EXECUTIVE SUMMARY

SANBI propose to upgrade the Administration Facilities at Kirstenbosch NBG in Cape Town. This will include the demolition of two existing prefab buildings, replacing one thereof with a 2.5 storey administration building, making improvements to the existing Fynbos Lodge, a small building with heritage significance, re-arranging and extending the parking area and stabilizing a section of an adjacent stream.

The location of this site is in the developed area of Kirstenbosch, immediately adjacent to Rhodes Drive. While built, the setting is still in a wooded, forest setting close to mountain streams. The Zone of Visual Influence is limited to the immediate site due to the surrounding trees.

While there will be a change to the visual environment through a new 2.5 storey building being built, on the footprint of the existing prefabricated building, this could be a positive improvement to the visual scene at the site, depending on the building materials and external finishes which at time of writing this report were not available, and the retention of all the trees.

The proposed parking area could be a negative visual impact as this entails the relocation of some existing trees, the removal of lawn and greenery and new paving. Plans at this stage do not reflect paving details nor any tree planting and as such this new parking area, which is also the forecourt to the Fynbos Lodge, is a large paved parking area and as such of visual concern.

Mitigation measures should include retention of wooded area around new Admin Building and appropriate hard and soft landscaping of the proposed parking development, which must play a dual role as the forecourt to the Fynbos, lodge building.

1. Introduction

1.1 Background and Approach to the study

SANBI propose infrastructure developments in Kirstenbosch National Botanical Gardens (NBG) in Cape Town in the Western Cape. These improvements will be to the existing buildings and a new Administration Building.

Sillito Environmental Consulting has been appointed to obtain the required authorization in terms of the NEMA regulations and have commenced the process.

Megan Anderson Landscape Architects (MALA) has been appointed to undertake the Visual Statement with respect to the possible visual impacts that the proposed development may have.

1.2 Terms of Reference

The following terms of reference have been proposed

- Identify issues raised in scoping phase, and site visit;
- Describe the receiving environment and the proposed project;
- Establish the view catchment area and receptors;
- Briefly indicate potential visual impacts, and possible mitigation measures

1.3 Methodology

A site visit and a photographic survey of the site and surrounds were undertaken. Receptors and the Viewshed were identified during the site visit.

A desktop mapping study was undertaken to map the viewshed and receptors

The findings of the above have been captured in this report and potential visual impacts identified with mitigation proposals.

1.4 Assumptions and Limitations

It is assumed that the information provided to MALA is correct.

2. Proposed Development

2.1 Site location

The proposed development is located within the Kirstenbosch National Botanical Gardens, which is located off Rhodes Drive in Cape Town, Western Cape.

Kirstenbosch is situated adjacent to the Table Mountain National Park and both form part of the Cape Floristic Region Protected Area, which was proclaimed a UNESCO World Heritage Site in 2004.

The entire Kirstenbosch National Botanical Garden falls outside of the City of Cape Town's zoning sphere and as such is not formally zoned as part of the City of Cape Town's zoning scheme,

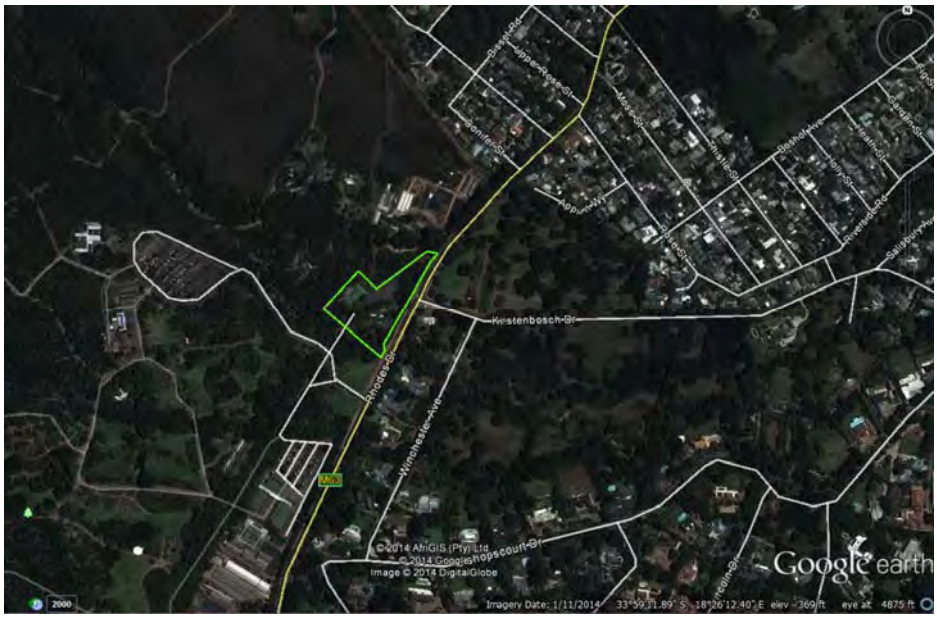

Figure 1 Location of site of proposed development in Kirstenbosch, Cape Town

The proposed development and upgrades is to take place in the small developed area (Erf 3040) of the cultivated section of the NBG.

Figure 2 Location of the development areas in the Harold Porter NBG (Source: VMA Architects)

2.2 Development Description

The development proposal is for the redevelopment of a 2500m^2 area of the cultivated gardens, including buildings. These buildings include Fynbos Lodge, which is over 60 years old, as well as the current Kirstenbosch Head Office as well as a small prefabricated building. The landscaping and parking areas associated with these existing buildings will also be altered in the redevelopment.

Due to the potential heritage value of Fynbos Lodge, no structural changes will occur to the building. The existing asbestos roofing will be replaced with a visually similar material, and maintenance-type renovations will take place in the interior of the building. The prefabricated building as well as the head office building will be demolished and redeveloped.

The upper catchment of the Liesbeck River is located in very close proximity to the area which is proposed to be redeveloped. The river is currently undercutting and weakening the north bank closest to the existing buildings and infrastructure. Therefore the development proposal includes the construction of gabions along the riverbank to reinforce this area. The gabions will run for approximately 20- 30metres within the existing curvature of the river. The total volume of material within the Liesbeck River to be excavated to put the gabions in place will be approximately 135m^3

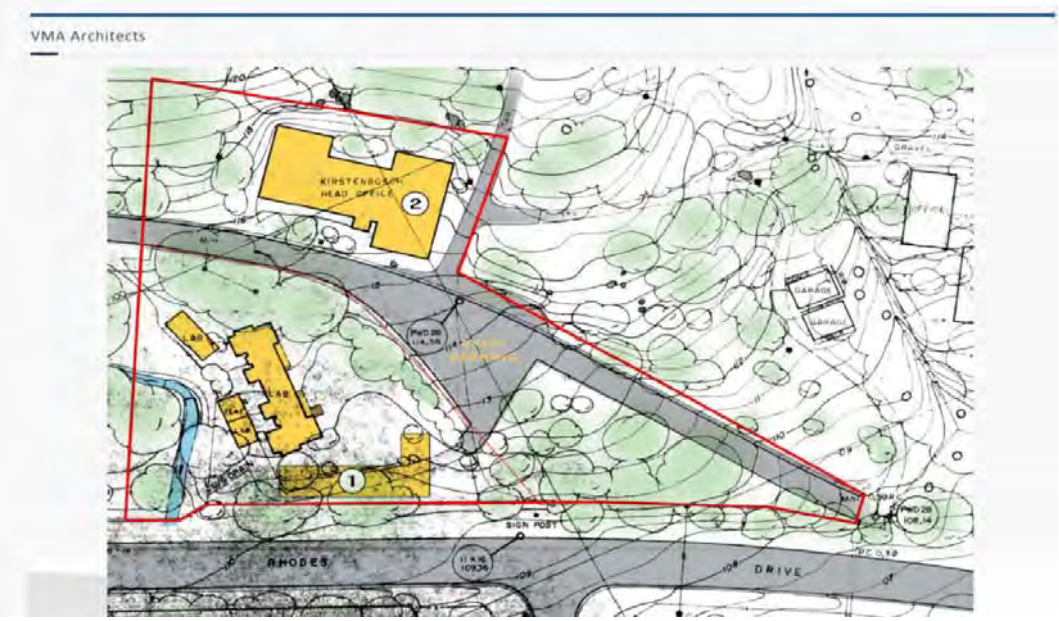

Figure 3 Site Plan of the location of the new proposed Administration Building (2) and Fynbos Lodge et al at the Kirstenbosch NBG

The new administration building facility will be situated in the position of the current Kirstenbosch Head Office and will accommodate the HR, Finance and IT departments and shared facilities for these departments. The total required area is 1778 m^2. The footprint of the current building is 850m2 so a multiple storey building will be required.

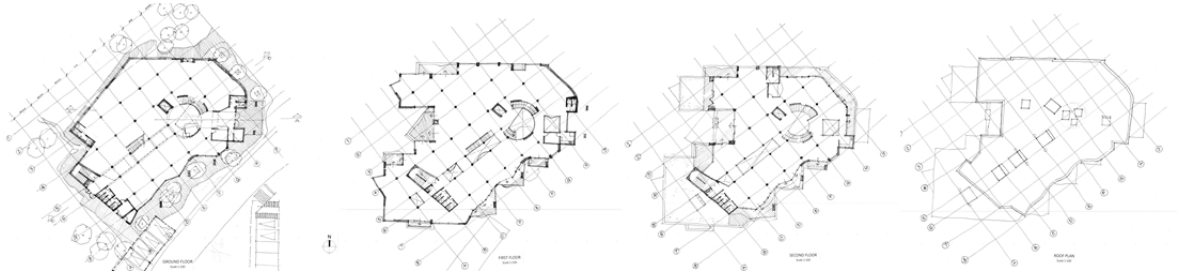

Figure 4 Proposed Ground Floor, First Floor, Second Floor and Roof Plan of proposed new building (Source: VMA Architects)

- Building will be within the existing development footprint and 2.5 storey's high;
- Ground level exterior will have a suspended timber deck to define the space which will soften the building and allow for an easier transition from the surrounding vegetated area to the building itself;
- 1st floor will cantilever over the ground floor to allow for the additional footprint required, avoid disturbing the surrounding vegetation and have a minimal structure as well as reducing the visual impact to adjacent residents through reducing the height of the building; and
- Roof of the Second Floor will be a garden space.

