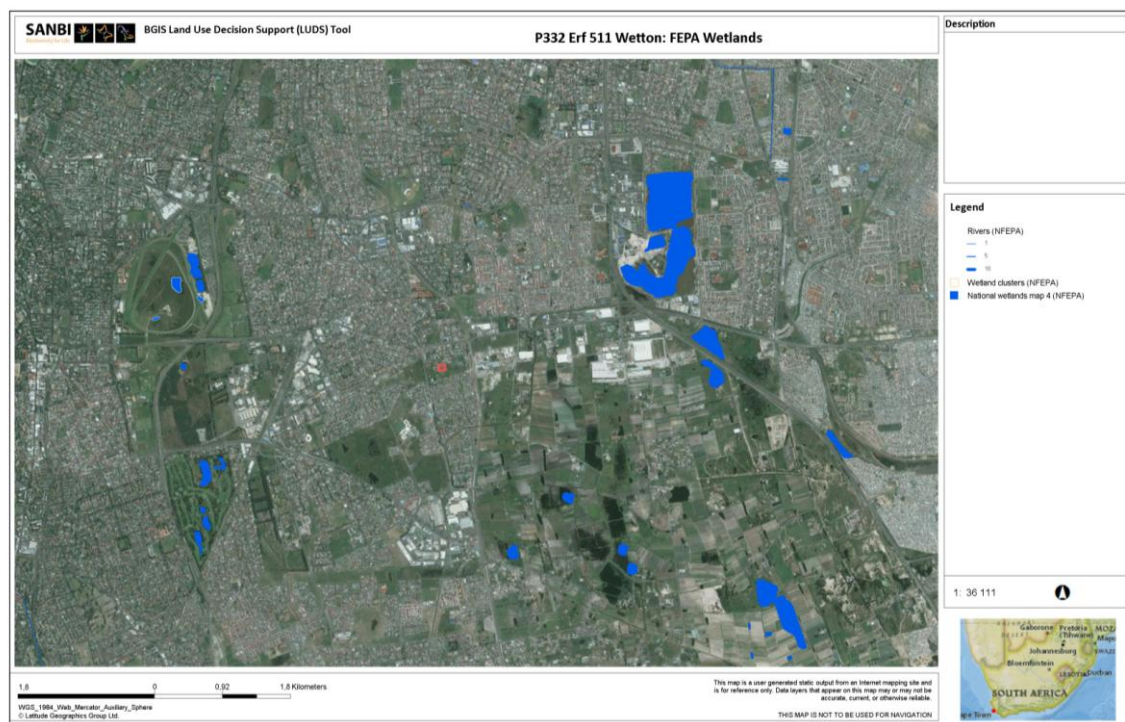


Figure 10. FEPA Wetlands in the vicinity study area (SANBI Biodiversity GIS, 2016)

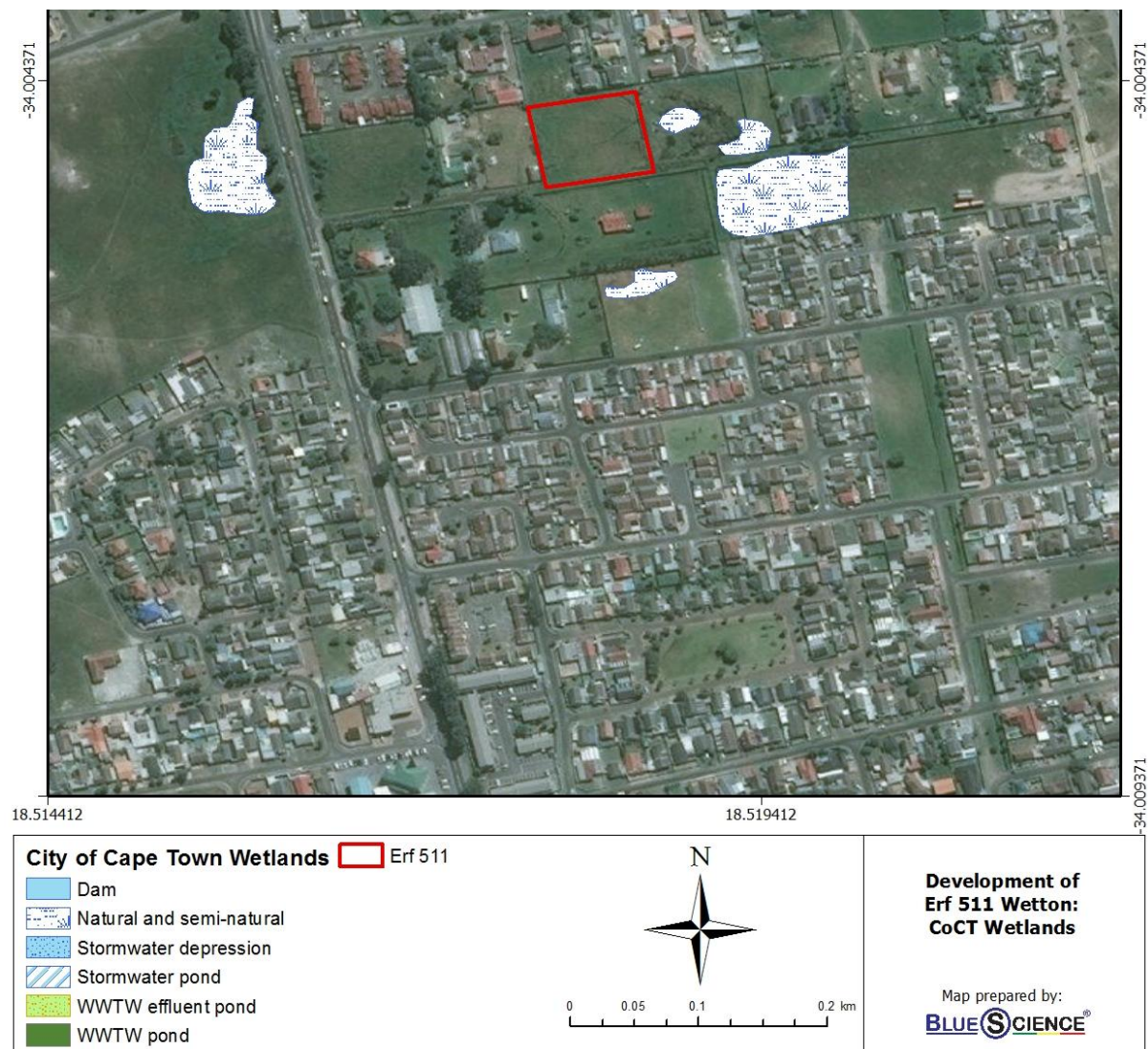


Figure 11. City of Cape Town wetland areas in the vicinity of the proposed activities

There are no aquatic features (rivers or wetlands) mapped on the study site in the National Freshwater Ecosystem Priority Areas (FEPA) maps (Figure 10). However, the City of Cape Town wetland mapping (Figure 11) indicates a number of small wetland areas, including the wetland on Erf 509, in the vicinity of Erf 511. Connectivity between these wetlands should be maintained and preferably linked with the Zeekoe/Lotus River and Zeekoeivlei downstream.

6.7. LAND USE

Erf 511 is located in the suburb of Wetton in the City of Cape Town and is zoned as Community 1: Local. The study area is mapped as urban (grey areas in Figure 12) in the 2009 national Landcover map. There are no areas mapped as natural in the study area (pale green areas in Figure 12). This is further reflected by the spatial development plan (Figure 13) for the area which has the area mapped as urban development. Agricultural activities take place to the south-east in Philippi Horticultural Area (yellow areas in Figure 12). The closest conservation areas are Edith Stevens Wetland Park (3 km to the east) and Zeekoeivlei/False Bay Ecology Park (5 km to the south).

