between 4 and 15 storeys. The River Club development can help to contribute to the density thresholds required in order to make the activity routes function optimally.

With regards to densities surrounding metropolitan parks, the Densification Policy suggests that densities should be higher than those in surrounding areas. Pertinently, the density should be such that it *"improves surveillance and security"*, something which the River Club can undoubtedly assist with within TRUP.

It is acknowledged that densification is not a "one size fits all" solution and must be considered in relation to context. However, it is believed that the proposed development at the River Club is compliant with the policies and objectives of the Densification Policy because:

- It is believed that the River Club represents an ideal spatial location for densification to occur due to its close proximity to existing development corridors and the public transport network;
- The development can help to contribute to the density thresholds required in order to make activity routes function optimally;
- The development can help to contribute to the density thresholds required in order to make public transport function optimally;
- The development will contribute towards the CoCT achieving its base density target;
- The precinct will promote a 'live, work, play' lifestyle; and
- The development will improve surveillance and security along the eastern boundary of TRUP.

3.11 City of Cape Town Urban Design Policy (2013)

In recognition that development has the potential to change the way the city is structured and can have an impact (positive or negative) on the collective, or public, environment, the City of Cape Town introduced the Urban Design Policy to guide and regulate development, and then assess development applications against these policies through the land use planning and building plan approvals process. The MSDF and Table Bay District Plan already include many sound urban design principles at the city scale which can be used to guide projects. The intention of the Urban Design Policy is to focus on the local level (i.e. the scale of the site, precinct or neighbourhood).

The Urban Design Policy contains a variety of strategic objectives, with specific policies falling under the umbrella of each respective objective. While at this stage of project it is not regarded as necessary to reflect compliance with each specific policy objective contained in the Urban Design Policy, the list below provides an overview of positive urban design aspects of the development:

- The Berkley Road extension will enable intensive mixed-use development to occur at the River Club. Moreover, this new road will provide a much needed movement link (vehicular and NMT) between west TRUP (i.e. land to the west of the Black River, including the River Club) and east TRUP (i.e. Maitland, Ndabeni and beyond). The Black River and M5 freeways are currently space barriers and this new road link will become a space integrator.

- By filling the old Liesbeek River channel and reconfiguring it as a vegetated stormwater channel, the site no longer appears as an island in the landscape, but rather becomes integrated with urban development to the west of the site. This intervention will place more emphasis of the rehabilitated riverine corridor to the east of the site as being part of a visually and ecologically congruent / continuous Liesbeek River corridor, which will consequently read as the Liesbeek River in the landscape.

- The site will accommodate intensive, mixed use development with appropriate densities in order to support nearby development corridors and public transport networks.

- The open spaces proposed at the River Club, including the 'eco-corridor' / parkland space, the riverine corridor and the vegetated stormwater swale, will remain connected to the wider open space system at the local scale. The buildings adjacent to the open spaces will be orientated towards the spaces and will be appropriately scaled to allow people using the spaces to feel comfortable.

- Building heights are distributed across the site in sympathy with surrounding form and function. In addition, indicative heights take cognizance of view lines on the site.

- Buildings will act as a device to define public space, and shield against elements on the very exposed site (e.g. prevailing wind; noise from the M5 freeway and Liesbeek Parkway)

- By raising the level of the ground above the 1:100 year floodline, users of the development will not be susceptible to future flood events, nor will there be any negative impact on surrounding properties.

- Minimal on-street parking is provided, with the majority of parking being provided in "basement" structures[8]. In addition, space allocated for parking will be capable of being retrofitted in the future in order to accommodate alternative uses (e.g. storage etc.).

- A network of pedestrian and other NMT routes will be designed to traverse the site, thus integrating the site with the surrounding precincts. Attention will be given to the interface between buildings and the public / pedestrian realm.

3.12 City of Cape Town Tall Building Policy (2013)

The City of Cape Town Tall Building Policy was adopted with the aim of controlling and guiding the development of tall buildings in the city. It is essentially a guide for the location and design of tall buildings that require height related departures, as well as an assessment tool that allows the City to ensure responsible growth that makes a positive contribution to placemaking and the public realm.