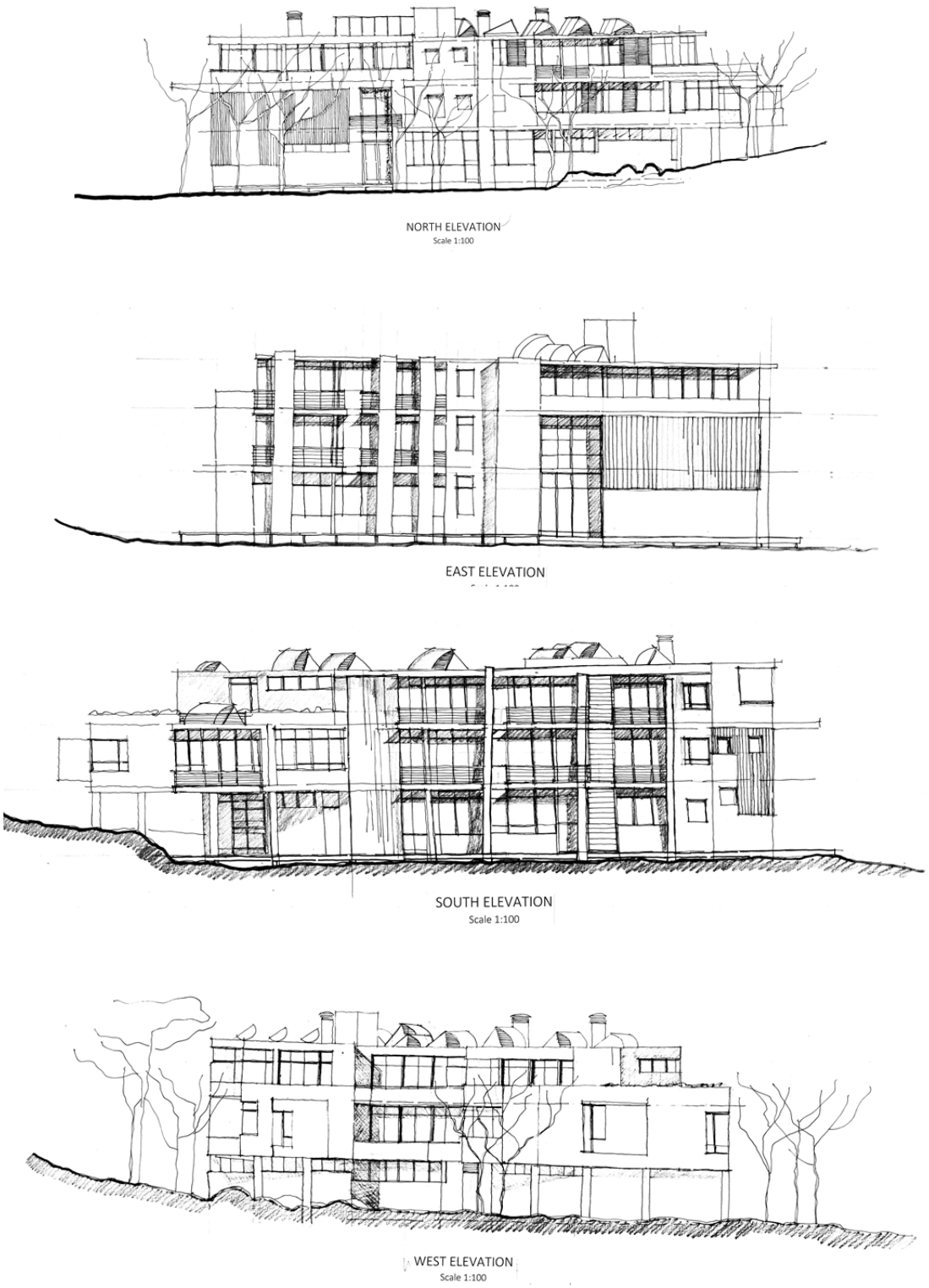

Figure 5 Proposed North, East, South and West Elevations of the proposed Administration Building (Source: VMA Architects)

In addition to the proposed Administration Building the following will be done:

1. Fynbos Lodge	- Upgrade & Removal Asbestos Roof & Provision of parking. Stabilization of River Bank with Gabions (Stones banks)
2. Parking	- 50 cars , 3 Mini buses & 1 Loading Zone.
3. Additional Space	- E.D.R.R (Marketing and Communication) – 21 staff members

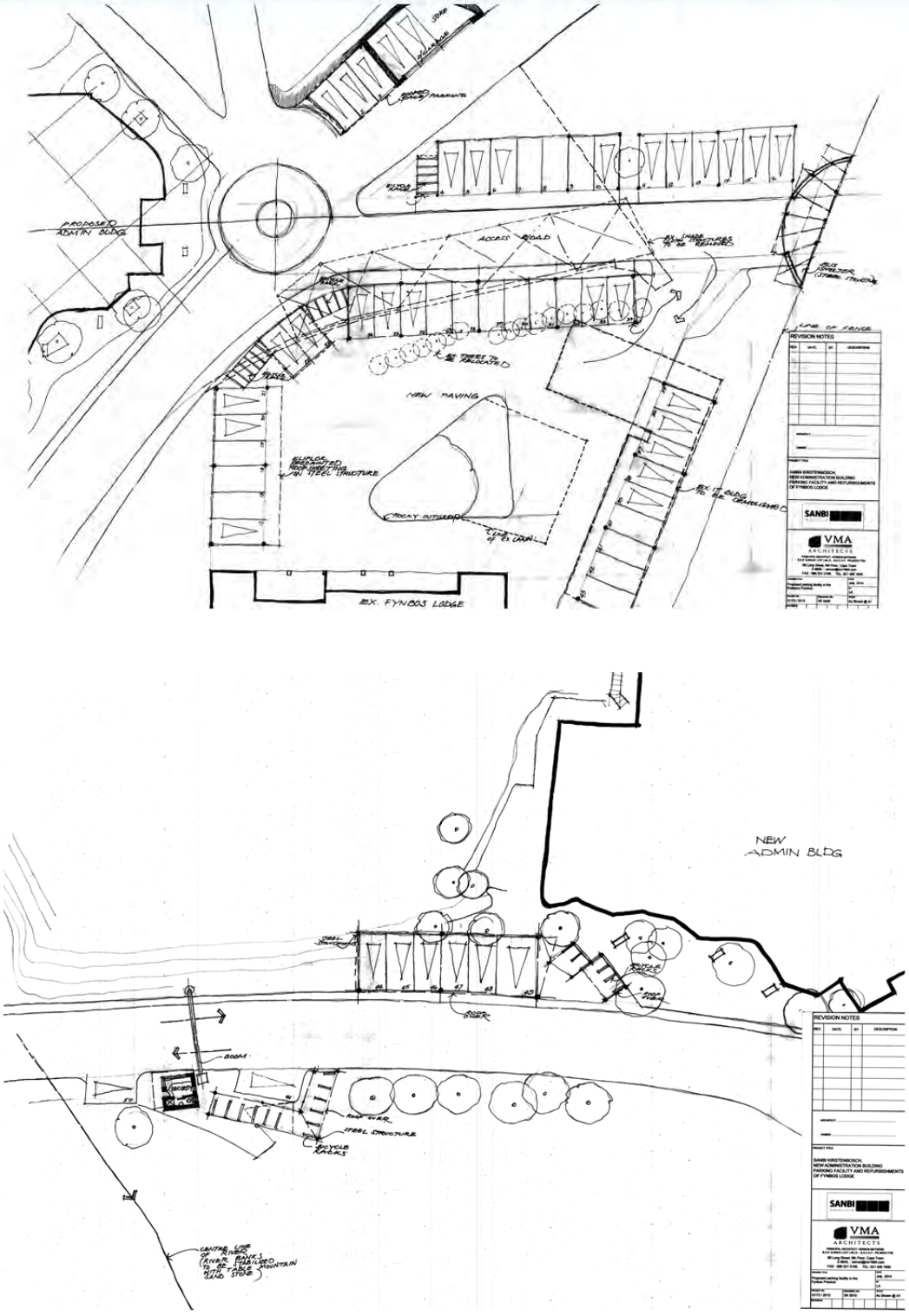

Figure 6 Proposed parking facility arrangement of the proposed Administration Building environs (Source: VMA Architects)

3. Visual Assessment of the Site and Proposed Development

3.1 Description of the affected area and scenic resources

The Kirstenbosch NBG, is located within The Cape Metro Area, described by Oberholzer and Winter as follows:

> The Cape Metro District, centred on Cape Town, is dominated by Table Mountain and the Cape Peninsula Mountain Chain, which is a National Park, World Heritage Site and area of major scenic and historic importance. Being an area of early colonial settlement, the city and its surroundings have a wide range of heritage sites too numerous to cover in the provincial inventory, but already well documented elsewhere. Robben Island is another World Heritage Site, famed for its political history.
>
> The quartzitic sandstone mountains of the Peninsula are a relic outlier of the Cape Fold Mountains, which include the Hottentots Holland Mountains to the east. These peaks and ranges are not only of scenic and tourism importance, but also for their biodiversity, water catchment and recreational value.
>
> Given the juxtaposition of mountain and sea, the Peninsula offers numerous scenic routes and passes including Chapman's Peak Drive, Ou Kaapse Weg and Redhill, as well as Sir Lowry's Pass leading to the Overberg. Near to Sir Lowry's Pass is the abandoned Gantouw Pass, an old wagon route over the mountains.

Besides the scenically dominant sandstone formations, the Malmesbury Group shales (Signal Hill, Blouberg and Tygerberg), the Cape Granites (Clifton, Hout Bay and Boulders in Simonstown), and the limestones (Macassar cliffs) all contribute to the varied landscapes and shorelines of the Cape Metro.