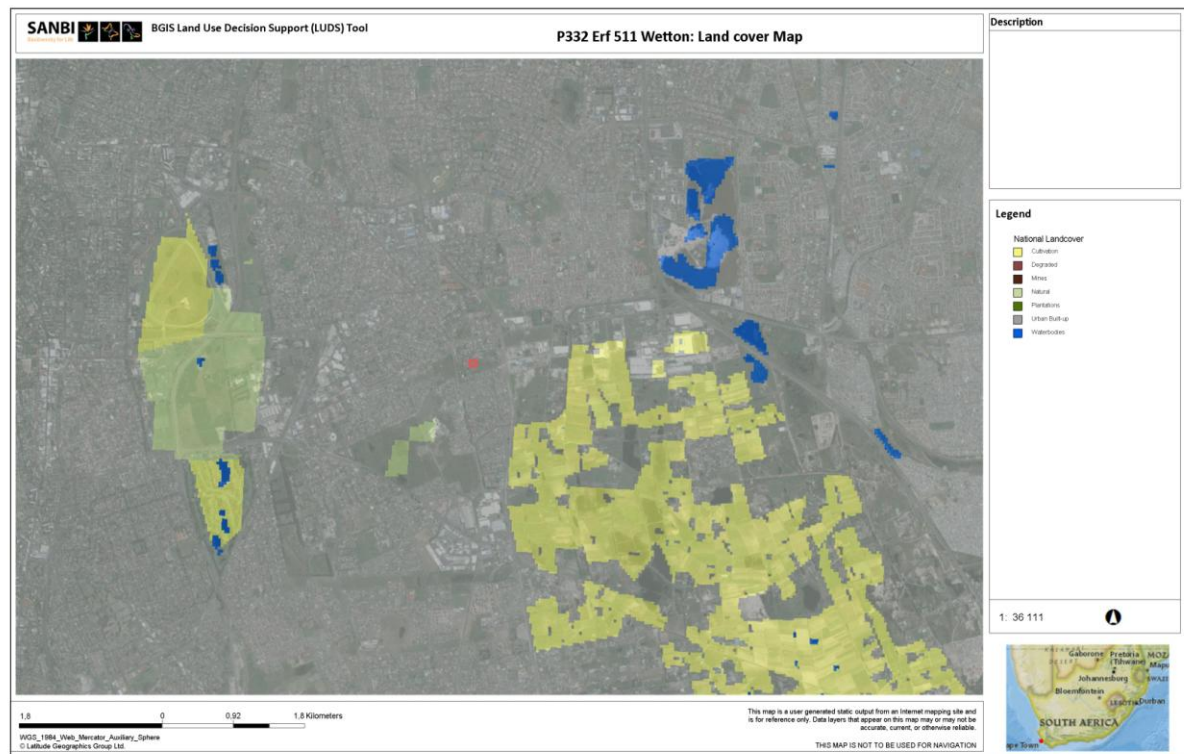


Figure 12. Land use map for surrounding area (SANBI Biodiversity GIS, 2016)

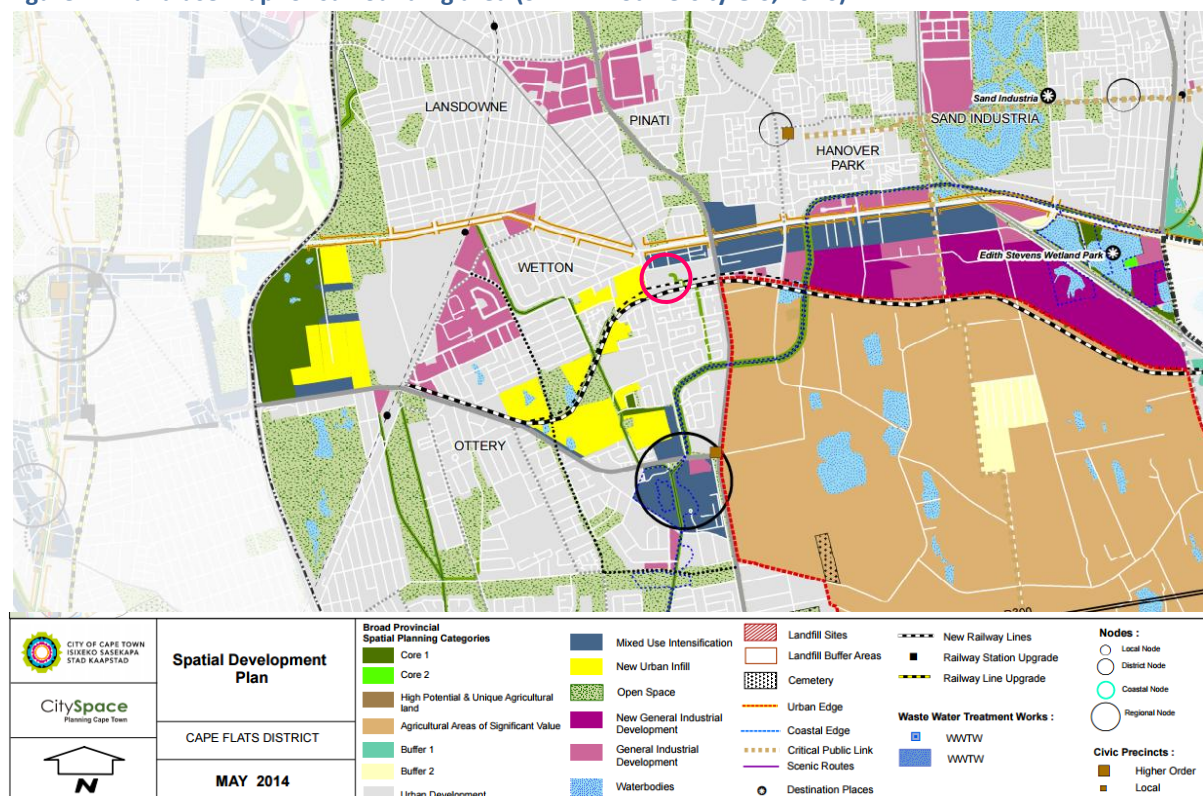


Figure 13. Spatial Development Plan for the area of concern (study area indicated by pink oval)

7. ASSESSMENT OF FRESHWATER FEATURES AND THEIR SIGNIFICANCE

7.1. WETLAND DESCRIPTION

Historically the area appears to have been wet, with a large wetland area to the east of the site (yellow oval in Figure 11). The area where the historical wetland occurred has now been developed and a new wetland area has formed on the erf immediately east of Erf 511, on Erf 509. The site was part of the greater Philippi Horticultural Area in 1938. Since then it has largely been developed into an urban area. The hardening of surfaces associated with this development has only increased the volume of storm water draining onto the undeveloped areas. The loss of surrounding permeable surfaces has also increased the wetlands importance as areas for storm water attenuation. As there is today, there appears to have been flow across the north eastern section of the site in 1938 (red oval in Figure 11).



Figure 14. An aerial photograph, captured in 1938, showing the study area (red circle) and the adjacent wetland area on Erf 509 (yellow circle)

Storm water enters the site from its northern boundary and flows diagonally across the north-eastern corner of the site to exit on the property's eastern boundary. The channel is dominated by bulrushes (*Typha capensis*) that indicate permanent to near-permanent inundation that is usually associated with storm water runoff in urban areas. The fringes of the bulrushes consist of slightly drier areas (but which were still wet in January 2016, during the site visit). These wetland fringes were dominated by *Cynodon dactylon* grassland with clumps of the sedge, *Pycnus polystachyos*, and arum lilies (*Zantedeschia aethiopica*). The rest of the site was dominated by invasive alien kikuyu grass (*Pennisetum clandestinum*) (Category 1b in wetlands where it does not already occur) and some alien dock (*Rumex usambarensis*) (Category 1b).

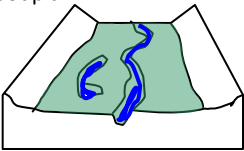
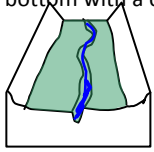
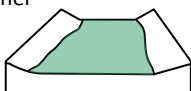
A drain/ storm water channel occurs along the erf's southern boundary. The channel appears to have been excavated in order to drain water off the site. Larger wetland habitat occurs on Erf 509 to

the east of the site. This wetland has been mapped as natural/near natural by the City of Cape Town wetland mapping (See Section 6.6). The flow of storm water across Erf 511 feeds into this wetland. The wetlands on Erf 511 are depression wetlands. The endangered Western Leopard Toad (*Bufo pantheris*), Clicking Stream Frog (*Strongylopus grayii*), Arum Lily Frog (*Hyperolius horstockii*) and Common Platanna (*Xenopus laevis*) are known to occur in the area.