The main principles of the Tall Building Policy are to:

- *Promote and encourage sustainable growth in the city by permitting greater building height in appropriate locations;*

[8] Refer to Footnote 4 on pg. 17.

- *Ensure that taller buildings fit into the context of the surrounding cityscape, without negative impacts;*
- *Encourage design excellence. Tall buildings should form part of high quality urban environments in specific locations;*
- *Recognise that growth is dynamic and that the approach to tall buildings should therefore be flexible, provided that the proposal meets the strictly applied criteria for quality, design, character, context and protection of the urban environment.*

Some of the buildings proposed at the River Club (i.e. those buildings located in the northern portion of the site abutting Berkley Road extension) amount to a "Level 3" application (i.e. "application for significant tall buildings") due to the fact these buildings will be over 35m in height. The Tall Building Policy requires the proponent to adhere to all of the policy statements contained within the policy document. Compliance with these polices is provided below. The urban design indicators and recommendations document prepared by Urban Concepts (refer to **Annexure M**) can be referred to for further information and analysis.

P1: *"The location of tall buildings must protect the keys views to Table Mountain, other mountain ranges such as Kogelberg / Helderberg and the sea from public spaces and key public places"*

The site features prominent views towards Table Mountain, in particularly Devil's Peak. Given these prominent views, as well as the sense of openness the site currently provides, Urban Concepts has recommended that "future development should maintain a sense of visual permeability through the site from either side". To this end, an open space corridor has been incorporated into the layout of the development proposal which extends across the site in an east-west direction between the development parcels of Precinct 1 and Precinct 2 (this corridor has multiple roles, including ecological, visual and recreational). This open space will allow for views across the site towards Devil's Peak to be retained, as illustrated in **Figure 13a** below.

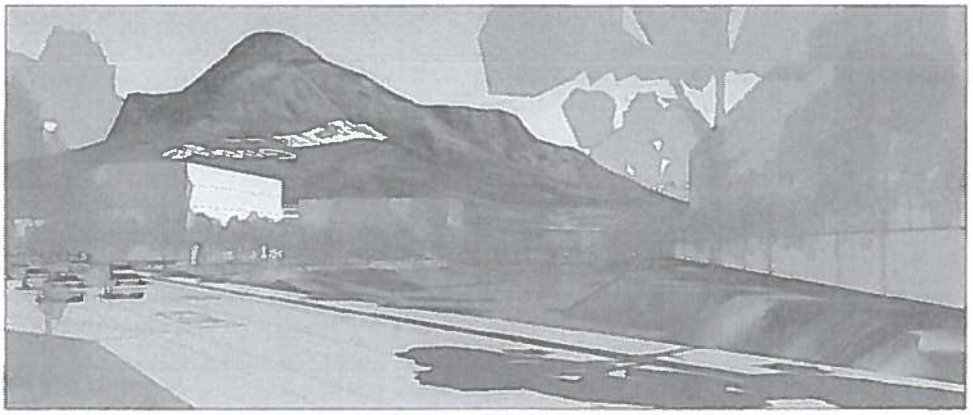

Figure 13a: Perspective looking through the open space corridor towards Devil's Peak (Source: Vivid Architects)

Another common view towards Devil's Peak is that experienced by motorists travelling along the M5. **Figure 13b** overleaf provides a perspective from the M5. While the proposed tall buildings

along Berkley Road will have some impact on the views towards the mountain, the elevation of the M5 means that views towards Devil's Peak are still experienced from this point.
A Visual Impact Assessment (VIA) has been conducted in relation to the proposal and is attached as **Annexure J**.