Important cultural landscapes, containing historical settlements and cultivation (mainly viticulture), include the Constantia Valley, Durbanville Hills, Bottleray Hills and the Lourens River Valley, as well as the Phillipi horticultural area (market gardens). Philadelphia is one of the old church towns of the Western Cape, and Mamre nearby is an historic mission village.

An old battle site occurs at Blouberg, and numerous World War II remains (mainly derelict radar stations) are found throughout the Cape Metro area, mainly on sites overlooking the coast.

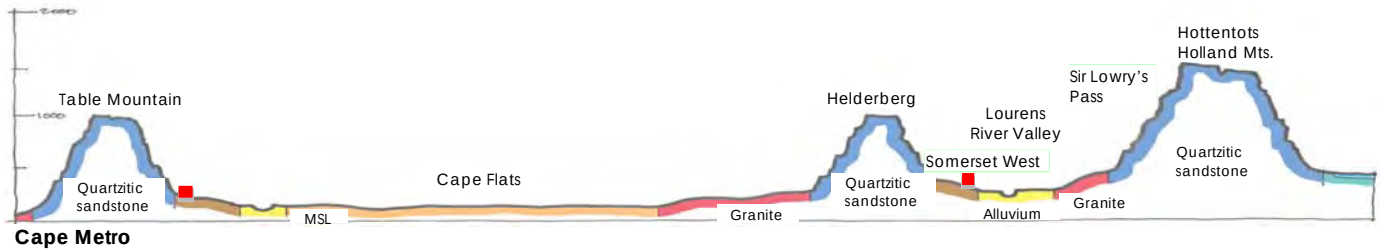

Figure 6 – Section through Cape Metro Area (source Oberholzer and Winter))

The Kirstenbosch estate is on the eastern face and foothills of the Cape Peninsula Mountain Chain and back of Table Mountain. It sweeps down from the steep scree slopes of the sandstone mountains onto the across rocky scree slopes and rolling shale hills. Tree-lined, fast-flowing mountain streams flow across the gardens.

Photo Plate 1 – The eastern mountain slopes above the Kirstenbosch Botanical gardens

Photo Plate 2 – Typical mountain stream which flows across the gardens and large boulders and forest.

Kirstenbosch NBG is classified as a nature reserve and covers 528 ha in total. The bulk of the area remains natural forest and fynbos and is classified as a protected area. 36 hectares have been cultivated, including restaurants, information and education centres, and buildings and infrastructure associated with SANBI operations and with the upkeep of the botanical garden.

The proposed site of development is within the built developed area of the garden, on the lower eastern border of the site. The Cape Town residential areas of Bishopscourt and Newlands are adjacent to the Kirstenbosch Gardens. These areas are low density wooded suburbs.

Photo Plate 3 – Existing parking area with the proposed new site in the background

Photo Plate 4 – Existing prefab building, which will be replaced by a 2.5 storey Administration building

The site of the proposed Administration building currently contains a prefabricated single storey building in a wooded area.

The Fynbos Lodge area comprises the Fynbos lodge and out buildings, the former of heritage significance and other prefab buildings, which will be demolished. These are arranged around a green courtyard of lawns and trees.

Photo Plate 5 – The existing Prefab office building within a wooded area

The Fynbos Lodge and additional building are existing buildings around a lawned and garden area. Parking facilities are between and adjacent to the buildings.

Local rock has been used extensively in the landscape, as retaining walls, bridge headwalls, steps and paving.

Photo Plate 6 – local rocks have been used extensively in the landscaping

Photo Plate 7 – The existing Fynbos lodge building, left, which has heritage significance and the outbuildings, all of which will be retained.

Photo Plate 8– The Fynbos lodge, right, overlooks a lawned courtyard with trees

The scenic resources of the surrounding area can be described as natural and wilderness area adjacent to parkland residential area.

The immediate area surrounding the proposed development can be described as a wooded built area.

The scenic and visual resources of the overall area are rated as high. The scenic and visual resources of area of the proposed development area are rated as moderate – high due to prefabricated buildings in wooded area.

3.2 Visibility of the Proposed Development

3.2.1 View Catchment

The geographical area from which the project will theoretically be visible, or view catchment area, is dictated primarily by topography.

Situated on the east facing mountain slopes, the greater view catchment of the site is defined by the surrounding ridges and peaks which form the Viewshed of the site. Maclear's Beacon and Reserve Peak in the west and Wynberg hill in the south-east. This is approximately 2kms from the site.

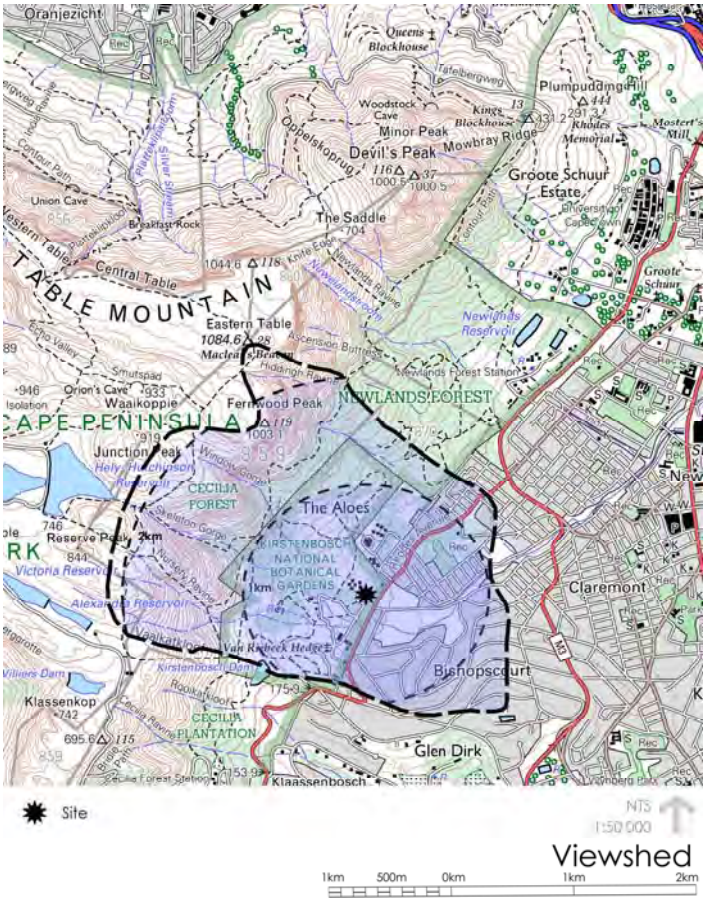

Figure 3 – Viewshed of the proposed Harold Porter NBG.

3.2.2 Zone of Visual Influence

Local features such as trees, landforms and buildings determine the Zone of Visual Influence (ZVI) of the site, i.e. the more relevant areas from which the proposed development will be seen.

The Zone of Visual Influence of the proposed Administration building is reduced to the immediately surrounding area by the wooded forest setting, an area of approximately 50 m from the proposed building.

The visibility of the proposed developments are therefore restricted to the site and local areas.

3.2.3 Receptors

The level of visual impact considered acceptable is dependent on the type of receptors.

- *High sensitivity – e.g. residential areas, nature reserves and scenic routes or trails;*
- *Moderate sensitivity – e.g. sporting or recreational areas, or places of work;*
- *Low sensitivity – e.g. industrial, or degraded areas.*

As indicated the text box above, the 'type' of receptors adds to the visual sensitivity of the site.

High sensitivity receptors will be:

- Tourists visiting the NBG; and
- Users of the scenic Rhodes Drive, which may get a glimpse of the proposed building and parking area when driving by, through vegetation.

Photo Plate 9 – Rhodes Drive runs past the proposed site of development mainly screened by vegetation

Moderate sensitivity receptors will be:

- workers in the NBG

There are no low sensitivity receptors.

4. Potential Visual Impacts

The following visual impacts can be expected:

4.1 Change in the visual character of the site from garden to building

The current site of the proposed development and upgrade is a built area in a wooded setting, Except for the Fynbos Lodge, the buildings are prefab, suggesting a temporary situation. These buildings are not of any visual significance. Some tarred roads and parking facilities exist around the buildings.

The proposed development of a new multi-storey admin building and re-arranged and larger parking area will result in a new building, which is a potentially positive visual impact (albeit it relatively large in scale) and more hardened surface for parking and circulation, which could be a negative visual impact as existing trees and lawn are being relocated and removed respectively. This parking area becomes the forecourt to the Fynbos lodge, which changes from a garden setting to a parking area, a negative visual impact.

This proposed visual impact would be:

- **Extent** - the spatial/geographical area of influence of the visual impact will be **local**, i.e. limited to the immediate surroundings;
- **Duration** - the predicted lifespan of the visual impact will be **long term**, i.e. the lifespan of the project;
- **Intensity** - the magnitude of the impact on visual, scenic and cultural resources will be **medium**, i.e. for the greater area these resources will not be affected but for the immediate area these resources will be affected to a limited extent;
- **Probability** - the degree of possibilty of the visual impact occurring to the immediate area will be **highly probable**;
- **Significance** - the significance of the impact occurring to the immediate area will be **medium** - the impact will result in moderate alteration of the environment and can be reduced by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated
- **Status** - the status of the visual impact will be positive and negative – the proposed building could enhance the scenic resources of the site while the expanded parking area with the removal of trees and lawn could provide for a visually harsh area.

Mitigation measures should include retention of wooded area around new Admin Building and appropriate hard and soft landscaping of the proposed parking development, which must play a dual role as the forecourt to the Fynbos, lodge building,

4.2 Additional night lighting

The larger Admin building will require additional night lighting but being a mainly day use building should not result in much night use and light requirement. There new parking area with removal of existing build opens up this area to Rhodes Drive and any additional lighting provided here may spill onto Rhodes Drive. Little information is available at present to assess this sufficiently.

