Appendix F: Impact Assessment

ENVIRONMENTAL CONSULTING

South African National Biodiversity Institute

(SANBI)

IMPACT ASSESSMENT FOR THE PROPOSED INFRASTRUCTURE DEVELOPMENTS AT KIRSTENBOSCH NATIONAL BOTANICAL GARDEN, FARM CA875-RE, CAPE TOWN, WESTERN CAPE

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DESCRIPTION AND ASSESSMENT OF THE SIGNIFICANCE OF IMPACTS PRIOR TO AND AFTER MITIGATION

Methodology and rating Scale used to determine the impacts of the proposed development:

Criteria	Rating Scale	Description
Nature	N/A	A description of the impact related to the proposed development
	N/A	
Extent	Site	The impact will affect the site / proposed development area only.
	Local	The impact will affect the site, the adjacent properties and the immediate surrounding area.
	Regional	The impact will affect the municipal area.
	Provincial	The impact will affect the provincial area.
	National	The impact will affect more than three provinces
Duration	Temporary	The impact of the proposed development will last between 0-6 months
	Short term	The impact of the proposed development will last between 6- 18 months.
	Medium term	The impact of the proposed development will last between 18 months and 5 years.
	Long term	The impact of the proposed development will last between 5 to 10 years.
	Permanent	The impact will be ongoing for the lifespan of the proposed development.
Severity	Low	Where the impact affects the environment in such a way that natural, cultural and social functions and processes are minimally affected
	Moderate	Where the affected environment is altered but natural, cultural and social functions and processes continue albeit in a modified way; and valued, important, sensitive or vulnerable systems or communities are negatively affected
	High	Where natural, cultural or social functions and processes are altered to the extent that the natural process will temporarily or permanently cease; and valued, important, sensitive or vulnerable systems or communities are substantially affected.
Potential for impact on irreplaceable resources	No	No irreplaceable resources will be impacted.
	Yes	Irreplaceable resources will be impacted.
Consequence	Extremely detrimental	A combination of extent, duration, severity and the potential for impact on irreplaceable resources
	Highly detrimental	
	Moderately detrimental	
	Slightly detrimental	
	Negligible	
	Slightly beneficial	
	Moderately beneficial	
	Highly beneficial	
	Extremely beneficial	
Probability (the likelihood of the impact occurring)	Improbable	It is highly unlikely or less than 50 % likely that an impact will occur.
	Probable	It is between 50 and 70 % certain that the impact will occur.
	Definite	It is more than 75 % certain that the impact will occur or it is definite that the impact will occur.
Significance	Very High (Negative)	A function of Consequence and Probability
	High (Negative)	
	Moderate (Negative)	
	Low (Negative)	
	Neutral	
	Low (Positive)	
	Moderate (Positive)	
	High (Positive)	
	Very High (Positive)	

ALTERNATIVE 1 (PREFERRED OPTION)

CONSTRUCTION PHASE IMPACTS

This phase refers to the demolition of the existing prefabricated Head Office and IT buildings and the construction of the new administration building and parking area within the developed portion of Farm CA875-RE of the Kirstenbosch National Botanical Gardens. According to the project manager, Amjad Hendricks (Aurecon), the length of the construction phase is anticipated to be approximately 18 months.

Potential impacts on geographical and physical aspects:	**Air Quality:** **Dust Impacts**
Nature of impact:	The construction phase will involve the following dust generating activities: ➢ Demolition of the existing prefabricated Kirstenbosch Head Office building and prefabricated IT building; ➢ Clearing of a portion of the cultivated garden to make space for the proposed parking area; ➢ Excavation activities prior to the construction of the new administration building; ➢ Construction of the new administration building; ➢ Construction of the new parking area; and ➢ Storage of construction materials (sand) on site.
Extent and duration of impact:	The extent of the impact will be local. The duration of the impact will be short term. The impact will cease once the construction phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but it can be mitigated.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impact can easily be mitigated with appropriate dust suppression and avoidance measures.
Proposed mitigation:	Mitigation of potential dust impacts include: ➢ The use of water bowsers; ➢ Wetting down the site; ➢ Erection of shade netting to prevent off site dust migration; ➢ Covering construction materials (sand) with weighted down shade cloth or a similar material; and ➢ Regular manual sweeping of the surrounding roads and sidewalks.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible.

Potential impacts on geographical and physical aspects:	**Traffic Impacts**
Nature of impact:	Increase in construction vehicles moving to and from the site resulting in an increase in traffic on Rhodes Drive adjacent to the site and the main internal access road within Kirstenbosch Garden itself.
Extent and duration of impact:	The extent of the impact will be local. The duration of the impact will be short term and will cease once the

	construction phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be mitigated.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The proposed activity will have a cumulative impact on the surrounding roads, particularly on Rhodes Drive as there is traffic on Rhodes Drive with existing associated traffic impacts.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impacted can be mitigated should the mitigation measures outlined below as well as the additional measures contained in the EMP (attached as **Appendix G**) be implemented correctly.
Proposed mitigation:	Proposed mitigation measures include: ➢ The contractor must provide a traffic marshal for situations where construction traffic may impede normal traffic flows on Rhodes Drive adjacent to the site and the main internal access road within Kirstenbosch Garden itself. ➢ All vehicles will be legally compliant. ➢ All drivers will be competent and in possession of an appropriate valid driver's license. ➢ All vehicles travelling on site will adhere to the specified speed limits. ➢ The movement of all vehicles will be controlled such that they remain on designated routes. ➢ No member of the workforce will be permitted to drive a vehicle under the influence of alcohol or narcotic substances. ➢ Should there be any abnormal traffic loads as a consequence of the construction phase activities, the local municipality and relevant traffic authorities should be notified.
Cumulative impact post mitigation:	Once all mitigation measures have been implemented, the cumulative impact is considered minor
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible.

Potential noise impacts:	**Noise impacts**
Nature of impact:	Increase in noise levels up to 60dB in an otherwise quiet area (associated with the construction vehicles as well as the equipment which will be utilised for the construction phase of the project) and subsequent disturbance of the surrounding residents and landowners as well as the users of the Kirstenbosch Garden.
Extent and duration of impact:	The extent of the impact will be local. The duration will be short term and will only occur during working hours approved by the Local Municipality (anticipated to be 08h00-17h00 on weekdays only). The impact will cease once the construction phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed however mitigation measures can be implemented to ensure that the noise levels remain acceptable both for the neighbouring areas (particularly Kirstenbosch Garden itself) and the workers on

	site.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impact can be mitigated by implementing appropriate noise reduction and management measures.
Proposed mitigation:	Proposed mitigation measures include: ➢ Prior to the commencement of work on site, all on site personnel should undergo training or have an information session regarding appropriate noise levels. ➢ The construction contractor must use modern equipment, which produces the least noise. ➢ Any unavoidably noisy equipment must be identified and located in an area where it has least impact. ➢ The use of noise shielding screens must be considered and the operation of such machinery restricted to when it is actually required. ➢ No noise generating work is to be conducted outside of normal working hours as approved by the local authority.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible.