7.2. WETLAND CLASSIFICATION

The classification of the wetland areas in the study area was based on the WET-EcoServices technique (Kotze *et al*, 2005). The WET-EcoServices technique identifies seven main types of wetland based on hydro-geomorphic characteristics (Table 2). The typical characteristic of these wetland areas is described in Table 3.

Table 2. Wetland hydro-geomorphic types typically supporting inland wetlands in South Africa

Hydro-geomorphic types	Description	Source of water maintaining wetland ¹	
		Surface	Sub-surface
Floodplain 	Valley bottom areas with a well-defined stream channel, gently sloped and characterized by floodplain features such as oxbow depressions and natural levees and the alluvial (by water) transport and deposition of sediment, usually leading to a net accumulation of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*
Valley bottom with a channel 	Valley bottom areas with a well-defined stream channel but lacking characteristic floodplain features. May be gently sloped and characterized by the net accumulation of alluvial deposits or may have steeper slopes and be characterized by the net loss of sediment. Water inputs from main channel (when channel banks overspill) and from adjacent slopes.	***	*/ ***
Valley bottom without a channel 	Valley bottom areas with no clearly defined stream channel, usually gently sloped and characterized by alluvial sediment deposition, generally leading to a net accumulation of sediment. Water inputs mainly from channel entering the wetland and also from adjacent slopes.	***	*/ ***
Hillslope seepage linked to a stream channel 	Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs are mainly from sub-surface flow and outflow is usually via a well-defined stream channel connecting the area directly to a stream channel.	*	***
Isolated Hillslope seepage 	Slopes on hillsides, which are characterized by the colluvial (transported by gravity) movement of materials. Water inputs mainly from sub-surface flow and outflow either very limited or through diffuse sub-surface and/or surface flow but with no direct surface water connection to a stream channel.	*	***
Depression (includes Pans) 	A basin shaped area with a closed elevation contour that allows for the accumulation of surface water (i.e. it is inward draining). It may also receive sub-surface water. An outlet is usually absent, and therefore this type is usually isolated from the stream channel network.	*/ ***	*/ ***

¹ Precipitation is an important water source and evapotranspiration an important

Water source: * Contribution usually small
 *** Contribution usually large
 */ *** Contribution may be small or important depending on the local circumstances
 Wetland

According to Table 2, the wetland features within the study area can be classified as follows:

Table 3. Classification of wetland areas within study area

Name	Erf 511, Wetton Wetlands
System	Inland
Ecoregion	South Western Coastal Belt
Landscape setting	Plain
Hydrogeomorphic Type	Depression wetlands
Longitudinal zonation	Not Applicable
Drainage	Surface water flows onto the site from the north and drains off through the site's eastern boundary
Seasonality	Permanent and seasonally inundated
Anthropogenic influence	Excavation of drainage lines. Invasion by kikuyu grass, development of surrounding area.
Vegetation	Cape Flats Sandstone Fynbos
Substrate	Sand
Salinity	Fresh

7.3. WETLAND INTEGRITY

The Present Ecological Status (PES) Method (DWAf 2005) was used to establish the integrity of the wetland in the study area and was based on the modified Habitat Integrity approach developed by Kleynhans (DWAf, 1999; Dickens *et al*, 2003). Table 4 shows the criteria and results from the assessment of the habitat integrity of the wetlands. These criteria were selected based on the assumption that anthropogenic modification of the criteria and attributes listed under each selected criterion can generally be regarded as the primary causes of the ecological integrity of a wetland.

Table 4. Habitat integrity assessment criteria for palustrine wetlands (Dickens *et al*, 2003)

Criteria	Relevance
Hydrologic	
Flow Modification	Consequence of abstraction, impoundment or increased runoff from developed land. Change in flow regime, volumes, velocity which affects inundation of wetland habitats resulting in floristic changes or incorrect cues to biota. Abstraction of groundwater flows to the wetland.
Permanent Inundation	Consequence of impoundment resulting in destruction of natural wetland habitat and cues for wetland biota.
Water Quality	
Water Quality Modification	From point or diffuse sources. Measure directly by laboratory analysis or assessed indirectly from upstream agricultural activities, human settlements and industrial activities. Aggravated by volumetric decrease in flow delivered to the wetland.
Sediment Load Modification	Consequence of reduction due to impoundments or increase due to land use practices such as overgrazing. Cause of unnatural rates of erosion, accretion or infilling of wetlands and habitats.
Hydraulic/Geomorphic	
Canalisation	Results in desiccation or changes to inundation patterns of wetland and thus changes in habitats. River diversions or drainage.
Topographic Alteration	Consequence of infilling, ploughing, dykes, trampling, bridges, roads, railway lines and other substrate disruptive activities that reduce or change wetland habitat directly in inundation patterns.
Biota	
Terrestrial Encroachment	Consequence of desiccation of wetland and encroachment of terrestrial plant species due to changes in hydrology or geomorphology. Change from wetland to terrestrial habitat and loss of wetland functions.
Indigenous Vegetation Removal	Direct destruction of habitat through farming activities, grazing or firewood collection affecting wildlife habitat and flow attenuation functions, organic matter inputs and increases potential for erosion.
Invasive Plant Encroachment	Affects habitat characteristics through changes in community structure and water quality changes (oxygen reduction and shading).
Alien Fauna	Presence of alien fauna affecting faunal community structure.
Over utilisation	Overgrazing, over fishing, etc.

Table 5. Wetland habitat integrity assessment (score of 0=critically modified to 5=unmodified)

Criteria & Attributes	Score
Hydrologic	
Flow Modification	2
Permanent Inundation	2.5
Water Quality	
Water Quality Modification	1.5
Sediment Load Modification	2
Hydraulic/Geomorphic	
Canalisation	2
Topographic Alteration	3.5
Biota	
Terrestrial Encroachment	3
Indigenous Vegetation Removal	1.5
Invasive Plant Encroachment	1.5
Alien Fauna	3.5
Over utilisation of Biota	3
Total Mean	2.4
Category	D (largely modified)

Table 6. Relation between scores given and ecological categories

Scoring Attribute*	Guidelines	Per	Interpretation of Mean* of Scores for all Attributes: Rating of Present Ecological Status Category (PESC)
Natural, score=5.	unmodified	-	Within general acceptable range CATEGORY A >4; Unmodified, or approximates natural condition.
Largely natural - score=4.			CATEGORY B >3 and ≤4; Largely natural with few modifications, but with some loss of natural habitats.
Moderately score=3.	modified-		CATEGORY C >2 and ≤3; moderately modified, but with some loss of natural habitats.
Largely modified - score=2.			CATEGORY D ≤2; largely modified. A large loss of natural habitats and basic ecosystem functions has occurred. OUTSIDE GENERALLY ACCEPTABLE RANGE
Seriously rating=1.	modified	-	CATEGORY E >0 and <2; seriously modified. The losses of natural habitats and basic ecosystem functions are extensive.
Critically modified - rating=0.			CLASS F 0; critically modified. Modifications have reached a critical level and the system has been modified completely with an almost complete loss of natural habitat.

The wetland areas on Erf 511 are considered to be largely modified. The major impact is the development of the surrounding areas, resulting in increased run-off with lower water quality. Other impacts relate to the construction of drainage channels for the conveyance of the storm water to and from the site and the invasion of kikuyu grass within the wetland areas. The site is wetter than it would have been naturally, with a larger permanently inundated area which has a low diversity as it is dominated by *T. capensis*.

7.4. ECOSYSTEM SERVICES SUPPLIED BY THE WETLANDS

The assessment of the ecosystem services supplied by the identified wetlands was conducted according to the guidelines as described by Kotze *et al* (2005). An assessment was undertaken that

examines and rates the services listed in Table 7. The characteristics were scored according to the general levels of services provided. The wetlands areas would appear to provide limited goods and services that are largely related to the mitigation of storm water runoff from the surrounding developed areas.