This proposed visual impact would be:

- **Extent** – the spatial/geographical area of influence of the visual impact will be **local**, i.e. limited to the immediate surroundings;
- **Duration** - the predicted lifespan of the visual impact will be **long term**, i.e. the lifespan of the project;

- **Intensity** - the magnitude of the visual impact will be **low – high**, i.e. could be a notable alteration;
- **Probability** - the degree of possibilty of the visual impact occurring will be **possible**, where it is likely that the impact will occur;
- **Significance** - the significance of the impact occurring will be **medium** - the impact will result in a moderate alteration of the environment and can be reduced by implementing the appropriate mitigation measures, and will only have an influence on the decision-making if not mitigated;
- **Status** - the status of the intensity (severity) thereof will be Medium, i.e. notable alteration of night time scenic resources,

Mitigation should include:

- No - limited street/parking lighting;
- Keeping street/parking lighting to low level lighting; and
- Limiting external lighting on the buildings.

5. Conclusions

The Administration building is proposed within the existing built and developed section of the NBG, on a site that has an existing prefab building on it.

The proposed new building will result in a change of visual character from single story to 2.5 story building, but will remain on the same footprint, retaining existing trees. This visual change could be positive and enhance the visual resource of the area depending on the finer details of the building – building materials etc.

The proposed parking arrangement will result in a greater paved area with less greenery in the form of trees and lawns and as such is a potential negative impact. A landscape architect should be appointed to ensure the area retains its natural qualities and that the paving and planting interventions are appropriate.

While the developments will result in a change in the visual landscape, the scenic resources of the greater area will be minimally affected, but at the local scale will be moderately affected. If mitigation measures are implemented, the visual impact will be low.

Other visual impacts will be possible additional night lighting and light spill onto Rhodes Drive. These too can be mitigated to reduce the visual impacts.

FRESHWATER ECOLOGICAL ASSESSMENT FOR THE PROPOSED ESTABLISHMENT OF A NEW ADMINISTRATION BUILDING AT KIRSTENBOSCH NATIONAL BOTANICAL GARDEN

The Freshwater Consulting Group

December 2014

Report prepared for:

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Document title	:	Freshwater ecological assessment for the proposed establishment of a new administration building at Kirstenbosch National Botanical Garden
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TABLE OF CONTENTS

1. BACKGROUND AND TERMS OF REFERENCE

The South African National Biodiversity Institute (SANBI) has been allocated funds for the period 2013-2016 for the refurbishment, upgrading and maintenance of existing infrastructure as well as construction of new infrastructure at the National Botanical Gardens. One of the proposed projects is the establishment of a new administration building and parking area at Kirstenbosch National Botanical Garden (NBG), Cape Town, which will replace the existing prefabricated buildings currently located along Rhodes Drive to the north east of the main entrance to the Garden. The prefabricated buildings will be demolished and minor alterations are intended for other buildings on the site. It is intended that the new administration building be a brick-and-mortar double-storey building, but that it will remain within the development footprint (approximately 500 m^2 in extent) of the existing buildings.

The proposed parking area will be within 32 m of the upper reaches of the Liesbeek River, which drains the south-western slopes of Table Mountain. Furthermore, the development proposal includes the construction of gabions along the undercutting north bank of the section of river adjacent to the site for the new administration building (20 to 30 m in length), to stabilise and reinforce this area so as to protect the buildings and infrastructure. As such, a Basic Assessment is required in terms of the EIA Regulations of the National Environmental Management Act (NEMA, Act No. 107 of 1998) to mitigate any potential impacts stemming either from construction activities or directly from the development itself. This report documents the results of a freshwater ecological assessment undertaken by the Freshwater Consulting Group (FCG) on behalf Sillito Environmental Consulting. It describes and assesses the potential impacts of the proposed development on the affected tributary of the Liesbeek River and its associated freshwater ecosystems.

1.1 Terms of Reference

The terms of reference was to provide specialist freshwater ecological input to the Basic Assessment, to evaluate the impacts of the proposed development activities associated with the establishment of new administration buildings at Kirstenbosch NBG. More specifically, the scope of work for FCG's input was as follows:

- Provide a description of the potentially affected freshwater ecosystems and assess their ecological importance and sensitivity;
- Assess the significance of any impacts to freshwater ecosystems that could stem directly from the development or from construction-related activities; and
- Recommend mitigation measures to limit potential impacts to freshwater ecosystems.

2. APPROACH TO THE STUDY

The following tasks were undertaken by FCG:

- Review of all available documentation and plans for the proposed decommissioning and construction activities;
- Examination of potentially relevant conservation/biodiversity plans (including the National Freshwater Ecosystem Priority Areas project and the City of Cape Town's Wetlands Map) to note whether any rivers or wetlands of regional or local conservation importance have been identified in close proximity to the site;
- Examination of relevant maps, as well as aerial and satellite imagery of the study area to identify potentially affected aquatic ecosystems;
- Completion of a site visit to visually assess the Present Ecological State (PES) of the section of river that flows past the existing buildings (using the assessment method described in **Appendix A**), and to scan the area around the buildings for visible signs of wetland presence;
- Collection of pH and electrical conductivity (EC) measurements from the potentially affected river reach at the site, and of aquatic invertebrate data using the sampling method known as the South African Scoring System Version 5 (SASS5) (after Dickens & Graham 2002, as described in **Appendix B**);
- Compilation of a GIS map showing the location of the delineated watercourse(s) in relation to the footprint of the proposed construction area;
- Determination of the conservation importance of the potentially affected watercourse(s), using the Ecological Importance and Sensitivity (EIS) assessment method for rivers (as described in **Appendix C**);
- Identification and assessment of the significance of potential impacts of the proposed activities on freshwater ecosystems, using the significance rating method and assessment criteria described in **Appendix D**;
- Preparation of an impact assessment report (i.e. the current report); and
- Specialist input will be provided into an application for "water use" authorisation to the Department of Water & Sanitation (DWS) in terms of the National Water Act (Act No. 36 of 1998).

3. DESCRIPTION OF FRESHWATER ECOSYSTEMS ON AND ADJACENT TO THE SITE

The proposed development is located alongside the upper reaches of the Liesbeek River, roughly two kilometres from its source where it flows past the entrance to the Kirstenbosch NBG (Figure 1). Upstream of this point the river rises as two first-order tributaries – Skeleton and Nursery streams – at an elevation of roughly 700 m on the eastern slopes of Table Mountain – the 'Back Table'. Topographic maps show these two tributaries converging at a point just upstream of the proposed development in Kirstenbosch NBG. However, the confluence could not be located during the course of field work and it is likely that the Nursery stream has subsequently been diverted and that it either fails to confluence with Nursery Stream, or does so at a point further downstream via stormwater drains. Where the river flows past the existing Administration buildings at the entrance to the NBG, it passes beneath two culverts which are separated by a distance of *c.* 90 m (Figure 2). The first culvert (Figure 3 – A(i)) diverts the river beneath the entrance road to the existing Administration buildings, while the second diverts it beneath Rhodes Drive (Figure 3 – C(i)).

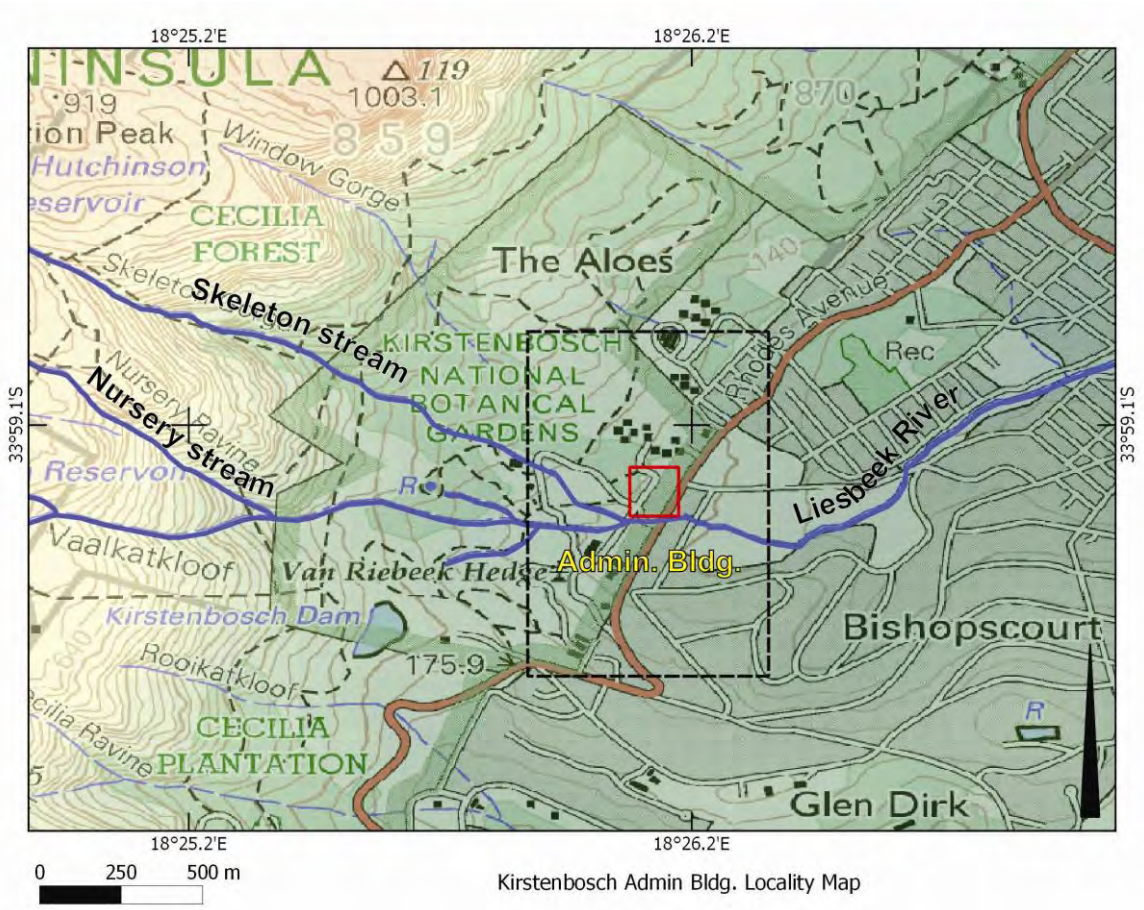

Figure 1 Locality map of proposed Administration buildings (bounded in red). The Liesbeek River is highlighted in blue showing its source on the slopes of the eastern slopes of Table Mountain. Skeleton and Nursery streams are shown to confluence just upstream.