Potential impacts on socio-economic aspects:	**Social Impacts:** **Income and Employment**
Nature of impact:	The construction activities will have a small scale impact on local employment and income opportunities for local construction workers and subsequent improvement in the livelihoods of all those employed as well as their dependents.
Extent and duration of impact:	The extent of the impact will be confined to the site itself. The duration of the impact will be short term and will cease once the construction phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	N/A the impact is a positive.
Degree to which the impact may cause irreplaceable loss of resources:	N/A the impact is a positive.
Cumulative impact prior to mitigation:	The benefits on local employment opportunities are considered cumulative as the surrounding area (Kirstenbosch Gardens administration, research and horticulture departments) are considered an additional source of employment.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A the impact is a positive.
Degree to which the impact can be mitigated:	N/A the impact is a positive.
Proposed mitigation:	N/A the impact is a positive.
Cumulative impact post mitigation:	N/A the impact is a positive.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A the impact is a positive. (The impact is considered to be a Low Positive).

Potential visual impacts:	**Visual**
Nature of impact:	The construction vehicles, machinery and construction camp as well as the construction materials located on site will have a minor visual impact on the surrounding environment.
Extent and duration of impact:	The extent of the impact will be local. The duration of the impact will be short term and will cease once the construction phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be mitigated.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).
Degree to which the impact can be mitigated:	The impact can be easily mitigated with the measures outlined below and contained the EMP (attached as **Appendix G**).
Proposed mitigation:	Proposed mitigation measures include: ➢ Screening of the site during construction activities. ➢ Management of the placement of vehicles, construction camp and materials placed on site. Vehicles can be parked in one specific area whilst materials placed on site can be placed in neat piles in specified sections of the site prior to use. ➢ Construction materials stored on the site prior to their use and waste stored on the site prior to removal should be kept in neat, separate piles to ensure good housekeeping at all times. ➢ Should any lighting be required by the Contractor, it should be aimed at the area to be lit on site and the over spillage must be kept to a minimum.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible.

Potential health and safety impacts:	**Health and Safety Risk:** **Removal of Asbestos Roofing from the Fynbos Lodge**
Nature of impact:	Inhalation of asbestos fibres during the incorrect removal of the asbestos roof tiles from the Fynbos Lodge and subsequent long term health risks (particularly asbestosis, mesothelioma and lung cancer).
Extent and duration of impact:	The extent of the impact will be site specific and only affect the appointed contractor(s) allocated to remove the material. The duration of the impact risk will be temporary for the duration of the removal of the asbestos roofing.
Probability of occurrence:	Unlikely if the mitigation measures outlined below are implemented in full.
Degree to which the impact can be reversed:	The impact cannot be reversed should it occur.
Degree to which the impact may cause irreplaceable loss of resources:	Should the mitigation measures outlined below not be implemented in full and the impact were to occur, it could cause severe impacts to human health and even loss of life.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	High (Negative).
Degree to which the impact can be mitigated:	The impact can be avoided in entirely should the mitigation

	measures outlined below be implemented in full.
Proposed mitigation:	The measures contained in the Occupational Health and Safety Act (Act No. 85 of 1993) Asbestos Regulation (2001) must be adhered to at all times including, but not limited, to the following: ➢ An employer shall, before any employee is exposed or may be exposed to asbestos dust, after consultation with the health and safety committee established for that section of the workplace, ensure that the employee is adequately and comprehensively informed and trained; ➢ The asbestos must be prevented from becoming air borne; ➢ All areas where asbestos removal work will be carried out should be sealed off and access should be restricted; ➢ Personal protective equipment and clothing including a single-use respirator must be worn at all times; and ➢ Monitoring equipment must be worn to measure personal exposure to asbestos during the removal phase.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).

Potential impacts on cultural-historical aspects:	**Heritage Impacts:** **Fynbos Lodge**
Nature of impact:	According to the Notice of Intent to Develop (Asha Consulting, 2014), the only heritage resource that will be impacted is a structure greater than 60 years of age (Fynbos Lodge). This will be as a result of the internal renovations and refurbishments planned for this building (re-painting, removal of the asbestos roof and replacing it with a similar material and replacing internal infrastructures such as counter tops).
Extent and duration of impact:	The extent of the impact will confined to the interior of the Fynbos Lodge itself only. The duration of the impact will be permanent once completed.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	Once the refurbishments have been completed, they cannot be reversed however this is a positive impact.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative as no other heritage resources will be impacted.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A the impact is a positive.
Degree to which the impact can be mitigated:	N/A the impact is a positive.
Proposed mitigation:	N/A the impact is a positive.
Cumulative impact post mitigation:	N/A the impact is a positive.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A the impact is a positive. The impact is considered to be a Low (Positive).

Potential impact on biological aspects:	**Botanical Impacts:** **Disturbance or loss of natural and partly natural cover.**
Nature of impact:	According to the Botanical Assessment (Nick Helme Botanical Surveys, 2014), despite the majority of construction taking place in areas that are currently built, hardened or lawn, disturbance or loss of natural or partly natural (including the cultivated garden area) will occur (although less than 0.2ha) during the construction phase activities.
Extent and duration of impact:	The extent of the impact will be confined to the construction site and site perimeter. The duration of the impact will be temporary to permanent.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed.
Degree to which the impact may cause irreplaceable loss of resources:	According to the Botanical Assessment (Nick Helme Botanical Surveys, 2014) the vegetated area likely to be disturbed is currently gardened or only partly natural and no plant species of conservation concern are likely to be impacted by the proposed development.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	This impact can be mitigated to some degree as per the measures outlined below:
Proposed mitigation:	Proposed mitigation measures as outlined in the Botanical Assessment Report (Nick Helme Botanical Surveys, 2014) are as follows: ➢ All alien invasive vegetation (excluding the only mildly invasive stone pines *Pinus pinea* which are a feature of the area) within the study area should be felled and/or removed. ➢ The area should be monitored for alien invasive vegetation for one year after construction. ➢ Suitable locally indigenous plant species should be planted in all areas requiring rehabilitation after construction is over. ➢ The medium sensitivity areas should not be disturbed during construction.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Neutral.