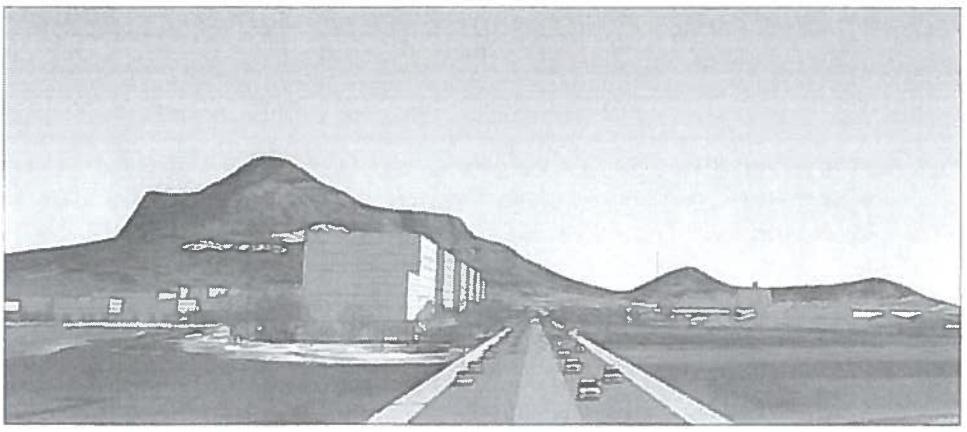

Figure 13b: Perspective looking from the M5 towards Devil's Peak (Source: Vivid Architects)

P2: *"Tall buildings should only be located in appropriate locations"*

The River Club site falls within the sphere of influence of the Metro South-East Integration Zone (refer to **Figure 9**), as well as within the broader Voortekker Road Corridor Integration Zone (refer to **Figure 10**), as identified in the MSDF (refer to sub-section 3.5). Specific strategic intentions listed in the MSDF in relation to the aforementioned Integration Zones is the opportunity to *"diversify and intensify land uses"* and *"intensify development"*.

According to the MSDF, *"land use intensification implies a greater mix of residential and non-residential land use (diversification) through the increased use of space, both horizontally and vertically (densification)"* (emphasis added). This implies that taller buildings are appropriate in areas that are identified in the MSDF for intensification, including Integration Zones.

P3: *"Applications must meet assessment criteria as set out in the Policy"*

While approximate height of the buildings at the River Club has been determined, the design of these buildings is still to be finalized. It is suggested that design related aspects of the various tall buildings should be assessed in future land use applications to be submitted. However, it is hoped that the principle of tall buildings can be agreed upon through this application.

P4: *"All tall buildings must contribute to a quality, active public realm at street and first floor level"*

The design of the various tall buildings is still to be finalized. However, it is proposed that some retail / commercial use will occur at first floor level to ensure the activation of the public realm surrounding the buildings.

P5: *"Possible additional review for significantly tall buildings"*

The design team, as well as other relevant members of the project team, are available to meet with the review committee to discuss the proposal for tall buildings on this site.

P6: *"Assessment on merit within the building's unique context"*

TRUP is specifically identified as a "strategic project" in terms of the MSEIZ. Specific objectives of the MSEIZ, as outlined in *Technical Supplement I: Integration Zone Overview* contained in the MSDF, include *inter alia*:

- *Contribute to a more compact and integrated city, with associated efficiency, productive, and resource sustainability gains.*
- *Use TOD as a lever to unlock growth and development through the enhancement of public transport infrastructure (including its institutional arrangements and processes) and the support of appropriate development at appropriate locations.*
- *Improve housing opportunities to enable productive livelihoods and communities.*
- *Maximise the investment by various spheres of government and related agencies in the provision and maintenance of infrastructure and public facilities; and encourage private sector and individual entrepreneurship and investment through appropriate infrastructure and facility provision, regulations, and urban management instruments.*
- *Enhance infrastructure provision in the MSEIZ.*

(emphasis added)

It is contended that the location of the site, combined with the scale of development proposed, means that the development can be a catalytic project, not only for TRUP and the MSEIZ, but for the whole of Cape Town.

P7: *"Area character analysis will inform the design of tall buildings"*

Urban Concepts undertook a contextual analysis in the urban design indicators and recommendations report (refer to **Annexure M**). The analysis includes an assessment of surrounding building height and form. **Figure 14** overleaf provides an illustrative analysis of the surrounding buildings. The following has been deduced by Urban Concepts:

- Heights of the buildings at the Black River Park development to the west of the site vary between 4 – 9 storeys (i.e. 15m – 32m).

- The PRASA buildings to the north are relatively low at approx. 20m – 25m in height. However, these appear monolithic on the landscape, particularly when experienced from the site.

- The premier foods buildings and silos, located to the north-west of the site, range between (approximately) 20m – 50m in height. The silos, in particular, dominate the skyline in this part of the city.