Table 7. Goods and services assessment results for the wetland in the study site (high=4; low=0)

Goods and services	Erf 511, Wetton Wetland
Flood attenuation	2
Stream flow regulation	0.5
Sediment trapping	2.0
Phosphate trapping	2.0
Nitrate removal	1.5
Toxicant removal	1.5
Erosion control	0.5
Carbon storage	1.5
Maintenance of biodiversity	1.5
Water supply for human use	0
Natural resources	0
Cultivated foods	0
Cultural significance	0
Tourism and recreation	0
Education and research	0

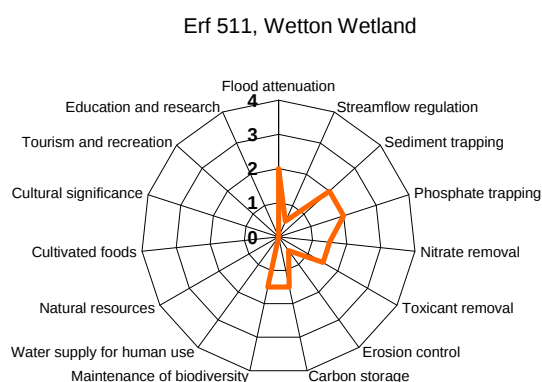


Figure 15. Ecosystem services provided by the wetland areas

The Erf 511 Wetton wetlands supply some goods and services in terms of flood attenuation, trapping of sediment, and storm water quality amelioration. It is these functions that should be maintained when developing the site.

7.5. 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 scale (Table 8). The median of the resultant score is calculated to derive the EIS category (Table 9). The results of the EIS assessment are shown in Table 10.

Table 8. Scale used to assess biotic and habitat determinants

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 9. 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 10. Results of the EIS assessment for the wetland areas

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

The wetland areas are not considered of ecological importance and have a low sensitivity. Therefore, the maintenance of the wetland should focus on maintaining the ecosystem services highlighted in Section 7.1.4.

8. WETLAND OFFSET ASSESSMENT

The existing wetland areas within the site consist of approximately 860 m² of permanently wet area and 180 m² of seasonally wet area, giving a total wetland area within the site of 1040 m² (Figure 3). To offset the existing wetland area it is proposed to create a grassed channel along the boundary at north-eastern corner of the site (about 50 m in length in total). The grassed channel will accommodate storm water from north (upstream) of the site as well as storm water generated on the sites and will then feed into the larger wetland area on the adjacent property on the eastern

boundary of the site. This property belongs to the City of Cape Town and consists largely of wetland habitat. A wetland area and storm water attenuation pond will be created at the north-eastern corner of the site and will be linked to the grassed channel.

The potential loss of wetland area was assessed using the DWS Wetland Offset Calculator to determine the wetland targets that would need to be achieved by the proposed wetland offset. A summary of the wetland offset targets for the wetland areas lost is provided in Table 11 below. The detailed assessments of the assessed wetland offset targets are attached in Appendix C.

Table 11. Wetland Offset Targets for wetland areas that would be lost

Wetland Offset Targets	Unit	Offset equivalent
Wetland Functionality	Functional area equivalents in m ²	416
Ecosystem Conservation	Habitat area equivalents in m ²	2652
Species Conservation	% habitat intactness	30

To attain the desired wetland offset to meet the targets provided above for the loss of wetland area within the site, a wetland area of nearly half of the site would need to be established. Considering the largely artificial nature of the wetland (the result of storm water runoff from surrounding developed areas), its setting in the landscape (within the urbanised area of Wetton which is not an affluent area) and the nature of the proposed development (a small private residential development), this extent of wetland would render the development of the site to not be economically feasible. There are thus two alternatives that could be considered in this regard:

- To develop a smaller on-site wetland offset that is largely associated with the storm water management for the site and meets with the City's policy requirements for a sustainable urban drainage system (SUDS); or
- To mitigate the loss of wetland through an off-site wetland offset on the adjacent City property.

The first option is the one preferred and proposed as described above. The second option would require agreements to be put in place with the City and would entail enhancement of the existing 1 700 m² of wetland as well as increasing the extent of the wetland to the required offset area of approximately 2 200 m². There would also need to be agreement with the City on the longer term maintenance and management of this wetland.

Based on the proposed layout plan and the available open space if 20 residential units were constructed within the property, allows for the establishment of a wetland offset of between 100 and 500 m² would be possible (Figure 16). An assessment for an on-site wetland offset of 500 m² was undertaken. The wetland offset could consist of a mix of seasonal and permanently wet areas where the seasonal portion could consist of a mix of kweek grass with seasonal herbaceous plants such as arum lilies while the permanently wet area could consist of rushes and sedges. A summary of the potential gains of the proposed wetland offset is provided in Table 12.

Table 12. Potential Gains of Proposed Wetland Offset

Potential Gains	Unit	Proposed Storm water Pond Offset Area
Wetland Functionality	Functional area equivalents in m ²	264
Ecosystem Conservation	Habitat area equivalents in m ²	525
Species Conservation	% habitat intactness	53



Figure 16. Proposed layout for the development of the site with the open space in which the wetland offset can be created (green area), overlain in Google Earth

The detailed assessment of the proposed wetland offsets is attached in Appendix C. The wetland offset would also need to be designed to ensure that the loss of wetland functionality in terms of storm water mitigation was incorporated.

Table 13. Comparison of wetland offset target against the potential gains of the proposed wetland offset

Component	Wetland Offset Target	Proposed Offset Area	Comment
Wetland functionality (m ² Equivalent)	416	264	63% of wetland offset target will be achieved in terms of functionality however the offset area will be specific to meet City storm water management policy
Ecosystem Conservation (m ² Equivalent)	2652	525	Offset will achieve 20% of offset target in terms of ecosystem conservation – this is largely due to loss of wetland area and the location of the wetland within an urban area
Species Conservation (% habitat intactness)	30	53	Species conservation will be improved from that of the current wetland area due to the fact that the wetland habitats would be improved

From Table 13, it can be seen that while the proposed wetland offset will not meet the wetland offset targets and objectives listed in Table 11 in terms of wetland functionality and ecosystem conservation. There would however be gains in terms of species conservation due to the fact that

the created wetland area would be an improvement on that which currently occurs within the site. It can thus be said that the creation of 500 m² of wetland habitat created in the storm water ponds would largely meet the wetland offset targets for the loss of existing wetland areas within the site. The proposed wetland offset will be located within the same property and is within the same vegetation type and of the same wetland type as some of the wetland areas that would be lost. It will also provide similar ecosystem goods and services as that of the wetland areas to be lost, that is storm water mitigation.

9. LEGISLATIVE AND CONSERVATION PLANNING REQUIREMENTS

The proposed upgrade activities need 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 City of Cape Town's Integrated Development Plan (Figure 13) and Biodiversity Plan (Figure 9), the River Corridor and Floodplain Management Policy, as well as the National Water Act (NWA) and the National Environmental Management Act (NEMA).

9.1. NEMA AND ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

NEMA is the overarching piece of legislation for environmental management in South Africa and includes provisions which 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. The proposed activity triggers Listed Activities in terms of the EIA Regulations 2010, as amended and a Basic Assessment is being undertaken.

9.2. 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,

According to the preamble to Part 6 of the NWA, *“This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette...”* *“The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary...”*

The General Authorisations 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 have recently been revised (Government Notice R509 of 2016). The proposed works within or adjacent to the wetland areas are likely to change the characteristics of the associated freshwater ecosystems and may therefore require authorization. Determining if a water use licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of a General Authorisations (GA). A risk assessment for the proposed project is included in the following section.

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.

9.3. 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 storm water runoff from developed areas by introducing Water Sensitive Urban Design principles to urban planning and storm water management in the Cape Town metropolitan area. In order to reduce impacts of urban storm water systems on receiving waters, all storm water 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 storm water runoff;
- Control quantity and rate of storm water 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 storm water 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 upliftment 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.

10. ASSESSMENT OF IMPACTS

10.1. DESCRIPTION OF POTENTIAL IMPACTS ON THE FRESHWATER ECOSYSTEMS

NATURE OF IMPACT: LOSS OF WETLAND HABITAT

The proposed activity will see the current wetland footprint of ~1040m² reduced to an area of about 500 m². This 500 m² will be set aside for storm water attenuation and open space. The current canal will be moved to pass through the north eastern corner of the property and a storm water pond and wetland areas will be constructed that are linked to the canal.

Significance of impacts without mitigation: The potential significance of this impact is considered to be medium to low as the wetland is not considered to be of ecological importance and will be offset.