Potential impact on biological aspects:	**Impacts on the Freshwater Ecology:** **Disturbance and loss of riparian vegetation.**
Nature of impact:	According to the Freshwater Ecological Assessment (Freshwater Consulting Group, 2014), during the construction phase there will be disturbance to and loss of terrestrial and riparian vegetation as a result of soil compaction, excavations, trampling by construction personnel, and movement and storage of materials and machinery on site.
Extent and duration of impact:	The extent of the impact will be site specific. The duration will be short term.
Probability of occurrence:	Definite.

Degree to which the impact can be reversed:	The impact cannot be reversed but can be avoided if the below mitigation measures are implemented in full.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impact can be mitigated in full should the below mitigation measures be strictly implemented.
Proposed mitigation:	Mitigation measures proposed by the freshwater specialist include: ➢ No construction activities should be undertaken within 10 metres of the outer edge of the river channel except when the river stabilisation work is being done. ➢ Danger tape should be used to demarcate no-go areas within the recommended 10 metre buffer. ➢ All equipment and materials storage areas should be located at a minimum distance of 10 metres from the riparian edge of the Liesbeck River.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).

Potential impact on biological aspects:	**Impacts on the Freshwater Ecology: Degradation and pollution of the Liesbeck River and associated aquatic habitat.**
Nature of impact:	According to the Freshwater Ecological Assessment (Freshwater Consulting Group, 2014), during the construction phase, waste materials and rubble generated by earth-moving and excavation as well as waste materials produced by work camps may end up in the river or along the riparian corridor resulting in the degradation and pollution of the Liesbeck River and the associated aquatic habitat.
Extent and duration of impact:	The extent of the impact will be site specific. The duration of the impact will be short term for the duration of the construction phase activities.
Probability of occurrence:	Probable.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be avoided if the below mitigation measures are implemented in full.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impact can be avoided should the below mitigation measures be strictly implemented.
Proposed mitigation:	Mitigation measures proposed by the freshwater specialist include: ➢ All rubble and other waste generated on the construction site should be removed from the site and disposed of at a recognised waste management facility. ➢ The river corridor (including the recommended 10 metre buffer area) must be inspected by the site manager and

	cleared of all waste on a daily basis. ➢ The Environmental Compliance Officer (ECO) must check whether there is any waste along the river corridor during every site inspection.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).

Potential impact on biological aspects:	**Impacts on the Freshwater Ecology: Contamination of river and riparian corridor.**
Nature of impact:	According to the Freshwater Ecological Assessment (Freshwater Consulting Group, 2014), during the construction phase, bitumen, fuels, oils, cement slurry and other related construction materials will very likely be utilised on site. If these come into contact with the adjacent freshwater resources, these materials will degrade water quality in the Liesbeck River and pose an ecological hazard to aquatic communities downstream.
Extent and duration of impact:	The extent of the impact will be local. The duration will be short term.
Probability of occurrence:	Improbable.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be avoided if the below mitigation measures are implemented in full.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources but will degrade the water quality and pose an ecological hazard to the aquatic communities downstream.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Moderate (Negative).
Degree to which the impact can be mitigated:	The impact can be avoided should the below mitigation measures be strictly implemented.
Proposed mitigation:	Mitigation measures proposed by the freshwater specialist include: ➢ Proper management of these materials is essential to minimalize the risk of contamination. ➢ All environmentally hazardous materials including, but not limited to, bitumen, fuels, oils and cement slurry should be 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 metres 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.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).

Potential impact on biological aspects:	**Impacts on the Freshwater Ecology:** **Impacts associated with installation of gabions along river bank.**
Nature of impact:	According to the Freshwater Ecological Assessment (Freshwater Consulting Group, 2014), the following negative construction phase impacts on the Liesbeck River ecosystem could occur when the gabions 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 of Cape Galaxius Fish in the Liesbeck 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.
Extent and duration of impact:	The extent of the impact will be local. The duration will be short term for the duration of the construction and installation of the gabions.
Probability of occurrence:	Probable.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be avoided if the below mitigation measures are implemented in full.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources but has the ability to degrade the water quality through sedimentation and pollution as well as physically disturb the aquatic ecosystems and the Liesbeck River itself.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	High (Negative).
Degree to which the impact can be mitigated:	The impact can be avoided should the below mitigation measures be strictly implemented.
Proposed mitigation:	Mitigation measures proposed by the freshwater specialist

	include: ➢ When the initial work is undertaken (i.e. excavation of the river bed and bank), 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. ➢ 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 required to be carried out in the river itself 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 other recommended freshwater ecology mitigation measures for the general construction work on the site (as outlined 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). ➢ 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.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).

OPERATIONAL PHASE IMPACTS

Potential impacts on visual aspects	**Change in Visual Character:** **Change in Visual Character as a result of the proposed administration building.**
Nature of impact:	According to the Visual Impact Assessment (Megan Anderson Landscape Architects, 2015), there will be a change in the visual character of the area as a result of the construction of the new upgraded administration building in place of the existing prefabricated Kirstenbosch head Office.
Extent and duration of impact:	The spatial/geographical area of influence of the visual impact will be local (i.e. limited to the immediate surroundings) and the predicted lifespan of the visual impact will be long-term (i.e. the lifespan of the project).
Probability of occurrence:	Highly probable.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be mitigated as outlined below.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The proposed land use is consistent with the accepted and established land use of this area of the site.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (Negative)
Degree to which the impact can be mitigated:	The impact can be mitigated with the measures outlined below and contained the EMP (attached as **Appendix G**).
Proposed mitigation:	Proposed mitigation measures include: ➢ Retention of wooded area and vegetated areas around the new administration building.
Cumulative impact post mitigation:	N/A The proposed land use is consistent with the accepted and established land use of this area of the site.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Positive).

Potential impacts on visual aspects	**Change in Visual Character:** **Change in Visual Character as a result of the proposed parking area.**
Nature of impact:	According to the Visual Impact Assessment (Megan Anderson Landscape Architects , 2015), there will be a change in the visual character of the area as a result of a portion of the cultivated garden being replaced with a car parking area.
Extent and duration of impact:	The spatial/geographical area of influence of the visual impact will be local (i.e. limited to the immediate surroundings) and the predicted lifespan of the visual impact will be long-term (i.e. the lifespan of the project).
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be mitigated as outlined below.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will cause irreplaceable loss of a portion of the cultivated garden (an area of low botanical sensitivity).
Cumulative impact prior to mitigation:	The impact is not considered to be a cumulative impact.
Significance rating of impact prior to mitigation	Medium (Negative).