Figure 2 Site Plan showing the existing parking lot, together with: (1) the existing IT building, (2) the administration building and (3) the 'Fynbos Lodge'. The Liesbeek River flows to the south of the proposed development through two culverts between the entrance road to the administration buildings (Culvert A) and beneath Rhodes Drive (Culvert B). The white dot indicates where SASS aquatic invertebrate samples were collected.

The existing administration and IT buildings are located between these two culverts on the northern bank of the river. The nearest existing built structure is *c*. 10 m from the river banks (Figure 2). The reaches of both Skeleton and Nursery streams upstream of the proposed development are relatively pristine and rise as typical Cape Floristic Region (CFR) mountain streams in Afromontane and riparian forest against the slopes Table Mountain. Further downstream in the vicinity of the existing administration building, however, the riparian zone has been colonized by a mix of alien species including oak, pine, poplar and palms. Downstream of the first culvert (Culvert A, Figure 3 – A(ii)), the channel banks are severely incised (down-cut). This is due to the fact that the channel cross-section of Culvert A is inadequate to cope with the volume of flows routed through it and no consideration has been given to reinforcing the banks immediately downstream. As a result, the increased velocities and erosive capacity of the water channelled through the culvert has led to gully erosion, washouts and disturbances to the riparian belt between Culvert A and B (Figure 3 – B (i), (ii) and C (ii)). Despite this erosion, the bed of the river itself has stabilised and instream habitat conditions are relatively good. During high flows, however, it is likely that large amounts of sediment are mobilized from the banks causing sedimentation downstream.

Figure 3 The upper reaches of the Liesbeek River where it passes adjacent the Administration buildings: A(i) upstream of Culvert A looking downstream (yellow box) that runs beneath the entrance road to the Administration buildings, A (ii) looking upstream from Culvert A, B(i) looking upstream towards Culvert A, B(ii) severe erosion immediately downstream of Culvert A, C(i) looking downstream towards Culvert B passing beneath Rhodes Drive, C(ii) bank erosion between the two culverts. Blue arrows indicate flow direction.

3.1 Present Ecological State (PES)

The assessment of the PES of the potentially affected river reach at the site was undertaken following the procedures outlined in the Index of Habitat Integrity (IHI) assessment method developed by the Department of Water Affairs (Kleynhans 1999) and described in Appendix A.

As noted above, the riparian zone upstream of Culvert A is geomorphologically stable, but dominated by alien tree species, whereas the riparian zone immediately adjacent to the proposed parking area (between Culvert A and B) is severely degraded by both alien plant species, as well as by down-cutting and gully erosion as a result of elevated water velocities through Culvert A, exacerbated by the absence of erosion mitigation measures. Despite these changes, the bed of the river itself has stabilised and instream habitat conditions are relatively good, both upstream and downstream of Culvert A. These conditions are reflected in the IHI scores (Table 1), which show the instream habitat conditions being relatively good (PES Category B – Largely natural) upstream of Culvert A, whereas riparian habitat conditions here are moderately modified (PES Category B/C). Downstream of Culvert A (between Culvert A and B) instream habitat conditions are largely natural (PES Category B), whereas the riparian zone is largely modified (PES Category D) – this low score being largely attributable to bank erosion and incision.

Table 1 IHI Scores and overall PES results for the river upstream and downstream of Culvert A.

CRITERIA	Upstream Culvert A		Downstream Culvert A	
	Score	Confidence	Score	Confidence
INSTREAM				
Water abstraction	5	H	5	H
Extent of inundation	0	H	0	H
Water quality	8	H	8	H
Flow modifications	0	H	0	H
Bed modification	5	M	5	M
Channel modification	5	H	8	M
Presence of exotic macrophytes	0	H	0	H
Presence of exotic fauna	0	H	0	H
Presence of solid waste	2	H	2	H
RIPARIAN				
Water abstraction	5	H	5	H
Extent of inundation	0	H	0	H
Water quality	8	H	8	H
Flow modifications	0	H	8	H
Channel modification	8	H	23	H
Decrease of indigenous vegetation	5	H	10	H
Exotic vegetation encroachment	10	H	10	H
Bank erosion	5	H	23	H
FINAL PES SCORES & CATEGORIES	**Upstream Culvert A**		**Downstream Culvert A**	
Instream	87.0		85.5	
	PES Category B		**PES Category B**	
Riparian	79.2		57.1	
	PES Category B/C		**PES Category D**	

The water quality in the potentially affected river reach, both upstream and downstream of Culvert A, is considered to be slightly to moderately impacted (IHI score of 8), mainly due to the use of organic material and fertilizer in the Kirstenbosch Garden. Runoff of nutrient-enriched water is likely to elevate the nutrient concentrations in the river and possibly the concentration of Total Dissolved Solids (as reflected by electrical conductivity measurements), relative to the presumed natural state. At the time of the site visit (April 2014), the electrical conductivity recorded in the river at the aquatic invertebrate sampling point (see map in Figure 2) was 6.1 mS/m (i.e. relatively low and reflective of near-natural conditions) and a pH of 5.1 was recorded (indicative of acidic conditions, as would be expected under natural conditions for a fynbos-dominated catchment). This suggests that, at the time of site visit, the water quality in the sampling reach was relatively good.

3.2 Aquatic invertebrates (and indigenous fish)

A total of 13 aquatic invertebrate families were recorded instream at the site just upstream of Culvert A (see sampling point on map in Figure 2). Five of these taxa have a high SASS5 sensitivity score (10 and above), including notonemourid stoneflies and teloganodid mayflies (Table 2), suggesting that habitat and water quality conditions were relatively good.

Table 2 List of aquatic invertebrate taxa present in the river adjacent to the proposed development.

Order	Family	Sensitivity Score
Annelida	Oligochaeta (Earthworms)	1
Crustacea	Potamonautidae* (Crabs)	3
Plecoptera (Stoneflies)	Notonemouridae	14
Ephemeroptera (Mayflies)	Baetidae (2 species)	6
	Teloganodidae	12
Odonata (Dragonflies & Damselflies)	Aeshnidae (Hawkers & Emperors)	8
	Corduliidae (Cruisers)	8
Trichoptera (Caddisflies)	Philopotamidae	10
Cased caddis:	Sericostomatidae	13
Coleoptera (Beetles)	Elmidae/Dryopidae (Riffle beetles)	8
	Gyrinidae (Whirligig beetles)	5
Diptera (Flies)	Athericidae	10
	Simuliidae (Blackflies)	5

The total SASS5 Score was calculated as 96 and the Average Score Per Taxon (ASPT) was 7.3[1]. Figure 4 plots the SASS5 Score and ASPT obtained at the site against the Biological Bands assigned to the upper reaches of rivers in the Southern Folded Mountains Ecoregion (based on the SASS interpretation guidelines of Dallas 2007). This figure shows that the site falls along the boundary between the bands for Ecological Categories B and C, i.e. it is considered to be in a Fair/Good ecological condition (largely natural to moderately modified). This rating is consistent with the expectation that the river is moderately impacted by development in and around Kirstenbosch NBG, and is in agreement with the instream PES results based on the river IHI (see Table 1).

[1] These results are based on the assumption that an unconfirmed taxon was Leptoceridae and not Sericostimatidae, which would have given a SASS5 Score of 103 and ASPT of 7.9.

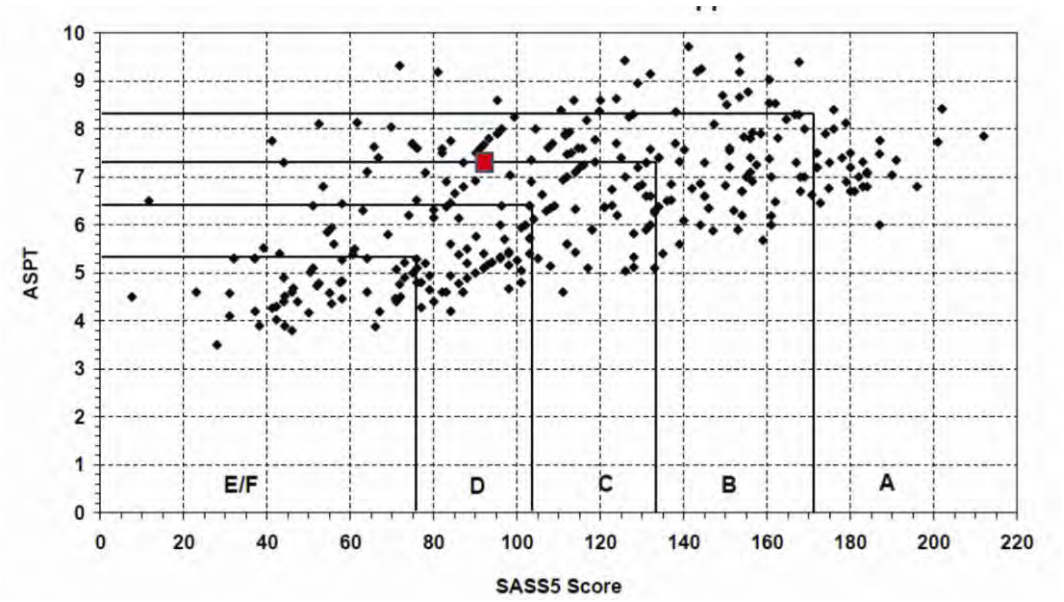

Figure 4 SASS5 Score and ASPT for the site sampled at Kirstenbosch (red square) plotted in relation to the SASS Biological Bands for the upper reaches of rivers in the Southern Folded Mountains Ecoregion .