- The M5 office park (located adjacent to the M5 to the east of the site) are 3 – 4 storeys in height (i.e. approximately 15m).

- Buildings on Observatory hill are relatively low (i.e. approximately 10m).

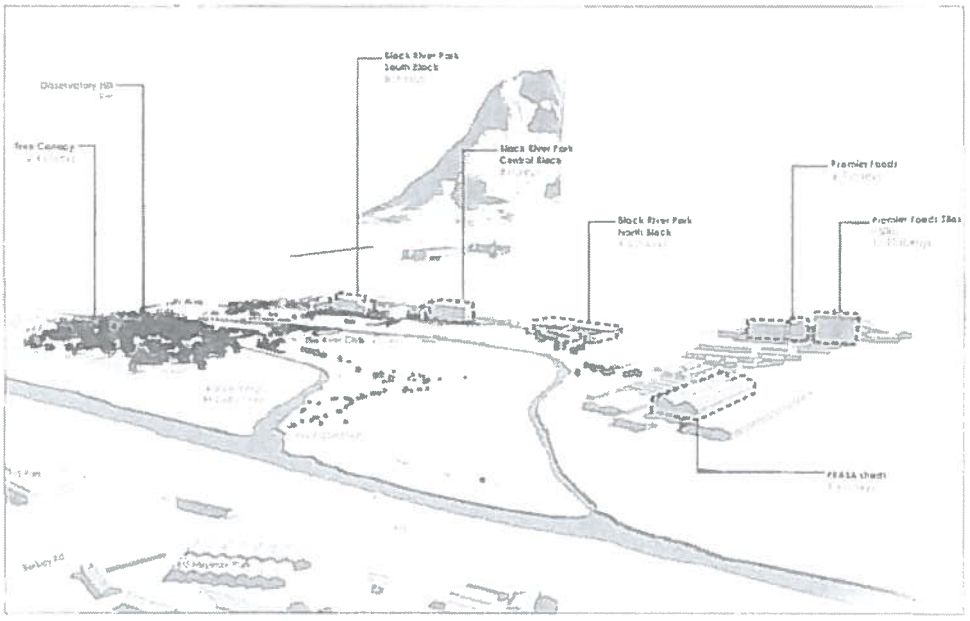

Figure 14: Analysis of surrounding building height and form (Source: Urban Concepts)

In addition to surrounding building height and form, other aspects that need to be assessed in relation to the tall buildings proposed are:

- Climatic conditions. Taller buildings in the northern portion of the site will assist to shield the remaining buildings in the southern portion from the prevailing northerly winds.

- Berkley Road extension. Taller buildings along the northern edge of the site will assist to define this road in the hierarchy (it will become an important link road between Salt River and Maitland).

- Gateways. Tall buildings at the main entrance to the site will act as a gateway element. Further, these buildings can form a gateway between Maitland (to the east) and Salt River (to the west).

P8: *"A tall building design should consider the three parts of a tall building within its context"*

While approximate height of the buildings at the River Club has been determined, the design of these buildings is still to be finalized. It is suggested that design related aspects of the various tall buildings should be assessed in future land use applications to be submitted.

P9: *"A tall building's design should include a mix of uses and promote the City's Densification Strategy"*

The design of the various tall buildings is still to be finalized. However, all tall buildings will contain a mix of uses (e.g. office / residential or office / retail or office / residential / retail). An average density of 40 du/ha is proposed across the site, which meets the City's base density target of 25 du/ha as contained in the Densification Policy.

P10: *"Criteria for renewable energy and/or efficiency in tall buildings must be considered to support limited infrastructure resources"*

Although the sustainable design elements of the building have not yet been finalized, the design team will aim to achieve green building certification for all buildings at the River Club. Some of the green building measures earmarked for inclusion / implementation include *inter alia* the following:

- reduction of heat loads, maximising natural light and promoting the circulation of fresh air;
- use of energy-efficient air conditioning and lighting;
- use of environmentally friendly, non-toxic materials;
- reduction of waste and using recycled materials;
- use of water-efficient plumbing fittings and water harvesting;
- planting of the balcony areas to mimic green roof technology; and
- reduction of care use by providing an exclusive driver service to residents.