(Low, Medium, Medium-High, High, or Very-High)	
Degree to which the impact can be mitigated:	The impact can be mitigated with the measures outlined below and contained the EMP (attached as **Appendix G**).
Proposed mitigation:	Proposed mitigation measures include: ➢ Appropriate hard and soft landscaping of the proposed parking development.
Cumulative impact post mitigation:	N/A The impact is not considered to be a cumulative impact.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).

Potential impacts on visual aspects	**Visual Impacts:** **Night Lighting**
Nature of impact:	According to the Visual Impact Assessment (Megan Anderson Landscape Architects , 2015) whilst the larger administration building will mainly be used during the day, additional night lighting may be required which may spill onto Rhodes Drive resulting in minor visual disturbance to motorists driving past the site at night.
Extent and duration of impact:	The spatial/geographical area of influence of the visual impact will be local and the duration of the impact will be long term.
Probability of occurrence:	Probable.
Degree to which the impact can be reversed:	The impact can be reversed by turning off the lights.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is considered cumulative as the surrounding areas adjacent to the site are developed with associated night lighting (i.e. adjacent residential areas).
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Medium (Negative).
Degree to which the impact can be mitigated:	The impact can be easily mitigated by turning off the lights or reduced by implementing appropriate mitigation measures outlined below.
Proposed mitigation:	Proposed mitigation measures include: ➢ No or very limited street/parking lighting; ➢ Keeping street/parking lighting to low level lighting; and ➢ Limiting external lighting on the administration building.
Cumulative impact post mitigation:	The cumulative impact once all the mitigation measures have been implemented is considered to be Low.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).

Potential impacts on botanical aspects	**Botanical Impacts** **Alien Plant Invasion**
Nature of impact:	According to the Botanical Assessment (Nick Helme Botanical Surveys, 2014), the operational phase impact may include some minor alien plant invasion.
Extent and duration of impact:	The extent of the impact will be confined to the site itself. The duration of the impact will be medium term (between 1 – 5years).
Probability of occurrence:	Probable.
Degree to which the impact can be reversed:	The impact can be reversed with the implementation of appropriate mitigation measures.

Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact can be considered cumulative as there is already a mix of indigenous and alien vegetation located both on and around the site.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).
Degree to which the impact can be mitigated:	This impact can be completely mitigated.
Proposed mitigation:	Proposed mitigation measures as outlined in the Botanical Assessment Report (Nick Helme Botanical Surveys, 2014) are as follows: ➢ The area should be monitored for alien invasive vegetation for one year after construction. ➢ Suitable locally indigenous plant species should be planted in all areas requiring rehabilitation after construction is over.
Cumulative impact post mitigation:	Once all the above mentioned mitigation measures have been put in place, the cumulative impact will be a positive.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Positive).

Potential impacts on socio-economic aspects:	**Socio-Economic Impacts:** **Building size and subsequent capacity for administration function.**
Nature of impact:	The administration building will incorporate the IT, Human Resources/Finance, Marketing and Communications Directorate, Shared Facilities Department and the Early Detection and Rapid Response Programme Units into one building resulting in streamlining of SANBI administration at Kirstenbosch Gardens.
Extent and duration of impact:	The spatial/ geographical area of influence of the impact will be local throughout the Kirstenbosch Garden. The duration of the impact will be permanent.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	Once the building is constructed, it cannot be reversed (positive).
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause an irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A the impact is a positive.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A the impact is considered to be a High Positive.
Degree to which the impact can be mitigated:	N/A the impact is a positive.
Proposed mitigation:	N/A the impact is a positive.
Cumulative impact post mitigation:	N/A the impact is a positive.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	High (Positive).

Potential impact on freshwater aspects:	**Freshwater Impacts:** **Hydrological and water quality impacts of stormwater runoff as a result of increased catchment hardening.**
Nature of impact:	According to the Freshwater Ecological Assessment (Freshwater Consulting Group, 2014), as a result of the increase in the extent of hardened surfaces and in the number of cars that will need to be accommodated in the

	new parking area there will be an increase in the amount of runoff during rainfall events and subsequent risk of pollutants entering aquatic systems.
Extent and duration of impact:	The extent of the impact will be local. The duration will be long term but reversible.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be significantly reduced with the implementation of the mitigation measures below.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	According to the Freshwater Ecological Assessment (Freshwater Consulting Group, 2014), the impact is considered to be cumulative as the surrounding roads (Rhodes Drive in particular) as well as the adjacent residential areas and associated driveways also have a large amount of hardened surfacing.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Moderate (Negative).
Degree to which the impact can be mitigated:	The impact can be significantly reduced with the implementation of the mitigation measures below.
Proposed mitigation:	Mitigation measures proposed by the freshwater specialist include: ➢ 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. ➢ Include a litter trap and a sediment trap (sump) at the outlet of all stormwater drainage systems, and maintain these regularly.
Cumulative impact post mitigation:	Once all the mitigation measures have been implemented, the cumulative impact is considered to be low/ negligible.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).

Potential impact on freshwater aspects:	**Freshwater Impacts:** **Reduced erosion of river banks and improved dissipation of high flows.**
Nature of impact:	According to the Freshwater Ecological Assessment (Freshwater Consulting Group, 2014), the installation of the gabions will lead to stabilisation of a section of the river bank which will reduce the ongoing erosion of the bank. This will allow for better dissipation and absorption of high flows as well as reduced sedimentation downstream.
Extent and duration of impact:	The extent of the impact will be regional. The duration will be long term but not permanent unless mitigation/ maintenance measures are implemented.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed once the gabions have been installed. This however is considered a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Significance prior to mitigation/ maintenance: Low (Positive).
Degree to which the impact can be mitigated:	N/A The impact is considered to be a positive.

Proposed mitigation:	Mitigation/ maintenance measures proposed by the freshwater specialist include: ➢ 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, installation and maintenance of the gabion baskets. ➢ Conduct regular inspections and ongoing maintenance of the gabion baskets.
Cumulative impact post mitigation:	N/A The impact is not considered to be a cumulative impact.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Significance post mitigation/ maintenance: Moderate (Positive).