Proposed mitigation: Kikuyu grass (*P. clandestinum*) should be kept out of the wetland area and associated open space. The newly designed wetland should contain both permanently inundated areas such as the channel and pond as well as a wider seasonal wetland which should be vegetated with appropriate wetland species such as, *Psoralea pinnata*, *Wachendorphia paniculata*, *Juncus*

capensis, *Pycnus polystachyos*, *Schoenoplectus scirpoides*, *Zantedeschia aethiopica* and *Cynodon dactylon*. The seasonal wetland should aid with the attenuation of larger storm flows. The wider seasonal wetland should be managed as a wetland area and not mowed to establish a lawn as this will facilitate the dominance of *P. clandestinum*.

Significance of impacts after mitigation: Low

Nature	Loss of aquatic habitat and associated ecosystem services	Status	-
Impact source(s)	Establishment of a residential development on Erf 511		
Impacted aquatic ecosystem	Wetlands on Erf 511 and potentially downstream wetland areas		
Magnitude	Extent	Local	
	Intensity	Medium	
	Duration	Short to long term	
	Reversibility	Irreversible	
	Probability	Probable	
Significance	Without mitigation	Medium to Low	M/L
	With mitigation	Low	L
Confidence	High		

NATURE OF IMPACT: IMPAIRMENT OF THE SURFACE WATER QUALITY

The current wetland offers moderate ecosystem services in terms flood attenuation, and the trapping of sediment, phosphate, nitrates and toxicants. With the reduction in size and further canalisation of the wetland, the degree to which these services of supplied by the wetland could be decreased.

Significance of impacts without mitigation: Low

Proposed mitigation: Prevention of any contaminated arising from the construction activities from impacting on the aquatic features should be managed in terms of the Environmental Management Plan for the Project. The construction should take place in the drier summer seasons as this will reduce the runoff from the construction site into the adjacent wetland areas. The wetland area should be designed to mitigate the water quality impacts arising from the site.

Significance of impacts after mitigation: Very Low

Nature	Impairment of water quality (sedimentation and possible contamination from construction materials and litter)	Status	-
Impact source(s)	Contaminated runoff from the construction and operation activities at the site		
Impacted aquatic ecosystem	The wetlands in and adjacent to Erf 509		
Magnitude	Extent	Local	
	Intensity	Medium to low	
	Duration	Short to long term	
	Reversibility	Reversible	
	Probability	Unlikely	
Significance	Without mitigation	Low	L
	With mitigation	Very Low	VL
Confidence	Medium		

NATURE OF IMPACT: MODIFICATION OF RUNOFF FROM THE SITE

Development of the site for the proposed development would be expected to alter the runoff characteristics of the site. In addition, if the wetland areas within the site are not offset, the impact of upstream storm water on the downstream aquatic features that is currently being mitigated by the wetland areas will increase.

Significance of impacts without mitigation: The proposed activities would be expected to have a limited impact that would be considered to be of a medium to low significance.

Proposed mitigation: The mitigation of the impacts of the storm water arising from the proposed developed area should be mitigated through onsite storm water management. The increased intensity of the runoff from the site that would result from the hardening of surfaces within the site should be mitigated by encouraging infiltration where possible within the developed site. The runoff from the site should be attenuated to reduce the risk of flooding of the downstream areas.

Significance of impacts after mitigation: A localised impact of very low overall significance.

Operational phase impact table:

Nature	Modification of storm water runoff characteristics from the site	Status	-
Impact source(s)	Construction and operation activities for the proposed development		
Impacted aquatic ecosystem	Aquatic biota and habitat downstream of the site		
Magnitude	<i>Extent</i>	Local	
	<i>Intensity</i>	Medium to low	
	<i>Duration</i>	Short and longer term	
	<i>Reversibility</i>	Reversible	
	<i>Probability</i>	Probable	
Significance	<i>Without mitigation</i>	Medium to low	M/L
	<i>With mitigation</i>	Very Low significance	VL
Confidence	Medium		

10.2. CUMULATIVE IMPACTS

The proposed development takes place within an area where much of the open spaces have been developed or are likely to be developed. As the permeable soils of the area have been developed or will be converted to hardened surfaces, the intensity of storm-water flows will increase. In addition, the replacement of wetlands in the wider area with hard storm water infrastructure such as canals and pipes result in more intensive runoff flows with poorer water quality drain into the important aquatic ecosystems downstream such as Zeekoeivlei, Rondevlei and Princessvlei. This also reduces the ability of the area to accommodate very high rainfall and run-off and increases the areas susceptibility to flooding.

11. RISK ASSESSMENT

A risk assessment was carried out for the proposed activity (summary in Table 14). The full risk assessment matrix is included in Appendix C. The risk rating, of the proposed activities is considered to be moderate to low provided the mitigation measures are implemented.

Table 14. A summary of the risk assessment for the proposed activity

Phases	Activity	Aspect	Impact	Significance	Risk Rating*
Construction	Construction of residential development	Construction of infrastructure such as houses and roads	Loss of wetland functioning; water quality impacts	100.75	M
		Construction of storm water attenuation / wetland area		48	L
Operation	Management of the open space / storm water wetland area	Control of alien vegetation, removal of sediment	Loss of habitat and biodiversity	48	L

* Where Low (L) risk has a significance score of 1-55 and Moderate risk (M) has a score of 56-169

12. CONCLUSIONS AND RECOMMENDATIONS

Erf 511, Wetton contains an isolated sand fynbos depression wetland that consists of permanent and seasonally wet areas. The wetland is considered to be largely modified and of low ecological sensitivity and importance. The wetland area supplies some goods and services in terms of flood attenuation, trapping of sediment, and storm water quality amelioration.

In order to be able to develop the site, the wetland areas within the site will largely be lost. To attain the desired wetland offset to meet the targets determined for the loss of wetland area within the site, a wetland area of nearly half of the site would need to be established. Considering the largely artificial nature of the wetland, its setting in the landscape and the nature of the proposed development, this extent of wetland offset would render the development of the site to not be economically feasible. Two wetland offset alternatives could be considered: a smaller on-site wetland offset; or an off-site wetland offset on the adjacent property. The first alternative is preferred as the second alternative would require agreements to be put in place with the City for the enhancement and longer term maintenance and management of the adjacent wetland area.

In order address an on-site wetland offset, an open area that will incorporate wetland features as well as storm water attenuation facilities is proposed. The area of the new proposed storm water open area is approximately 500 m² while the exiting wetland is ~1400m². Although the loss of the wetland will not be completely offset, the loss in habitat is not deemed a significant impact due to the existing wetland's modified state and low ecological importance. The supply of ecosystem services of the wetland will however not be reduced by the reduction in the wetland size.

It is recommended that the wetland area should be kept clear of *P. clandestinum* grass as well as woody invasive plants which are abundant in the area, such as *Acacia saligna*. Control of these species should be done in conjunction with the planting of indigenous aquatic and facultative aquatic plants, such as *Psoralea pinnata*, *Wachendorphia paniculata*, *Juncus capensis*, *Pycnus polystachyos*, *Schoenoplectus scirpoides*, *Zantedeschia aethiopica* and *Cynodon dactylon*. The seasonal wetland should aid with the attenuation of larger storm flows. The wider seasonal wetland should be managed as a wetland area and not mowed to establish a lawn as this will facilitate the dominance of *P. clandestinum*.

Prevention of any contaminated arising from the construction activities from impacting on the aquatic features should be managed in terms of the Environmental Management Plan for the Project. The construction should take place in the drier summer seasons as this will reduce the runoff from the construction site into the adjacent wetland areas.

The mitigation of the impacts of the storm water arising from the proposed developed area should be mitigated through onsite storm water management. In addition the increased intensity of the runoff from the site that would result from the hardening of surfaces within the site should be mitigated by encouraging infiltration where possible within the developed site.

The risk of the proposed activities is considered to be moderate to low provided the mitigation measures are implemented. This will likely require that a water use licence application will need to be submitted to the DWS for approval.

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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, 2010 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, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) 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 in terms of regulation 71 of GN No. R. 543.

Signature of the specialist:



Date: 10 October 2016

APPENDIX B: BACKGROUND AND QUALIFICATIONS OF SPECIALIST CONSULTANT

Contact details: PO Box 455, Somerset Mall, 7137

Names: Antonia Belcher

Profession: Aquatic Scientist

Fields of Expertise: Specialist in freshwater assessments, monitoring and reporting

Relevant work experience:

Due to involvement in the development and implementation of the River Health Programme in the Western Cape, as well as numerous freshwater assessments through the province and greater Southern Africa, we have taken part in many 'state-of-river' assessments as well as routine monitoring and specialized assessments of rivers and wetlands in the area.