3.13 City of Cape Town Transit Oriented Development Strategic Framework (2016)

According to the Transit Oriented Development Strategic Framework, the vision for Transit Oriented Development (TOD) in Cape Town is:

"To progressively move toward a compact, well connected, efficient, resilient urban form and movement system that is conducive to economic and social efficiency and equality whilst providing cost effective access and mobility, with the least possible negative impact on the environment."

The TOD Strategic Framework is seen as a tool to implement TOD in Cape Town. It identifies the tools and mechanisms to be employed by various role players who have a collective impact on development to ensure that they move progressively toward the new TOD vision for the City. Ultimately, the TOD Strategy aims to trigger a paradigm shift through direct public and private sustainable investment into the built form.

The objectives of TOD in Cape Town are defined in the framework as follows:

- Maximise "location efficiency" so that people can walk, cycle and use public transport. This can be achieved through a comprehensive approach to land use density, mix and intensity, as well as a focus on prioritised public transport at a metro, corridor, nodal and precinct scale.

- Boost ridership and minimize congestion thereby ensuring that the public transport system becomes more viable.
- Provide a rich mix of housing, shopping, recreational and transportation choices.
- Enable cost and operational efficiencies in the provision and design of urban infrastructure.
- Create a sense of place.

In terms of the TOD Strategy, high intensity development should occur in Transit Accessible Precincts (TAPs), which are precincts located within a 500m radius from a higher order public transport station. Essentially, TAPS are determined based on their level of access to the transit network. In the context of the River Club, both Observatory rail station (to the south-west) and Koeberg rail station (to the north-east) fall within a 500m radius of the site[9]. Therefore the River Club should be considered as falling within a TAP, and consequently the intensive, mixed-use nature of the proposed development should be considered compliant with the TOD Strategy.

3.14 Parking Policy for the City of Cape Town (2014)

The Parking Policy is a comprehensive approach to the provision, management, regulation and enforcement of parking in the City of Cape Town. The stated strategic intent of the Parking Policy is to *"manage parking supply and demand in high parking demand areas efficiently (including availability of loading bays, bus bays and reserved parking) and to reduce private car dependency"*.

The City's strategic intent to reduce private car dependency is pertinent to this application, particularly considering the number of parking bays envisaged for the site. Policy 7 of the Parking Policy – *"Implement reduced parking requirements to facilitate new development and address private car dependency proactively"* – deals with the need to address private car dependency. The only sub-policy that specifically addresses private car dependency in the context of this application is sub-policy 7.7, which states *"Investigate the implementation of maximum parking standards in addition to the existing minimum parking requirements"*. Since no maximum parking standards are contained in the DMS, the proposed development only needs to provide for the minimum number of bays required.

Notwithstanding the above, it is acknowledged that the envisaged number of parking bays currently provided means that the development is not entirely consistent with the strategic intent to "reduce private car dependency". However, as was argued in relation to the TOD Strategic Framework, the prevailing property market means that the provision of parking for commercially driven mixed-use developments at this point in time is a necessity and a development will simply not succeed if adequate parking is not provided. At this stage, the preliminary number of bays to be provided is not excessive and in some cases is less than current market norms.

It should be emphasized that the exact number of parking bays to be provided has yet to be determined and any parking related departures will be applied for in subsequent land use planning applications.

[9] Notwithstanding the development being within a 500 m radius of these train stations, the actual walking distance from Observatory Station (to the Liesbeek Road entrance) is approximately 820 m, while the actual walking distance from Koeberg Station (to the Berkely Road extension entrance) is approximately 850 m.

3.15 City of Cape Town Integrated Human Settlements Five Year Plan (2012-2017)

The aim of the Integrated Human Settlements Five-Year Plan is to provide a clear view of the challenges and opportunities facing the City of Cape Town in terms of providing for the housing needs of Cape Town's steadily growing and increasingly urbanised population.

The document largely focuses on strategies to improve the provision of public housing to the marginalised residents of Cape Town. Since the River Club is a private development initiative on privately owned land, the policy is not applicable to this application.