Potential impact on Heritage aspects:	**Heritage Impacts:** **Impacts of the Gabions on the Fynbos Lodge**
Nature of impact:	According to the Freshwater Ecological Assessment (Freshwater Consulting Group, 2014), the installation of the gabions will lead to stabilisation of the section of the river bank along which the Fynbos Lodge is located. This will reduce the ongoing erosion of the bank and remove the risk of the increasingly instability of the ground adjacent to the Fynbos Lodge and the subsequent potential risk of damage or even collapse of this building of significant heritage value.
Extent and duration of impact:	The extent of the impact will be site specific. The duration will be long term but not permanent unless migration/ maintenance measures are implemented.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed once the gabions have been installed. This however is considered a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A The impact is considered to be a positive.
Degree to which the impact can be mitigated:	N/A The impact is considered to be a positive.
Proposed mitigation:	N/A The impact is considered to be a positive.
Cumulative impact post mitigation:	N/A The impact is not considered to be a cumulative impact.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A The impact is considered to be a Moderate Positive.

Other:	**Potential impacts on local municipal energy budget.**
Nature of impact:	The proposed development incorporates energy efficient measures that will reduce the new administration building's demand on the local municipal budget.
Extent and duration of impact:	The extent of the impact would be regional. The duration of the impact would be permanent.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed once the administration building has been constructed. This however is considered a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.

Cumulative impact prior to mitigation:	It is not known whether the impact is cumulative as it is unknown whether the surrounding land users also incorporate energy efficiency measures into their properties.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A The impact is considered to be a positive.
Degree to which the impact can be mitigated:	N/A The impact is considered to be a positive.
Proposed mitigation:	N/A The impact is considered to be a positive.
Cumulative impact post mitigation:	It is not known whether the impact is cumulative as it is unknown whether the surrounding land users also incorporate energy efficiency measures into their properties.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A The impact is considered to be a Low Positive.

Other:	**Potential impacts on local water resources.**
Nature of impact:	The proposed development incorporates optimal reuse and recycling of water measures that will reduce the new administration building's demand on local water resources.
Extent and duration of impact:	The extent of the impact would be regional. The duration of the impact would be permanent.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed once the administration building has been constructed. This however is considered a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	It is not known whether the impact is cumulative as it is unknown whether the surrounding land users also incorporate energy efficiency measures into their properties.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A The impact is considered to be a positive.
Degree to which the impact can be mitigated:	N/A The impact is considered to be a positive.
Proposed mitigation:	N/A The impact is considered to be a positive.
Cumulative impact post mitigation:	It is not known whether the impact is cumulative as it is unknown whether the surrounding land users also incorporate energy efficiency measures into their properties.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A The impact is considered to be a Low Positive.

DECOMMISSIONING PHASE IMPACTS

This phase refers to the future decommissioning and demolition of the proposed Kirstenbosch administration building, the parking area and landscaped areas within the developed portion of Farm CA875-RE of the Kirstenbosch National Botanical Garden. This phase also refers to the decommissioning of the contractor camp.

Please note: As the Fynbos Lodge is considered to be a building of significant heritage status, it is not anticipated that this building will be decommissioned. As such, this section does not include measures for the decommissioning of the Fynbos Lodge or the bank stabilisation (gabions) within the Liesbeck River.

Potential impacts on geographical and physical aspects:	**Air Quality:** **Dust Impacts**
Nature of impact:	The decommissioning phase will involve the following dust generating activities: ➢ Demolition of the administration building, parking area and landscaped areas; and ➢ Breaking down and removal of the Contractor camp;
Extent and duration of impact:	The extent of the impact will be local. The duration of the impact will be temporary. The impact will cease once the decommissioning phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but it can be mitigated.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impact can easily be mitigated with appropriate dust suppression and avoidance measures.
Proposed mitigation:	Mitigation of potential dust impacts include: ➢ The use of water bowsers; ➢ Wetting down the site; ➢ Erection of shade netting to prevent off site dust migration; and ➢ Regular manual sweeping of the surrounding roads and sidewalks.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible.

Potential impacts on geographical and physical aspects:	**Traffic Impacts**
Nature of impact:	Increase in decommissioning related vehicles moving to and from the site resulting in an increase in traffic on Rhodes Drive adjacent to the site and the main internal access road within Kirstenbosch Garden itself.
Extent and duration of impact:	The extent of the impact will be local. The duration of the impact will be temporary and will cease once the decommissioning phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be mitigated.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The decommissioning activities will have a cumulative impact on the surrounding roads, particularly on Rhodes Drive as there is traffic on Rhodes Drive with existing

	associated traffic impacts.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impacted can be mitigated should the mitigation measures outlined below as well as the additional measures contained in the EMP (attached as **Appendix G**) be implemented correctly.
Proposed mitigation:	Proposed mitigation measures include: ➢ The contractor must provide a traffic marshal for situations where decommissioning vehicle related traffic may impede normal traffic flows on Rhodes Drive adjacent to the site and the main internal access road within Kirstenbosch Garden itself. ➢ All vehicles will be legally compliant. ➢ All drivers will be competent and in possession of an appropriate valid driver's license. ➢ All vehicles travelling on site will adhere to the specified speed limits. ➢ The movement of all vehicles will be controlled such that they remain on designated routes. ➢ No member of the workforce will be permitted to drive a vehicle under the influence of alcohol or narcotic substances. ➢ Should there be any abnormal traffic loads as a consequence of the decommissioning phase activities, the local municipality and relevant traffic authorities should be notified.
Cumulative impact post mitigation:	Once all mitigation measures have been implemented, the cumulative impact is considered minor
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible.

Potential noise impacts:	**Noise impacts**
Nature of impact:	Increase in noise levels up to 60dB in an otherwise quiet area (associated with the decommissioning related vehicles as well as the equipment which will be utilised for the decommissioning phase of the project) and subsequent disturbance of the surrounding residents and landowners as well as the users of the Kirstenbosch Garden.
Extent and duration of impact:	The extent of the impact will be local. The duration will be temporary and will only occur during working hours approved by the Local Municipality (anticipated to be 08h00-17h00 on weekdays only). The impact will cease once the decommissioning phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed however mitigation measures can be implemented to ensure that the noise levels remain acceptable both for the neighbouring areas (particularly Kirstenbosch Garden itself) and the workers on site.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impact can be mitigated by implementing appropriate

	noise reduction and management measures.
Proposed mitigation:	Proposed mitigation measures include: ➢ Prior to the commencement of decommissioning activities on site, all on site personnel should undergo training or have an information session regarding appropriate noise levels. ➢ The decommissioning contractor must use modern equipment, which produces the least noise. ➢ Any unavoidably noisy equipment must be identified and located in an area where it has least impact. ➢ The use of noise shielding screens must be considered and the operation of such machinery restricted to when it is actually required. ➢ No noise generating work is to be conducted outside of normal working hours as approved by the local authority.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible.