Relevant publications:

- 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

ASPECTS AND IMPACT REGISTER/RISK ASSESSMENT FOR WATERCOURSES INCLUDING RIVERS, PANS, WETLANDS, SPRINGS, DRAINAGE LINES: Erf 511 Wetton Wetland
 COMPILED BY: Toni Belcher, BlueScience

Nr.	Phases	Activity	Aspect	Impact	Severity				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
					Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+ Vegetation)	Biota														
1	Construction	Construction of residential development	Construction of infrastructure such as houses and roads.	Loss of wetland functioning; water quality impacts	3	3	3	2	2.75	2	3	7.75	4	3	5	1	13	100.75	M	The construction should take place in the drier summer seasons as this will reduce the runoff into the wetland areas from the construction site. Prevention of any contaminated runoff from impacting on the aquatic features at the construction sites should be managed in terms of the Environmental Management Plan for the Project. The storm water attenuation pond should be large enough to ensure adequate retention time on the site to allow for the settling of sediment and removal of nutrients and toxicants.		Channelled Valley Bottom Wetland on Erf 511
			Construction of storm water attenuation area /wetland		2	2	2	2	2	1	3	6	1	1	5	1	8	48	L			
	Operation	Management of the open space /storm water / wetland area	Control of alien vegetation, removal of sediment	Loss of habitat and biodiversity	1	1	1	1	1	1	4	6	1	1	5	1	8	48	L	<i>P. clandestinum</i> grass should be kept out of the wetland area. The newly designed wetland should contain both permanently inundated areas such as the channel and pond as well as a wider seasonal wetland which should be vegetated with appropriate wetland species such as, <i>P. polystachyos</i> , <i>Z. aethiopica</i> and <i>C. dactylon</i> . The seasonal wetland should aid with the attenuation of larger storm flows. The wider seasonal wetland should be managed as a wetland area and not mowed to establish a lawn as this will facilitate the dominance of <i>P. clandestinum</i> .		

APPENDIX D: WETLAND OFFSET CALCULATION

Determining wetland offset targets: Permanent and seasonal					
Wetland Functionality Targets					
Impact Assessment	Prior to development	Wetland size (m2)	1040		
		Functional value (%)	45		
	Post development	Functional value (%)	0		
		Change in functional value (%)	40		
	Key Regulating and Supporting Services Identified		Stormwater amelioration & some habitat for wetland biota		
	Development Impact (Functional area equivalents)		416.0		
Offset calculation	Offset Ratios	Triggers for potential adjustment in exceptional circumstances	None		
		Functional Importance Ratio	1.0		
	Functional Offset Target (Functional area equivalents)		416.0		
Further considerations	Have other key Provisioning or Cultural Services Identified that require compensation?		No		
	Additional compensatory mechanisms proposed				
Ecosystem Conservation Targets					
Impact Assessment	Prior to development	Wetland size (m2)	1040		
		Habitat intactness (%)	45		
	Post development	Habitat intactness (%)	0		
		Change in habitat intactness (%)	40		
Development Impact (Habitat area equivalents)		416			
Determining offset ratios	Ecosystem Status	Wetland Vegetation Group (or type based on local classification)	Depression wetlands within Cape Rats Sand Fynbos		
		Threat status of wetland	Threat status	CR	
			Threat status Score	15	
		Protection level of wetland	Protection level	Not Protected	
			Protection level Score	2	
		Protection level Score	2		
	Ecosystem Status Multiplier		30		
	Regional and National Conservation context	Priority of wetland as defined in Regional and National Conservation Plans	Not specifically identified as important	0.5	
		Regional & National Context Multiplier		0.5	
	Local site attributes	Uniqueness and importance of biota present in the wetland	Low biodiversity value	0.5	
		Buffer zone integrity (within 500m of wetland)	Buffer compatibility score	0	
		Local connectivity	Moderate connectivity	0.75	
		Local Context Multiplier		0.4	
	Ecosystem Conservation Ratio		6.38		
Offset Calculation	Development Impact (Habitat area equivalents)		416.0		
	Ecosystem Conservation Ratio		6.4		
	Ecosystem Conservation Target (Habitat area equivalents)		2652.0		
Species Conservation Targets					
Species review and selection	Desktop Evaluation: Species flagged as potentially occurring at the site	Species Name Typha capensis, Pycreus polystachyos, Zantedeschia aethiopica, Cynodon dactylon			
	Specialist assessment: Species of conservation concern identified as requiring offset activities	Species Selected All the species are occurring within highly disturbed wetland areas and are not considered of conservation concern	Rationale for species selection No species selected as none are considered as requiring offset activities		
Target Species 1: All the species are occurring within highly disturbed wetland areas and are not considered of conservation concern					
Impact Assessment	Impact measure	Selected species impact measure	Habitat measure		
		Selected unit of measurement	Wetland functionality and habitat diversity expressed as a percentage		
		Description and rationale for species impact measure selected Considering that the wetland area exists within an urban environment, it is recommended to rather measure functionality and the ability of the wetland area to provide stormwater functionality while also providing some habitat diversity for wetland biota			
	Prior to development	Species impact measure	30		
		Post development	Species impact measure	0	
	Change in species impact measure		30		
Development Impact (Species impact measure)		30			
Determining offset ratios	Offset Ratios	Offset Ratio	1.0		
		Description and rationale for offset ratio selected Due to the current degraded state of the wetland areas, the offset should at least be an improvement on the existing functionality and habitat diversity to be in any way meaningful			
	Species Conservation Ratio		1.0		
Offset Calculation	Development Impact (Species impact measure)		30.0		
	Species Conservation Ratio		1.0		
	Species Conservation Target (Species measure)		30.0		
Offset Calculation	Species	Unit of measure	Ratio Required	Species Conservation Targets	
	All the species are occurring within highly disturbed wetland areas and are not considered of conservation concern	Wetland functionality and habitat diversity expressed as a percentage	1.0	30.0	

Offset Receiving Areas: Assessing potential gains

Note: Cells where information must be entered are highlighted in grey

Contribution Towards Wetland Functionality Targets

Wetland attributes	Wetland Reference		Erf 511 Wetton Stormwater Pond System	
	Criterion	Relevance	Site attributes	Acceptability Guidelines
Alignment with site selection guidelines	Wetland type	Targeted wetlands should typically be of the same type to ensure that similar services to those impacted are improved through offset activities.	Wetland is of the same type as the impacted wetland.	Ideal
	Key services targeted	Targeted wetlands should be prioritised and selected based on their ability to compensate for key regulating and supporting services impacted by the proposed development.	Selected wetland is well placed to contribute meaningfully towards improving key regulating and supporting services identified.	Ideal
	Offset site location relative to impacted wetland	Targeted wetlands should ideally be located as close to the impacted site as possible.	Selected wetland is located within the same local catchment as the impacted wetland.	Ideal
	Overall comment on alignment with site selection guidelines	The offset would be located within the same site once developed and would be able to provide similar but improved functionality		
Preliminary Offset Calculation	Prior to offset activities	Wetland size (m2)	800	
		Functional value (%)	0	
	Following successful offset implementation	Functional value (%)	80	
		Change in functional value (%)	80	
	Preliminary Offset Contribution (Functional equivalents)		640.0	
Final Offset Calculation	Criterion	Relevance	Offset activity	Adjustment factor
	Types of offset activities proposed	The risk of offset failure is linked to the type of offset activity planned with wetland establishment considered less preferable and more risky than rehabilitation or averted loss activities.	Rehabilitation & Protection	0.66
	Final Offset Contribution (Functional equivalents)		422.4	