Note on freshwater fish—Cape galaxias (*Galaxias zebratus*) is a small paleao-endemic freshwater fish species, which was observed to be present at the site. The taxonomic and conservation status of this fish species is currently uncertain. Recent phylogeographic studies show that *G. zebratus* is a species complex with up to ten unique isolated lineages represented in the Cape Floristic Region (Waters and Cambray 1997, Wishart et al. 2006, Chakona et al. 2013). Table Mountain populations (i.e. those in the Liesbeek and Disa Rivers) share genetic affinities with Eerste River populations, but are separate from populations on the Cape Peninsula further south (i.e. the Schusters, Klaasjagers and Els Rivers, and populations in the wider Western Cape region). Pending species descriptions and range distribution studies, the populations in the Liesbeek River adjacent to the proposed development should be considered of moderate to high conservation importance at a regional/provincial scale.

3.3 Ecological Importance and Sensitivity (EIS)

The EIS of the aquatic ecosystems associated with the Liesbeek River at the site affected by the proposed development was assessed according to the procedures recommended for rivers by the Department of Water Affairs and described in Kleynhans (1999) (Appendix B). The biotic importance and sensitivity of the aquatic ecosystem (i.e. the presence/absence of rare, unique or endangered biota, species sensitivity and richness) was considered to be low overall (median EIS score = 1) but moderate to high for the instream component of the river (median EIS score = 2) (see Table 3), mainly due to the confirmed occurrence of Cape Galaxius fish species. The importance and sensitivity of the habitat (abiotic) ecosystem components was rated as moderate overall (median EIS score >1 but <2) and high for the instream component

(EIS score >2). The biotic rating was primarily due to the presence of unique and sensitive biota rather than rare or endangered species – although, as noted above, the conservation status of the Cape galaxias on site is currently unclear.

The high rating accorded the habitat (abiotic) component of the ecosystem on site was primarily attributable to the presence of aquatic habitat types that are deemed to be sensitive to flow change. Also, the location of the site in a sensitive conservation area – the Table Mountain National Park – contributed to this high score.

Table 3 EIS results for the potentially affected section of the Liesbeek River.

Criteria	Liesbeek River @ Kirstenbosch	
	instream	riparian
BIOTIC		
Rare & endangered biota	0	0
Unique biota	3	0
Intolerant (i.e. sensitive) biota	3	0
Species/taxon richness	1	0
median scores	**2**	**0**
	1	
HABITAT		
Diversity of aquatic habitat types	1.5	0
Refuge value of habitat types	1.5	0
Sensitivity of habitat to flow changes	3	0
Sensitivity of habitat to WQ changes	3	0
Migration route/corridor	1	0
Protected/natural areas	4	0
median scores	**2.3**	**0**
	1.1	

In terms of the National Freshwater Ecosystem Priority Areas (NFEPA) project, the Liesbeek River and its tributaries are listed as a Fish Support Area (Figure 5). Fish Support Areas are Fish Sanctuaries where the ecological condition of rivers flowing through the FEPA sub-catchment is lower than an A or B. The recommendation is that no activities be undertaken in the catchment that could further degrade the ecological integrity of these river reaches and that, ideally, the ecological condition of these Fish Support Areas be improved.

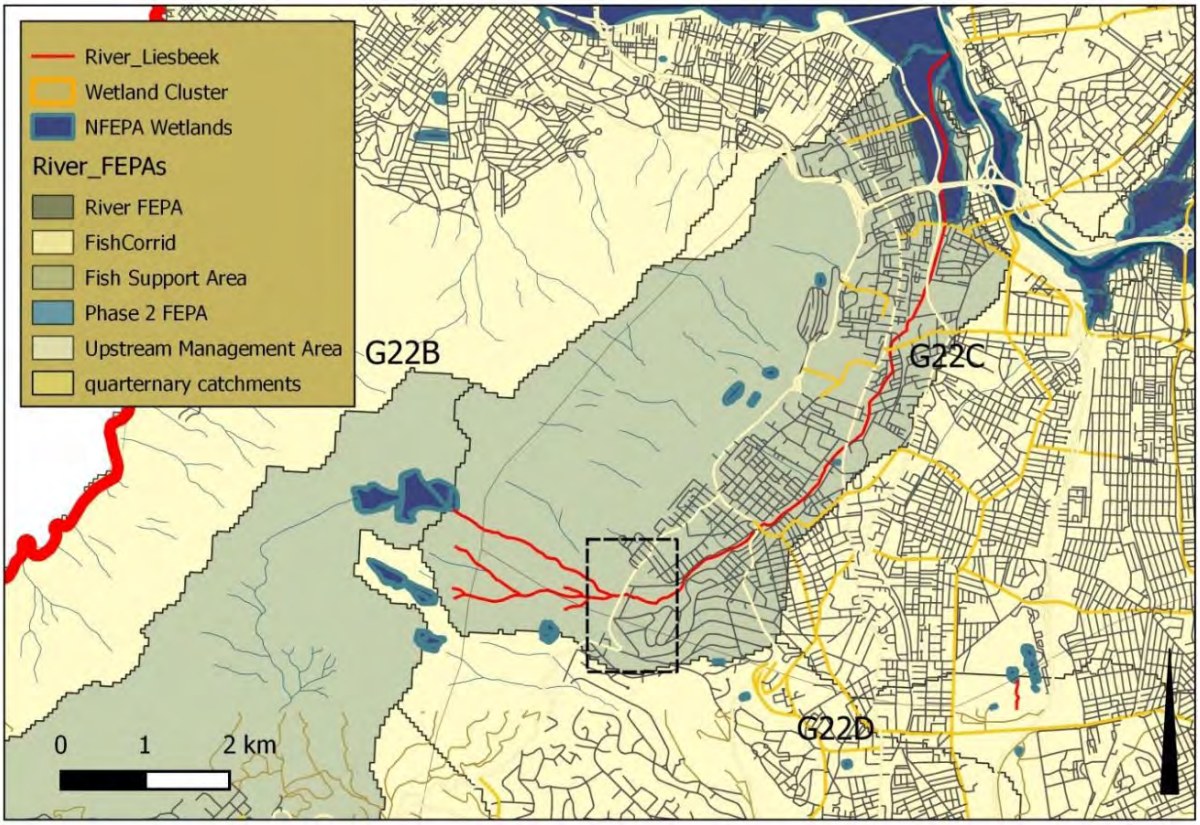

Figure 5 The Liesbeek River showing the location of wetlands, Fish Support Areas and FEPA sub-catchments mapped by the National Freshwater Ecosystems Priority Areas (NFEPA) project within Quaternary Catchments G22B, G22C and G22D. The Liesbeek River (shown in red) flowing through Kirstenbosch NBG is shaded as a Fish Support Area.

4. PROPOSED ACTIVITIES

The proposed works would entail the decommissioning of existing administrative infrastructure as well as the construction and refurbishment of new infrastructure adjacent the entrance to Kirstenbosch NGB along its boundary with Rhodes Drive. In addition, a section of the river bank adjacent to the proposed infrastructure upgrades would be stabilised with gabions. A summary of the proposed activities in each area follows (refer to Figure 2, Figure 6 and Figure 7).

IT Building (*Building 1*, Figure 2; block #1 in Figure 6; and Figure 7(1)) — The existing prefabricated IT building (Building 1) would be demolished and the site would be converted into a parking area. This parking area would be within 32 m of the river channel. Part of the existing garden in front of the building (Figure 7) would be removed to accommodate the parking area.

Administration Building (*Building 2*, Figure 2; block #2 in Figure 6; and Figure 7(2)) — The existing administration building (Building 2) would be demolished and a new double-storey administration building would be constructed in its place, within the bounds of the existing development footprint.

'Fynbos Lodge' (*Building 3*, Figure 2; 'LAB' in Figure 6; and Figure 7(3)) — The asbestos roof of the 'Fynbos Lodge' (Building 3) would be removed and replaced. Minor interior renovations, including painting and replacing counter tops would also be undertaken. No structural changes are proposed for the building.

River bank stabilisation (purple line in Figure 2; photo B(ii) in Figure 3) — Gabions and a reno mattress would be installed along a section of the northern bank of the river reach adjacent to the site, to stabilise and reinforce this eroded area. The gabions would run for approximately 20-30 metres within the existing curvature of the river. The total volume of material to be excavated from the bed and bank of the river to put the gabions and reno mattress in place would be approximately 135 m^3.

Stormwater management — The proposed approach to the management of stormwater runoff from the areas to be developed is to retain and treat stormwater through the use of permeable paving in the parking area and access road. According to the Stormwater Management Report (OWSA 2014), the 2 400 m^2 of permeable paving that is proposed would be adequate to meet the attenuation and water quality requirements of the City of Cape Town's (2009) stormwater management policy.