Potential impacts on socio-economic aspects:	**Social Impacts:** **Income and Employment**
Nature of impact:	The decommissioning activities will have a small scale impact on local employment and income opportunities for local workers and subsequent improvement in the livelihoods of all those employed as well as their dependents.
Extent and duration of impact:	The extent of the impact will be confined to the site itself. The duration of the impact will be temporary and will cease once the decommissioning phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	N/A the impact is a positive.
Degree to which the impact may cause irreplaceable loss of resources:	N/A the impact is a positive.
Cumulative impact prior to mitigation:	The benefits on local employment opportunities are considered cumulative as the surrounding area (Kirstenbosch Garden administration, research and horticulture departments) are an additional source of employment.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A the impact is a positive.
Degree to which the impact can be mitigated:	N/A the impact is a positive.
Proposed mitigation:	N/A the impact is a positive.
Cumulative impact post mitigation:	The benefits on local employment opportunities are considered cumulative as the surrounding area (Kirstenbosch Garden administration, research and horticulture departments) are an additional source of employment.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	N/A the impact is a positive. (The impact is considered to be a Low Positive).

Potential visual impacts:	**Visual**
Nature of impact:	➢ The decommissioning related vehicles, machinery and Contractor camp as well as the decommissioning related

	materials located on site will have a minor visual impact on the surrounding environment. ➢ Temporary loss of sense of place.
Extent and duration of impact:	The extent of the impact will be local. The duration of the impact will be short term and will cease once the decommissioning phase is over.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be mitigated.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).
Degree to which the impact can be mitigated:	The impact can be easily mitigated with the measures outlined below and contained the EMP (attached as **Appendix G**).
Proposed mitigation:	Proposed mitigation measures include: ➢ Screening of the site during decommissioning activities. ➢ Management of the placement of vehicles, Contractor camp and materials placed on site. Vehicles can be parked in one specific area whilst materials placed on site can be placed in neat piles in specified sections of the site prior to use. ➢ Materials stored on the site prior to their use and waste stored on the site prior to removal should be kept in neat, separate piles to ensure good housekeeping at all times. ➢ Should any lighting be required by the Contractor, it should be aimed at the area to be lit on site and the over spillage must be kept to a minimum.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Negligible.

Potential impact on biological aspects:	**Botanical Impacts:** **Disturbance or loss of natural and partly natural cover.**
Nature of impact:	Despite the majority of the buildings and infrastructure being placed within areas that are currently built, hardened or lawn, disturbance or loss of natural or partly natural (including the cultivated garden area) will likely occur (although less than 0.2ha) during the decommissioning phase activities.
Extent and duration of impact:	The extent of the impact will be confined to the decommissioning site and site perimeter. The duration of the impact if it occurs will be temporary to permanent.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed.
Degree to which the impact may cause irreplaceable loss of resources:	According to the Botanical Assessment (Nick Helme Botanical Surveys, 2014) the vegetated area likely to be disturbed is currently gardened or only partly natural and no plant species of conservation concern are likely to be impacted by the proposed development.
Cumulative impact prior to mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-	Low (Negative).

High)	
Degree to which the impact can be mitigated:	This impact can be mitigated to some degree as per the measures outlined below:
Proposed mitigation:	Proposed mitigation measures as outlined in the Botanical Assessment Report (Nick Helme Botanical Surveys, 2014) are as follows: ➢ All alien invasive vegetation (excluding the only mildly invasive stone pines *Pinus pinea* which are a feature of the area) within the study area should be felled and/or removed. ➢ The area should be monitored for alien invasive vegetation for one year after decommissioning. ➢ Suitable locally indigenous plant species should be planted in all areas requiring rehabilitation after the decommissioning activities are over. ➢ The medium sensitivity areas should not be disturbed during the decommissioning activities.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Neutral.

Potential impact on biological aspects:	**Impacts on the Freshwater Ecology: Disturbance and loss of riparian vegetation.**
Nature of impact:	During the decommissioning phase there will most likely be disturbance to and loss of terrestrial and riparian vegetation as a result of soil compaction, excavations, trampling by decommissioning personnel, and movement and storage of materials and machinery on site.
Extent and duration of impact:	The extent of the impact will be site specific. The duration will be short term.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be avoided if the below mitigation measures are implemented in full.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impact can be mitigated in full should the below mitigation measures be strictly implemented.
Proposed mitigation:	Mitigation measures proposed by the freshwater specialist include: ➢ No decommissioning related activities should be undertaken within 10 metres of the outer edge of the river channel. ➢ Danger tape should be used to demarcate no-go areas within the recommended 10 metre buffer. ➢ All equipment and materials storage areas should be located at a minimum distance of 10 metres from the riparian edge of the Liesbeck River.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).

Potential impact on biological aspects:	**Impacts on the Freshwater Ecology:** **Degradation and pollution of the Liesbeck River and associated aquatic habitat.**
Nature of impact:	During the decommissioning phase, waste materials and rubble generated by earth-moving and excavation as well as waste materials produced by work camps may end up in the river or along the riparian corridor resulting in the degradation and pollution of the Liesbeck River and the associated aquatic habitat.
Extent and duration of impact:	The extent of the impact will be site specific. The duration of the impact will be short term for the duration of the decommissioning phase activities.
Probability of occurrence:	Probable.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be avoided if the below mitigation measures are implemented in full.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Low (Negative).
Degree to which the impact can be mitigated:	The impact can be avoided should the below mitigation measures be strictly implemented.
Proposed mitigation:	Mitigation measures proposed by the freshwater specialist include: ➢ All rubble and other waste generated during decommissioning activities should be removed from the site and disposed of at a recognised waste management facility. ➢ The river corridor (including the recommended 10 metre buffer area) must be inspected by the site manager and cleared of all waste on a daily basis. ➢ The Environmental Compliance Officer (ECO) must check whether there is any waste along the river corridor during every site inspection.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).

Potential impact on biological aspects:	**Impacts on the Freshwater Ecology:** **Contamination of river and riparian corridor.**
Nature of impact:	During the decommissioning phase, bitumen, fuels, oils and other related materials will likely be utilised on site. If these come into contact with the adjacent freshwater resources, these materials will degrade the water quality in the Liesbeck River and pose an ecological hazard to aquatic communities downstream.
Extent and duration of impact:	The extent of the impact will be local. The duration will be short term.
Probability of occurrence:	Improbable.
Degree to which the impact can be reversed:	The impact cannot be reversed but can be avoided if the below mitigation measures are implemented in full.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources but will degrade the water quality and pose an ecological hazard to the aquatic communities downstream.

Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact prior to mitigation (Low, Medium, Medium-High, High, or Very-High)	Moderate (Negative).
Degree to which the impact can be mitigated:	The impact can be avoided should the below mitigation measures be strictly implemented.
Proposed mitigation:	Mitigation measures proposed by the freshwater specialist include: ➢ Proper management of these materials is essential to minimalize the risk of contamination. ➢ All environmentally hazardous materials including, but not limited to, bitumen, fuels and oils should be managed in such a way that they are not able to contaminate the river through direct spills or stormwater runoff. ➢ No bitumen, fuels or oils or any other environmentally hazardous materials should be stored within 10 metres of the riparian edge. ➢ 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.
Cumulative impact post mitigation:	N/A The impact is not considered to be cumulative.
Significance rating of impact after mitigation (Low, Medium, Medium-High, High, or Very-High)	Very Low (Negative).

NO-GO ALTERNATIVE

Potential impact on Heritage aspects:	**Heritage Impacts:** **Fynbos Lodge**
Nature of impact:	The interior of the existing Fynbos Lodge would remain unchanged as the building would not be renovated or upgraded. This would mean that the interior of this building would not be re-painted, the internal structures (counter tops) would not be replaced and the asbestos roofing would not be removed and replaced.
Extent and duration of impact:	The extent of the impact is local to the interior of the Fynbos Lodge itself. The duration of the impact will be long-term with increasing degradation of the interior of the Fynbos Lodge over the course of time
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact can be reversed if the refurbishments and upgrade take place.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause the irreplaceable loss of the Fynbos Lodge itself, however the building will continue to degrade over time.
Cumulative impact prior to mitigation:	The impact is not considered to be a cumulative impact
Significance rating of impact:	Low (Negative).

Potential impact on Heritage aspects:	**Heritage Impacts:** **No stabilisation of the banks of the Liesbeck River.**
Nature of impact:	The upper catchment of the Liesbeck River would not be stabilised which would mean that the river would continue to undercut and weaken the north bank directly adjacent to the Fynbos Lodge which, in time, may result in increasingly instability of the ground adjacent to the Fynbos Lodge and potential damage or even collapse of this building of significant heritage value.
Extent and duration of impact:	The extent of the impact is site specific to the area of the Fynbos Lodge. The duration of the impact will be permanent once it occurs.
Probability of occurrence:	Definite with time.
Degree to which the impact can be reversed:	The impact cannot be reversed once it happens.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will cause the irreplaceable loss of the Fynbos Lodge, a building of significant heritage importance.
Cumulative impact prior to mitigation:	The impact is not considered to be a cumulative impact
Significance rating of impact:	High (Negative).

Potential impact on Health and Safety:	**Health Impact:** **Continued presence of Asbestos within the roof of the Fynbos Lodge.**
Nature of impact:	Potential health risk to any individuals coming into contact with or disturbing the asbestos contained within the roof of the Fynbos Lodge.
Extent and duration of impact:	The extent of the impact is site specific confined to area of the Fynbos Lodge only and would only affect those who disturb the asbestos sections of the roof. The duration of the impact will be temporary if asbestos exposure was brief however the impact has the risk of being long term or permanent if exposure is prolonged.
Probability of occurrence:	Unlikely.

Degree to which the impact can be reversed:	If the impact occurs, it cannot be reversed.
Degree to which the impact may cause irreplaceable loss of resources:	Depending on the duration of exposure, the impact has the potential to cause long term health risks (particularly asbestosis, mesothelioma and lung cancer) and even loss of human like- an irreplaceable resource.
Cumulative impact prior to mitigation:	The impact is not considered to be a cumulative impact.
Significance rating of impact:	High (Negative).

Potential impact on Visual aspects:	**Visual Impact:** **Prefabricated IT building and administration building remaining on site.**
Nature of impact:	Visual impact as a result of the existing prefabricated IT building and prefabricated Kirstenbosch Head Office remaining in operation at the site.
Extent and duration of impact:	The extent of the impact is local to area of site. The duration of the impact will be long- term.
Probability of occurrence:	Definite, the buildings are already in place and the No-Go option would entail a continuation of the existing building layout and visual impact.
Degree to which the impact can be reversed:	The impact cannot be reversed.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be a cumulative impact
Significance rating of impact:	Low (Negative).

Potential impact on Visual aspects:	**Visual Impact:** **Night lighting.**
Nature of impact:	Occasional night lighting used as and when required which spills onto Rhodes Drive resulting in minor visual disturbance to motorists driving past the site at night.
Extent and duration of impact:	The extent of the impact is local to area of site. The duration of the impact will be long- term.
Probability of occurrence:	Definite, the buildings are already in place and the No-Go option would entail a continuation of the existing building layout and visual impact.
Degree to which the impact can be reversed:	The impact cannot be reversed.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is considered cumulative as the surrounding areas adjacent to the site are developed with associated night lighting (i.e. adjacent residential areas).
Significance rating of impact:	Low (Negative).

Potential impact on Visual aspects:	**Visual Impact:** **Cultivated Garden remaining intact and in place.**
Nature of impact:	The existing cultivated garden (of low botanical sensitivity) would remain undisturbed and in place.
Extent and duration of impact:	The extent of the impact is local to area of site. The duration of the impact will be long- term.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	N/A This impact is a positive.
Degree to which the impact may cause irreplaceable loss of resources:	N/A This impact is a positive.
Cumulative impact prior to mitigation:	N/A This impact is a positive.
Significance rating of impact:	Low (Positive).

Potential impact on Botanical aspects:	Botanical Impact: Cultivated Garden remaining intact and in place
Nature of impact:	The existing cultivated garden (of low botanical sensitivity) would remain undisturbed and in place.
Extent and duration of impact:	The extent of the impact is local to area of site. The duration of the impact will be long- term.
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	N/A This impact is neutral.
Degree to which the impact may cause irreplaceable loss of resources:	N/A This impact is neutral.
Cumulative impact prior to mitigation:	N/A This impact is neutral.
Significance rating of impact:	Neutral

Potential impact on Botanical aspects:	Botanical Impact: Invasive Alien Vegetation Control.
Nature of impact:	Should the proposed development not go ahead, there would be no additional invasive alien vegetation control on and around the site.
Extent and duration of impact:	The extent of the impact is local to area of site. The duration of the impact will be long- term -permanent.
Probability of occurrence:	Definite
Degree to which the impact can be reversed:	The impact can be reversed with the implementation of the mitigation measures associated with the construction and operational phases of the proposed development.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact:	Low (Negative).