Contribution Towards Ecosystem Conservation Targets

Wetland attributes	Wetland Reference		Erf 511 Wetton Stormwater Pond System	
	Wetland Vegetation Group (or type based on local classification)		Depression wetland within Cape Flats Sand Fynbos	
	Threat status of wetland		Threat status	CR
	Criterion	Relevance	Site attributes	Acceptability Guidelines
Alignment with site selection guidelines	Like for Like	Targeted wetlands should be aligned with "like-for-like" criteria to ensure that gains associated with wetland protection are commensurate with losses.	Wetland is of the same wetland type within the same wetland vegetation group	Ideal
	Landscape planning	To what degree is wetland selection aligned with Regional and National Conservation Plans	Wetlands have not been specifically identified as important in landscape planning	May be acceptable
	Wetland condition	The habitat condition of the wetland should ideally be as good / better than that of the impacted site prior to development (or at least 8 PES Category in the case of largely un-impacted wetlands)	Final habitat condition is likely to be better than that of the impacted wetland.	Ideal
	Local biodiversity value	Wetlands that are unique or that are recognised as having a high local biodiversity value should be prioritised for wetland protection.	The wetland is characterised by habitat and / species of moderate biodiversity value.	Acceptable
	Viability of maintaining conservation values	Connectivity and consolidation with other intact ecosystems together with the potential for linkage between existing protected areas is preferable.	The wetland is well connected to other intact natural areas	Acceptable
	Overall comment on alignment with site selection guidelines	Connectivity within the area is also problematic as much of the target area is being urbanised - there will however be connectivity with wetland areas to the east of the site. The key functionality will be stormwater mitigation which is of a high priority in the urbanised environment		
Preliminary Offset Calculation	Wetland areas to be secured	Wetland size (m2)	2200.0	
		Habitat intactness (%)	80	
		Wetland habitat contribution (hectare equivalents)	1760.0	
	Buffer zones to be secured	Area of wetland buffer zone included in the wetland offset site	5	
		Integrity of buffer zone	0.5	
		Buffer zone area equivalents	0.6	
Final Offset Calculation	Buffer zone contribution (hectare equivalents)		0.6	
	Criterion	Relevance	Site attributes	Adjustment factor
	Security of tenure	Offset activities that formally secure offset sites for longer than the minimum requirement are more likely to be maintained in the long-term and are therefore preferred.	Minimum acceptable security of tenure for a longer period.	1.5
	Offset Contributions	Wetland habitat contribution (area equivalents)	2640.0	
		Buffer zone contribution (area equivalents)	0.9	
	Functional Offset Contribution (area equivalents)		2640.9	

Contribution Towards Species Conservation Targets

Target Species 1:		Psoralea pinnata, Wachendorphia paniculata, Juncus capensis, Pycreus polystachyos, Schoenoplectus scirpoides, Zantedeschia aethiopica, Cynodon dactylon		
Proposed offset activities	Description of offset activities proposed	Establishment of a wetland offset		
	Rationale for proposed offset activities	Wetland offset to be established in stormwater management system to replace lost functionality but will be enhanced to introduce wetland habitat lost due to development of site.		
Preliminary Offset Calculation	Species impact measure	Selected species impact measure	Habitat measure	
		Selected unit of measurement	area (square meters)	
		Species impact measure (secured)	80.0	
	Preliminary species contribution		80.0	
Final Offset Calculation	Criterion	Relevance	Site attributes	Adjustment factor
	Security of tenure	Offset activities that formally secure offset sites for longer than the minimum requirement are more likely to be maintained in the long-term and are therefore preferred.	Minimum acceptable security of tenure for shortest acceptable period	1
	Risk of proposed activities	The risk of activities potentially failing to deliver desired outcomes should be taken into account when assessing the potential offset contributions.	Moderate Risk	0.66
	Species Adjustment Factor			0.66
	Final Offset Contribution (Species measure)		52.8	

ADDENDUM TO FRESHWATER ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF ERF 511, WETTON IN CAPE TOWN

February 2018

Background

This addendum report provides freshwater specialist comment on the final layout plan (Dated February 2018) that ensued from discussions held with the Department of Water and Sanitation on the proposed layout plan considered in the Freshwater Report for the project, dated October 2016. Figure 1 below reflects the new proposed layout plan for the proposed development, dated February 2018. In this addendum report, the Risk Assessment of the initial freshwater assessment report has been revised for the new proposed layout plan to inform the water use authorisation for the proposed project.



Figure 1. The proposed final layout for Erf 511, Wetton

Risk Assessment

A revised risk assessment was carried out for the revised layout plan dated February 2018 (summary in Table 9). The full risk assessment matrix can be seen in full in Appendix A. The risk rating, (where Low (L) risk has a significance score of 1-55 and Moderate risk (M) has a score of 56-169) of the proposed activities is considered to be moderate to low provided the mitigation measures are implemented.

The revised layout poses a low risk of unacceptably impacting on the wetland features within the area and as such could be authorised by means of the General Authorisations for Section 21 (c) and (i) water uses.

Table 1: A summary of the risk assessment for the revised layout plan for Erf 511, Wetton

Phases	Activity	Aspect	Impact	Significance	Risk Rating
Construction	Construction of residential development	Construction of infrastructure such as houses, roads and stormwater infrastructure in and adjacent to wetland area	Loss of wetland habitat and functioning; water quality impacts	51.875	L
Operation	Management of the open space /storm water / wetland area	Control of alien vegetation, removal of sediment from wetland habitat	Loss of habitat and biodiversity	48	L

Concluding Remarks

The revised layout plan for the development has largely taken into account the delineated wetland areas within the site and as such now poses a low risk of unacceptably impacting on the aquatic features within the area, both during the construction and operation phases of the project.

Prepared By:

Toni Belcher



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Appendix A: Risk Assessment

ASPECTS AND IMPACT REGISTER/RISK ASSESSMENT FOR WATERCOURSES INCLUDING RIVERS, PANS, WETLANDS, SPRINGS,DRAINAGE LINES: Erf 511 Wetton Wetland

COMPILED BY: Toni Belcher, BlueScience (SACNASP 40040/10)

DATE: February 2018

Nr.	Phases	Activity	Aspect	Impact	Severity				Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating	Control Measures	Confidence	Type Watercourse
					Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorph+V egetation)	Biota														
1	Construction	Construction of residential development	Construction of infrastructure such as houses, roads and stormwater infrastructure in and adjacent to wetland area	Loss of wetland habitat and functioning; water quality impacts	1	1.25	1.25	1.25	1.1875	1	3	5.1875	1	3	5	1	10	51.875	L	The construction should take place in the drier summer seasons as this will reduce the runoff into the wetland areas from the construction site. Prevention of any contaminated runoff from impacting on the aquatic features at the construction sites should be managed in terms of the Environmental Management Plan for the Project. The storm water attenuation pond should be large enough to ensure adequate retention time on the site to allow for the settling of sediment and removal of nutrients and toxicants .	High	Seasonal and permanently inundated wetland areas on Erf 511: PES=D; EIS=Low
	Operation	Management of the open space /storm water / wetland area	Control of alien vegetation, removal of sediment from wetland habitat	Loss of habitat and biodiversity	1	1	1	1	1	1	4	6	1	1	5	1	8	48	L	<i>P. clandestinum</i> grass should be kept out of the wetland area. The newly designed wetland should contain both permanently inundated areas such as the channel and pond as well as a wider seasonal wetland which should be vegetated with appropriate wetland species such as, <i>P. polystachyos</i> , <i>Z. aethiopica</i> and <i>C. dactylon</i> . The seasonal wetland should aid with the attenuation of larger storm flows. The wider seasonal wetland should be managed as a wetland area and not mowed to establish a lawn as this will facilitate the dominance of <i>P. clandestinum</i> .	Moderate to High	

**ADDENDUM TO FRESHWATER ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF ERF
511, WETTON IN CAPE TOWN**
February 2020

Background

This addendum report provides freshwater specialist input on the final layout plan (Dated February 2018, see Figure 1 below). The input is in direct response to the following comment from the Department of Environment Affairs and Development Planning:

Freshwater Specialist Study:

"3.1 The Freshwater Impact Assessment Report (dated October 2016 and compiled by BlueScience) only assessed the impacts on the wetlands associated with the initial alternative that was identified.

3.2 An assessment of the impacts on wetlands as a result of the preferred alternative was not included in the Freshwater Impact Assessment Report. However, an updated risk assessment for the preferred alternative was undertaken by the Freshwater specialist.

3.3 The Freshwater Impact Assessment Report must be updated to include an assessment of the above and must confirm whether the preferred alternative will result in the infilling of the wetland located on the proposed site.