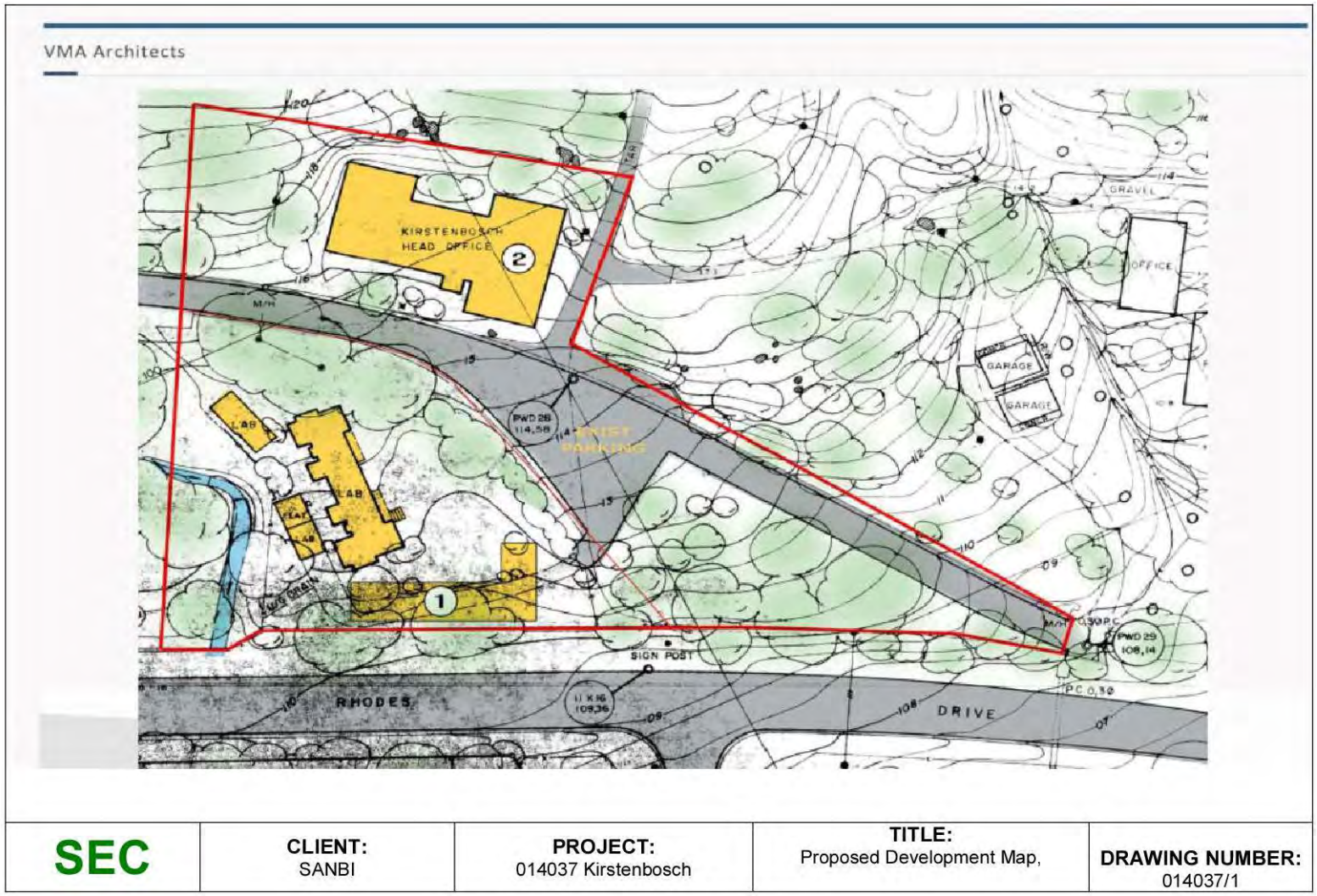

Figure 6 Proposed development plan (block number 1 is the proposed parking area, where the existing IT building is located, and block number 2 is the existing admin building that would be reconstructed)

Figure 7 Existing administrative infrastructure in Kirstenbosch NBG: (1) IT Building, (2) Administration Building showing the existing parking lot and (3) the 'Fynbos Lodge'

5. ASSESSMENT OF POTENTIAL IMPACTS OF PROPOSED ACTIVITIES ON FRESHWATER ECOSYSTEMS

The rating method used to assess the significance of the potential impacts of the proposed infrastructure upgrades at Kirstenbosch NBG on the adjacent river ecosystem is described in Appendix D.

5.1 Construction Phase Impacts

5.1.1 Site access, materials and equipment storage, and construction-related disturbance

Description: Disturbance to and loss of terrestrial and riparian vegetation, and compaction of soils due to excavations, trampling by construction personnel, and movement and storage of materials and machinery on site.

Assessment: Disturbance to and loss of vegetation on the site, and along the riparian corridor of the Liesbeek River, will lead to mobilisation of sediments in the river channel and increased sediment loads downstream. The risks of erosion and sedimentation will be greater during the high flow (winter) season.

Mitigation:

- No construction activities should be undertaken within 10 m of the outer edge of the river channel (i.e. south of buildings (a) and (b) in Figure 2), except when the river stabilisation work is done (see Section 5.1.4).
- Danger tape should be used to demarcate no-go areas within the recommended 10 m buffer.
- All equipment and materials storage areas should be located at a minimum distance of 10 m from the riparian edge of the Liesbeek River.

Table 4: Impact Significance Rating: Degradation of aquatic ecosystems as a result of site access, materials and equipment storage, and construction-related disturbance

	WITHOUT MITIGATION		WITH MITIGATION	
Category	**Rating**	**Description**	**Rating**	**Description**
Extent	Med	Impact beyond site boundary: sediment transport into the Liesbeek River	Low	Impacts unlikely beyond site boundary
Duration	Low	Short term: sediments re-mobilised during the following flood season	Low	Short term, easily reversible
Intensity	Low	Minor change in habitat diversity and ecosystem structure and function	Low	Little to no change
Confidence	High	-	Med	-
Probability	Med	Low to Medium probability of impact without mitigation	Low	Low likelihood with mitigation
Status	**(-)**	**Negative**	**(-)**	**Negative**
Significance	**Low**	Some loss of ecosystem structure and function	**Low**	Little to no loss of ecosystem structure and function

5.1.2 Waste materials generated by construction activities and work camps

Description: Waste materials and rubble generated by earth-moving and excavation, and waste materials produced by work camps may end up in the river or along the riparian corridor.

Assessment: Inadequate management of waste materials and rubble generated by construction activities or work camps will degrade aquatic habitat and pollute the Liesbeek River.

Mitigation:

- All rubble and other waste generated on the construction site should be removed from site and disposed of at a recognised waste management facility.
- The river corridor (including the recommended 10 m buffer area) must be inspected by the site manager and cleared of all waste on a daily basis.
- The ECO must check whether there is any waste along the river corridor during every site inspection.

Table 5: Impact Significance Rating: Degradation of Liesbeek River as a result of waste materials generated by construction activities and work camps

	WITHOUT MITIGATION		WITH MITIGATION	
Category	**Rating**	**Description**	**Rating**	**Description**
Extent	Low	Impact restricted to riparian corridor and river immediately adjacent to site	Low	Short section of river adjacent to site
Duration	High	Long term: Builders rubble won't be mobilised in all but the largest floods	Low	Short-term (duration of construction phase)
Intensity	Med	Change in habitat diversity and ecosystem structure and function	Low	Very little change
Probability	High	Likely without mitigation	Low	Low probability of impact with mitigation
Confidence	High	-	High	-
Status	**(-)**	**Negative**	**(-)**	**Negative**
Significance	**Low**	Some loss of ecosystem structure and function in the immediate vicinity	**Low**	Little to no loss of ecosystem structure and function

5.1.3 Contamination of river and riparian corridor by bitumen, fuels, oils or cement slurry

Description: Bitumen, fuels, oils, cement slurry and other construction materials pose an environmental risk to the river and riparian corridor during the construction phase. Proper management of these materials is essential to minimise this risk.

Assessment: Construction materials including bitumen, cement slurry, or oil or fuels for construction machinery will degrade water quality in the Liesbeek River and pose an ecological hazard to aquatic communities downstream.

Mitigation:

- All environmentally hazardous materials, including bitumen, fuels, oils and cement slurry should managed in such a way that they are not able to contaminate the river through direct spills or stormwater runoff.
- No bitumen, fuels, oils, cement, cement slurry, or any other environmentally hazardous materials should be stored within 10 m of the riparian edge.
- Operators must manage and contain cement slurry, and remove and dispose of excess materials from the vicinity of the riparian corridor.
- All spills should be reported immediately and workers should be instructed to store, transport and use hazardous materials in ways that minimise the risk of spills.

Table 6: Impact Significance Rating: Contamination of Liesbeek River and riparian corridor by bitumen, fuels, oils or cement slurry

	WITHOUT MITIGATION		WITH MITIGATION	
Category	**Rating**	**Description**	**Rating**	**Description**
Extent	Med	Impact beyond site boundary: possible transport of spills into the Liesbeek River and downstream	Low	Impacts unlikely beyond site boundary
Duration	Low	Short term: waste materials will be flushed from the river relatively quickly (within days)	Low	Short term, easily reversible
Intensity	Med	Intensity depends on the type and severity of the spill	Low	Little to no change if there is no spillage or runoff of contaminants into the Liesbeek River corridor
Probability	Med	Likely without mitigation	Low	Low probability of impact with mitigation
Confidence	Med	-	Med	-
Status	**(-)**	**Negative**	**(-)**	**Negative**
Significance	**Med**	Minor loss of ecosystem structure and function	**Low**	Little to no loss of ecosystem structure and function

5.1.4 Impacts associated with installation of gabions and reno mattress along river bank

Description: The following negative construction-phase impacts on the Liesbeek River ecosystem could occur when the gabions and reno mattress are installed along the river bank:

- Sedimentation of river and knock-on effects to aquatic biota, especially when the initial excavation work is carried out along the base of the river bank.
- Disruption of spawning by Cape Galaxius in the Liesbeek River downstream of the construction site (the spawning period for this fish species complex is typically from spring to mid-summer).
- Localised alteration of flows and sediment loads in the river at and immediately downstream of the construction site, due to the presumed temporary isolation of an instream work area within the river when the initial work in the river is conducted and the pumping of water from this area back into the river.
- Physical disturbance to instream and riparian habitat, as a result of construction activities taking place in the river.
- Physical damage to river embankments and riparian vegetation through the storage of construction materials (including rocks) and/or equipment in these areas.
- Damage to riparian areas through the dumping of excavated material and spoil.
- Pollution of the river through leakage of fuels, oils, etc. from construction machinery, or through the runoff of cement and cement slurry from the construction area.
- Generation of litter and other waste material (e.g. wire off-cuts from the construction of the proposed gabion baskets) in the river channel itself and along the river banks.
- Increased disturbance of aquatic and semi-aquatic fauna, due to noise and the presence of a construction team with their machinery in and adjacent to the river.