3.16 City of Cape Town Social Development Strategy

The Social Development Strategy (SDS) articulates the role of the City of Cape Town in promoting and maximising social development. Social development is understood broadly as the overall improvement and enhancement in the quality of life of all people, especially people who are poor or marginalised. At its core is a focus on addressing poverty, inequality and social ills while providing for the participation of people in their own development.

The SDS is structured around five high-level objectives. These objectives are listed below and in each instance it is demonstrated how the River Club development may assist to meet these objectives:

1. *Maximise income generating opportunities for people who are excluded or at risk of exclusion*

The River Club is a private sector development on privately owned land. Therefore the future commercial tenants will primarily be those able to afford the market related rentals. Notwithstanding, it is anticipated that all future tenants will have employment opportunities people who are excluded or at risk of exclusion.

Further, 20% of all redineital space will be allocated to inclusionary housing, which will be offered at below market value rentals. These residents, who may or may not currently be excluded, will therefore have enhanced access to economic opportunities in economically active parts of the city (e.g. Salt River, Woodstock, Maitland and Cape Town CBD).

2. *Build and promote safe households and communities*

The River Club will be a safe environment for all.

3. *Support the most vulnerable through enhancing access to infrastructure and services*

The River Club development will be fully serviced. It is again emphasised that the River Club is a private sector development on privately owned land and will therefore not necessarily include public facilities (e.g. clinics etc.).

4. *Promote and foster social integration*

The River Club will offer inclusionary housing opportunities at below market value rentals. These units will be integrated, as far as possible, into the same blocks of apartments as the other residential units.

5. *Mobilise resources for social development*

The River Club development has potential to be a catalytic project for the entire TRUP initiative and may generate resources for the further implementation of TRUP, which in turn could lead to social development in this part of the city.

4. ENVIRONMENTAL, HERITAGE & SOCIO-ECONOMIC FACTORS

4.1 Surface Water Hydrology

4.1.1 Overview

A comprehensive surface water hydrology assessment relating to the site and the surrounding area has been conducted by Aurecon.

The objectives of the study are, *inter alia*, to determine:

- The effect that developing the River Club site would have on the extent of flooding along the Black and Liesbeek Rivers;
- The implications that any changes to the surface water hydrology might have on flood levels which would affect infrastructure and private property in the vicinity of the Black and Liesbeek Rivers;
- The cumulative impacts on surface water hydrology of the River Club development and all other likely / planned developments in the surrounding area; and
- The potential ecological impacts of developing the River Club site, particularly on the Raapenberg Wetland & Bird Sanctuary.

The report is comprehensive, and technical, and for a complete understanding of the surface hydrology in relation to the site it is highly recommended that one refers to the surface hydrology assessment attached as **Annexure H**. Nevertheless, a high-level summary is provided here to give an overview of the report.

4.1.2 Literature Review

A comprehensive review of all available information on this part of the floodplain was conducted, including *inter alia:* historical topographical photographs; climate change considerations; previous flooding related investigations; recorded flood events; and surrounding development proposals of significance.

The review of the information available revealed that:

- The River Club site is prone to flooding by events with a frequency of recurrence of about once in every 2 to 5 years (however it was not possible to undertake a statistical analysis with the available data);
- There are a significant number of studies that incorporate the River Club site;
- Some of these studies provide contradictory results;
- There is a significant interest in the future development of the River Club site and there are a wide range of stakeholders;
- There are a variety of contradictory 'visions' of what should, and should not be done;
- There is concern that infilling of the River Club site will result in significant increases in flood levels;
- Some stakeholders have openly rejected any study that indicates a negligible impact on flood levels; and

- There is a need for a detailed analysis of the potential for flooding in the vicinity of the River Club site.

4.1.3 Results

Monitoring points

Twelve key 'monitoring points' indicated in **Figure 15** were selected for comparison purposes. These points were chosen to represent areas where any floodwater impacts of the proposed development are most likely to be realised / be of concern.