Potential impact on Socio- Economic aspects:	Socio-Economic: SANBI administrative functionality
Nature of impact:	The administrative functions of SANBI would remain separated resulting in continued difficulty in streamlining SANBI's administrative functioning and SANBI's socio-economic needs remaining unaddressed.
Extent and duration of impact:	The extent of the impact is local to the Kirstenbosch National Botanical Garden. The duration of the impact will be long-term.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed unless additional administrative capacity is created.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	The impact is not considered to be cumulative.
Significance rating of impact:	Moderate (Negative).

Potential impact on Freshwater Ecology:	Freshwater Ecology: No potential disturbance or loss of riparian vegetation.
Nature of impact:	Should the construction activities not take place, there would be no risk of disturbance to or loss of the riparian vegetation in and along the Liesbeck River adjacent to the site.
Extent and duration of impact:	The extent of the impact is local to the Kirstenbosch National

	Botanical Garden. The duration of the impact will be long-term.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	N/A The impact is a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is a positive.
Significance rating of impact:	Low (Positive).

Potential impact on Freshwater Ecology:	**Freshwater Ecology:** **No potential degradation or pollution of the Liesbeck River.**
Nature of impact:	Should the construction activities not take place, there would be no risk of construction waste (rubble, plastic and other general waste) ending up in the river.
Extent and duration of impact:	The extent of the impact is local to the Kirstenbosch National Botanical Garden. The duration of the impact will be long-term.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	N/A The impact is a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is a positive.
Significance rating of impact:	Low (Positive).

Potential impact on Freshwater Ecology:	**Freshwater Ecology:** **No potential contamination of the Liesbeck River and associated riparian vegetation.**
Nature of impact:	Should the construction activities not take place, there would be no risk of construction related materials such as bitumen, fuel, oil, cement and cement slurry entering the river.
Extent and duration of impact:	The extent of the impact is local to the Kirstenbosch National Botanical Garden. The duration of the impact will be long-term.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	N/A The impact is a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is a positive.
Significance rating of impact:	Low (Positive).

Potential impact on Freshwater Ecology:	**Freshwater Ecology:** **No potential impacts associated with the construction of the gabions within the existing curvature of the Liesbeck River.**
Nature of impact:	Should the construction activities not take place, there would be no risk of increased sedimentation in the river, no disruption of the fish spawning, no localised alteration of the river flow, no disturbance to the riparian habitat, no damage to the river embankments, no pollution of the river and no general disturbance to the aquatic flora and fauna.
Extent and duration of impact:	The extent of the impact is local to the Kirstenbosch National Botanical Garden. The duration of the impact will be long-term.
Probability of occurrence:	Definite.

Degree to which the impact can be reversed:	N/A The impact is a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is a positive.
Significance rating of impact:	Low (Positive).

Potential impact on Freshwater Ecology:	**Freshwater Ecology:** **No reduction in the erosion of the banks of the Liesbeck River.**
Nature of impact:	Should the construction activities not take place, there would be no stabilisation of the Liesbeck River banks and no subsequent erosion control resulting in continued low absorption of sediment downstream.
Extent and duration of impact:	The extent of the impact is local to the Kirstenbosch National Botanical Garden and surrounding area. The duration of the impact will be long- term.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact can only be stopped if bank stabilisations (i.e. gabions) are implemented.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	This impact is not considered to be cumulative.
Significance rating of impact:	Low (Negative).

Potential impact on Freshwater Ecology:	**Freshwater Ecology:** **Stormwater runoff**
Nature of impact:	Should the proposed development not take place, there would not be an increase in surface hardening and associated increase in stormwater runoff.
Extent and duration of impact:	The extent of the impact is local to the Kirstenbosch National Botanical Garden. The duration of the impact will be long-term.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	N/A The impact is a positive.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A The impact is a positive.
Significance rating of impact:	Low (Positive).

Other potential impacts:	**No reduction in demand on local municipal energy budget.**
Nature of impact:	The existing Kirstenbosch Head Office and Administration building would remain in place and as such no additional energy efficient measures would be realised. Thus, instead of the reduction in energy demand that would be realised with the construction of the new administration building, the existing building's current energy demand would remain the same.
Extent and duration of impact:	The extent of the impact would be regional. The duration would be permanent.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The ongoing impact cannot be reversed.
Degree to which the impact may cause	Without the implementation of energy efficient measures,

irreplaceable loss of resources:	the use of non-renewable energy resources would remain the same resulting in their irreplaceable loss.
Cumulative impact prior to mitigation:	It is not known whether the impact is cumulative as it is unknown whether the surrounding land users incorporate energy efficiency measures into their properties.
Significance rating of impact:	Low (Negative).

Other potential impacts:	**No reduction in demand on the local water resources.**
Nature of impact:	The existing Kirstenbosch Head Office and Administration building would remain in place and as such no additional water reuse and recycling measures would be realised. As such, no possibility for reduction in water usage would be realised and the existing building's water demand would remain the same.
Extent and duration of impact:	The extent of the impact would be regional. The duration would be permanent.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The ongoing impact cannot be reversed.
Degree to which the impact may cause irreplaceable loss of resources:	Without the implementation of water reuse and recycling measures, the use of local water resources would remain the same resulting in their irreplaceable loss.
Cumulative impact prior to mitigation:	It is not known whether the impact is cumulative as it is unknown whether the surrounding land users incorporate water reuse and recycling measures into their properties.
Significance rating of impact:	Low (Negative).

Other potential impacts:	**No additional temporary construction phase impacts**
Nature of impact:	(Low) Positive Impacts ➢ No temporary air quality impacts within the vicinity of the site. ➢ No temporary increase in traffic on and adjacent to the site. ➢ No temporary increase in noise impacts on the site. ➢ No temporary increase in construction related visual impacts. (Low) Negative Impacts: ➢ No temporary increase in income and employment opportunities for local construction workers.
Extent and duration of impact:	Continuation with the status quo of the site remaining as it is as a result of no construction phase activities occurring on site.
Probability of occurrence:	Definite.
Degree to which the impact can be reversed:	The impact cannot be reversed.
Degree to which the impact may cause irreplaceable loss of resources:	The impact will not cause irreplaceable loss of resources.
Cumulative impact prior to mitigation:	N/A This impact is not considered to be cumulative.
Significance rating of impact:	See "Nature of impact" section above