Assessment: The potential construction-phase impacts associated with the installation of the proposed gabions and reno mattress were evaluated, overall, to be of low significance with the recommended mitigation measures assumed to be in place (see Table 7). Without mitigation, however, it was predicted that the sedimentation of the river that could occur during the initial excavation work and the related impact of possibly disrupting the spawning of Cape Galaxius fish species downstream of the construction site (as a result of the smothering of spawning habitat) would result in an overall negative impact of medium-to-high significance on the river ecosystem. The most important recommended mitigation measures for these impacts are to conduct the proposed activities in the low-flow season and outside of the typical spawning period for Cape Galaxius – this would be from early January to late March – and to create an isolated instream work area that is kept as dry as possible while the initial excavation activities are being carried out.

Mitigation:

- When the initial work is undertaken (i.e. excavation of the river bed and bank, and placement of the reno mattresses), the work area should be isolated from the rest of the stream for the duration of this phase of work (e.g. using sandbags) and the isolated work area should be kept as dry as

possible by pumping water out of this area. The sediment-laden water that is pumped from the isolated work area must not be discharged directly back into the river, but rather over land adjacent to the river where there can be some infiltration and settlement. This will reduce the sediment load in the water and the velocity at which the water enters the river. In addition, as a final line of defence against sedimentation of downstream areas, a temporary permeable barrier to trap sediments should be placed across the river immediately downstream of the work area (and downstream of the point at which the water that is pumped from the work area re-enters the river). This temporary barrier can be constructed using sand bags and/or gabion baskets, wrapped with geotextile fabric.

- The work that is to be carried out in the river itself (e.g. the installation of the reno mattresses) should be undertaken between the beginning of January and the end of March, during the low-flow season and when the spawning period for the Cape Galaxius fish species (spring to mid-summer) should be over. If any work is to be carried out in the river during spring or early summer, when Cape Galaxius are potentially spawning downstream of the site, then more stringent sediment control measures and more frequent monitoring by an ECO will be required.
- No construction material (e.g. rocks) or excavated spoil material should be stockpiled in the river channel, on the river banks or in the riparian zone of the river.
- All litter and other waste generated during installation (including wire off-cuts from the construction of the gabion baskets) should be immediately removed from the river channel and banks.
- Avoid the use of noisy machinery (as far as possible), minimise the amount of time spent working in the river, and only allow workers into the river when they need to be in there to complete specific tasks.
- All the recommended mitigation measures for the general construction work on the site (as outlined in Sections 5.1.1 to 5.1.3, above) should be properly implemented.
- The construction area and the section of the stream adjacent to and downstream of this should be inspected on a regular (at least weekly) basis by the ECO for signs of disturbance, sedimentation and pollution when the gabion installation work is being undertaken. If signs of disturbance, sedimentation or pollution are noted, immediate action should be taken to remedy the situation and, if necessary, a freshwater ecologist should be consulted for advice on the most suitable remediation measures.
- If the ECO observes any incident while the gabions are being installed that results in a visually significant negative impact on the ecological condition of the river (or is informed of such an incident), a stop-works instruction should be issued, and the incident should be immediately reported to the Department of Water & Sanitation (DWS) (Compliance and Enforcement Unit) and to the City of Cape Town (Environmental Compliance Unit, Environmental Resource Management Department).

Table 7: Impact Significance Rating: Impacts on Liesbeek River during installation of proposed gabions and reno mattress along eroded section of the northern bank of the river

	WITHOUT MITIGATION		WITH MITIGATION	
Category	**Rating**	**Description**	**Rating**	**Description**
Extent	Med-High	Impact beyond site boundary: sedimentation of Liesbeek River and disruption of spawning by Cape Galaxius fish populations	Med	Impact less likely but could still affect regionally important Cape Galaxius
Duration	Low	Short term: sediments re-mobilised during the following flood season	Low	Short term, easily reversible
Intensity	Med	Moderate change in habitat quality and ecosystem structure and function	Low	Minor, localised deterioration of habitat quality
Confidence	Med	-	Med	-
Probability	Med	Distinct possibility without mitigation	Low	Low probability of impact with mitigation
Status	**(-)**	**Negative**	**(-)**	**Negative**
Significance	**Med-High**	Potentially major loss of ecosystem structure and function	**Low**	Little to no loss of ecosystem structure and function

5.2 Operational Phase Impacts

5.2.1 Hydrological and water quality impacts of stormwater runoff as a result of catchment hardening

Description: There will be an increase in the extent of hardened surfaces and in the number of cars that will need to be accommodated in the new parking area. This will increase the amount of runoff during rainfall events and the risk of pollutants entering aquatic systems.

Assessment: It was estimated by the stormwater planning engineers for the project that the post-development runoff from the site will be 46% more than the pre-development runoff for the 1 in 10 year recurrence interval storm. The storage requirement for a 24 hour storm with a 1 in 10 year recurrence interval (which was used as the design objective to comply with the attenuation requirements of the City's stormwater policy) were calculated to be $50m^3$ (OWSA 2014). The stormwater planning engineers have calculated that this volume can be retained within the proposed permeable paving structure for the parking area and access road (the area required for the treatment of water for a 24 hour storm with a recurrence interval of 10 yrs is $1200m^2$ and the extent of permeable paving proposed for the development is $2400m^2$). The stormwater planning engineers have also indicated that the proposed permeable paving will ensure compliance with the City's (2009) water quality criteria for stormwater runoff from new developments.

Mitigation:

- Ensure that the permeable paving is regularly brushed and vacuumed (at least twice a year) to ensure that it retains its permeability, and immediately replace any paving blocks that are cracked or broken (these

maintenance requirements should be written into the operational-phase component of the EMP).

- Include a litter trap and a sediment trap (sump) at the outlet of all stormwater drainage systems, and maintain these regularly.

Table 8: Impact Significance Rating: Hydrological and water quality impacts of stormwater runoff as a result of catchment hardening

	WITHOUT MITIGATION		WITH MITIGATION	
Category	**Rating**	**Description**	**Rating**	**Description**
Extent	Low-Med	Localised impact beyond site	Low-Med	Localised impact beyond site
Duration	Med	Long-term but reversible	Med	Long-term but reversible
Intensity	Med	Moderate increase in runoff and pollutants likely over time if permeable paving is not properly maintained	Low	Very little change to hydrology and water quality likely with proper maintenance of permeable paving and installation of sediment traps
Probability	Med	Distinct possibility of impacts over time	Low	Impacts unlikely with proper maintenance of permeable paving
Confidence	Med-High	-	Med-High	-
Status	**(-)**	**Negative**	**(-)**	**Negative**
Significance	**Med**	Moderate changes could occur to ecosystem functioning	**Low**	Low significance. Impacts are minor and largely mitigated

5.2.2 Reduced erosion of river banks and improved dissipation of high flows

Description: The stabilisation of a section of the river bank will reduce ongoing erosion of the bank, and will allow for better dissipation and absorption of high flows. The improved dissipation and absorption of high flows would result from the permeable nature of the reno mattress and gabion baskets that are to be installed.

Assessment: The proposed stabilisation of the eroding section of river bank with gabions is likely to have a largely positive impact on the river during the operational phase. There is a minor risk that the bank stabilisation structures could lead to a localised increase in flow rates and/or water depths in the river. It was, however, determined by the Engineers that the introduction of the gabion structure will have a negligible increased effect on the flow rates and water depths (in the order of 1% - 2%), as the Manning n-value (a factor related to the frictional resistance of the river surface) for gabion boxes is similar to that of the natural river bed (pers. comm., Adeeb Abrahams: Orrie, Welby-Solomon & Associates).

Mitigation:

- Ensure that the mesh size of the baskets is small enough in relation to the size of the stones to be used in the baskets, so that stones do not wash out of the baskets and compromise the structural integrity of the stabilisation measures.
- Ensure that there is good supervision and quality control during the construction and installation of the gabion baskets and reno mattress.
- Conduct regular inspections and ongoing maintenance of the reno mattress and gabion baskets (this requirement should be written into the operational-phase component of the EMP).

Table 9: Impact Significance Rating: Reduced erosion of river banks and improved dissipation of high flows

	WITHOUT MITIGATION		WITH MITIGATION	
Category	**Rating**	**Description**	**Rating**	**Description**
Extent	Low-Med	Positive impact would extend downstream of site	Low-Med	Positive impact would extend downstream of site
Duration	Low-Med	Effectiveness would diminish over time without maintenance	Med	Long-term but not permanent
Intensity	Low-Med	Minor to moderate improvement likely	Med	Moderate improvement likely
Probability	High	Definite	High	Definite
Confidence	Med	-	Med	-
Status	**(+)**	**Positive**	**(+)**	**Positive**
Significance	**Low-Med**	Positive impact of low to medium significance anticipated.	**Med**	Positive impact of medium significance anticipated

5.3 Cumulative Impacts

Some additional hardening of the catchment area for the Liesbeek River will occur. This is considered to be a cumulative impact of very low to negligible significance, due to the extremely small size of the property that is to be developed relative to the total size of the catchment area for the river.

5.4 "Water use" authorisation

The bulk of the proposed activities, excluding the installation of bank stabilisation measures, would take place outside of the current-day riparian zone of the Liesbeek River but the 1:100 year flood line has not been determined for the relevant section of the river. As such, it is unclear whether the proposed activities would be considered to be a Section 21(i) "water use" in terms of the National Water Act (Act No. 36 of 1998) (NWA) – i.e. altering the bed, banks, course or characteristics of a watercourse – because this particular "water use" is defined in the relevant General Authorisation (Government Notice No. 1199 of December 2009) as "any change affecting the resource quality within the riparian habitat or 1:100 year floodline, whichever is the greater distance ...". The proposed installation of gabions along a section of the northern bank of the river does, however, trigger the legal requirement for "water use" authorisation in terms of Section 21 (c) – impeding or diverting the flow of water in a watercourse – and Section 21 (i) of the NWA. This was confirmed by the Department of Water & Sanitation (DWS), in a letter dated 19/11/2014 and an application should thus be submitted to the Western Cape office of DWS. It is likely that the applicable "water uses" fall under the ambit of the relevant General Authorisation.