Since the original freshwater assessment report was compiled in 2016 and was followed by an addendum report, it was felt that, for consistency sake, it would be best to respond to the above in an additional addendum report.



Figure 1. The proposed final layout for Erf 511, Wetton

The final development proposal comprises of 19 dwelling units, parking and internal roads and a large open space that would incorporate the required wetland offset area for the site. It is proposed that for the installation of the sewer pipeline within the development, the pipeline will be excavated and a manhole (concrete base, precast manhole rings, with cover and frame and backfill) constructed. To minimise the potential environmental impact of the sewer pipeline, the manhole base can be constructed from precast concrete.

The proposed stormwater system within the site will receive some additional stormwater runoff to be discharged into the wetland from the developed areas, but no construction will take place in the wetland area.

The installation of the roadworks will not have any impact on the adjacent wetland on ERF 509.

In terms of the proposed landscaping within the site (See Appendix A for the proposed landscape plan), the following activities are anticipated:

- Removal of any alien vegetation, building rubble and refuse by hand and with hand-held tools;
- Removal of a 300mm topsoil layer with a light machine prior to construction that will be stored on site;
- Shaping of the shallow wetland area with flat banks with a light machine to tie into the stormwater in and outflows as per levels provided by the engineer;
- Placement of the 300mm topsoil layer, shaping by hand with hand-held tools and covering with 50mm coarse organic topsoil layer by hand (only above winter water level);
- Planting of ex-open and 6 pack size plants at a density of 5/m² in three different zones (dry wetland banks, marginal areas - prone to seasonal flooding and the base of the wetland - inundated during winter months); and
- Maintenance of the area to remove weeds and alien vegetation by hand for a period of 12 months after which maintenance is handed over to the homeowners.

Freshwater Impact Assessment

The intent for the final layout for the proposed development was to avoid loss of wetland habitat within the site and to limit the need to offset or recreate the wetland as far as possible but rather to improve and consolidate the existing wetland area. In the original freshwater assessment report, a wetland offset determination was undertaken. The existing wetland areas within the site were indicated to consist of approximately 860 m² of permanently wet area and 180 m² of seasonally wet area, giving a total wetland area within the site of 1040 m². The wetland is considered to be largely modified and of low ecological sensitivity and importance, providing some goods and services in helping to attenuate flooding and capture sediment, phosphates, nitrates and toxicants.

The final layout will result in some infilling of mapped wetland habitat within the site but allows for more than 1000 m² of open space for the recreation of wetland habitat as well as rehabilitation of the remainder of wetland habitat that is associated with the stormwater channel that passes through the site. The wetland that will be created within the site will thus be of the same or greater extent, will have improved ecological condition and will still be associated with the stormwater channel that feeds water onto the site and then connects with the wetland habitat on the adjacent property. An improvement in wetland habitat and functionality can thus be expected. For this reason, it can also

be expected that the potential freshwater impact will be less than that originally assessed for the development layout considered in the October 2016 report.

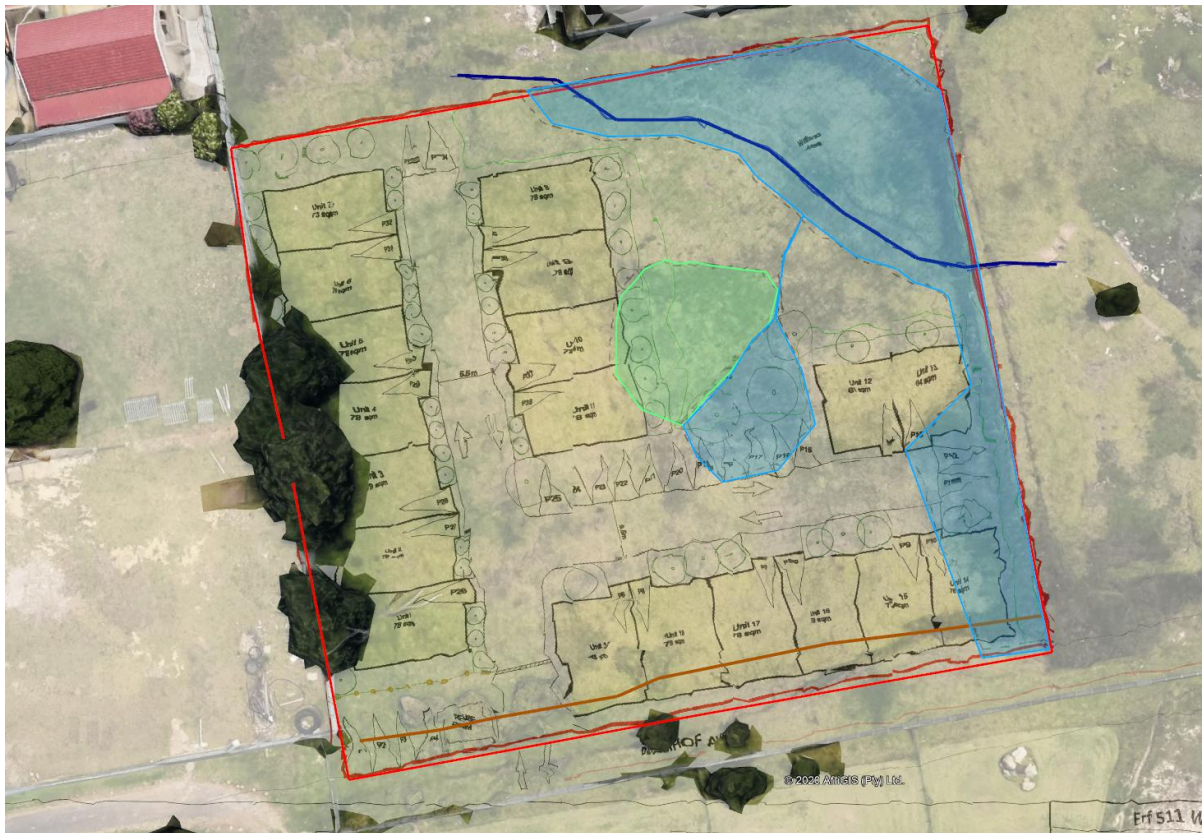


Figure 2. Final layout plan for the site, overlaid in Google Earth, together with the mapped wetlands within the site where the green polygon comprises of seasonal, grass dominated wetland and the blue polygons more permanently wet and bulrush dominated wetlands

The impact assessment of October 2016 determined the potential loss of wetland habitat as a result of the proposed development, with mitigation, to be **Low to very low** and the water quality impacts to be **Low**. With the final proposed layout, the significance of these potential impacts could be expected to be reduced to **Very Low**. The recommended mitigation measures would remain largely as were originally recommend, that is:

- The construction should take place in the drier summer seasons as this will reduce the runoff into the adjacent wetland areas from the construction site. Prevention of any contaminated runoff from impacting on the aquatic features at the construction site should be managed in terms of the Environmental Management Plan for the Project.
- The recreation and rehabilitation of the wetland area should be undertaken by a suitably quality horticulturalist / rehabilitation specialist with input from an aquatic ecologist.
- A pond should be created within the wetland habitat that is large enough to ensure adequate retention time on the site to allow for the settling of sediment and removal of nutrients and toxicants.
- *Pennisetum clandestinum* or kikuyu grass should be kept out of the wetland area. The newly designed wetland should contain both permanently inundated areas such as the channel and pond

as well as a wider seasonal wetland areas which should be vegetated with appropriate wetland species such as the indigenous sedges and rushes (*Pycnus polystachyos*, *Eleocharis limosa*, *Cyperus textilis*, *Schoenoplectus scirpoides* and *Juncus effusus*), arum lilies *Zantedeschia aethiopica*, water lilies *Watsonia meriana* and red hot pokers *Kniphofia uvaria*, kweek *Cynodon dactylon*. The seasonal wetland should aid with the attenuation of larger storm flows. The wider seasonal wetland should be managed as a wetland area and not mowed to establish a lawn as this will facilitate the dominance of *P. clandestinum*.

Concluding Remarks

The revised layout plan for the development has largely taken into account the delineated wetland areas within the site and as such will have an impact of Very Low significance on the aquatic features within the area, both during the construction and operation phases of the project. Given the above findings, I am of the opinion that there should not be any reason from a freshwater perspective, that the proposed development should not be approved provided that the recommended mitigation measures are implemented.

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