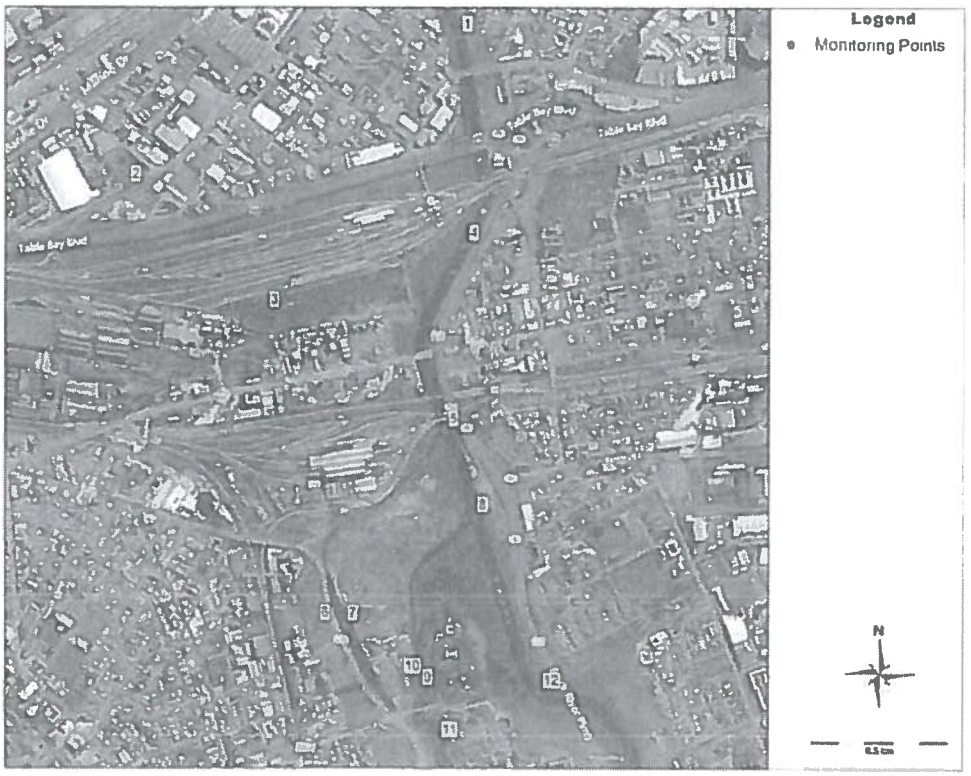

Figure 15: Floodwater 'monitoring points' (Source: Aurecon)

Impact of the proposed development on flooding in the surrounding urban area

a. Runoff from the site

The runoff from the site would have no impact on the flood level for two primary reasons:

- For smaller recurrence interval storm events the conceptual design envisages a system of swales to attenuate and treat the flow – in accordance with the CoCT's 'Management of Urban Stormwater Impacts Policy'; and

- For larger storm events (e.g. 1 in 100-year recurrence interval flood events) the peak runoff from the site occurs approximately 1 to 3 hours before the peak flow in the adjacent rivers. Additionally, the total volume of runoff from the site is equivalent to approximately half a minute's flow in the Black River.

b. Flooding as a result of overland flow / minor system surcharging

It is important to recognise that not all flooding in an urban area is necessarily related to the flows in a nearby river. The piped underground stormwater system is typically sized for smaller recurrence interval events (typically for flood magnitudes smaller that than the 1 in 2-year, 1 in 5-year and 1 in 10-year events, depending on the design criteria).

It is usually planned that during larger storm events (with flood magnitudes greater than the 1 in 2-year, 1 in 5-year or 1 in 10-year events, depending on design criteria) the excess flows will discharge overland via the road network which is intentionally designed to serve as part of the surface drainage system. While this may be considered as 'flooding', it is intentional and not related to the flooding caused by flows in a nearby river – in this case the Liesbeek and the Black Rivers.

Additionally, for small storm events, should the stormwater infrastructure (inlets and/or pipes) become blocked it is expected that stormwater will be conveyed via the road network – which may appear to be flooding but is often unrelated to the flow in the river.

Figure 16 overleaf illustrates the exisitng flooding that occurs within the adjacent urban area and affects a number of houses in lower Observatory. This flooding is the result of local overland flows that occur within the adjacent urban area when the local stormwater runoff exceeds the capacity of the local minor (piped) stormwater system. **Figure 16** indicates that for storms equal to or smaller than the 1 in 20-year recurrence interval event local flooding in the highlighted area will not be caused by flows in the river.

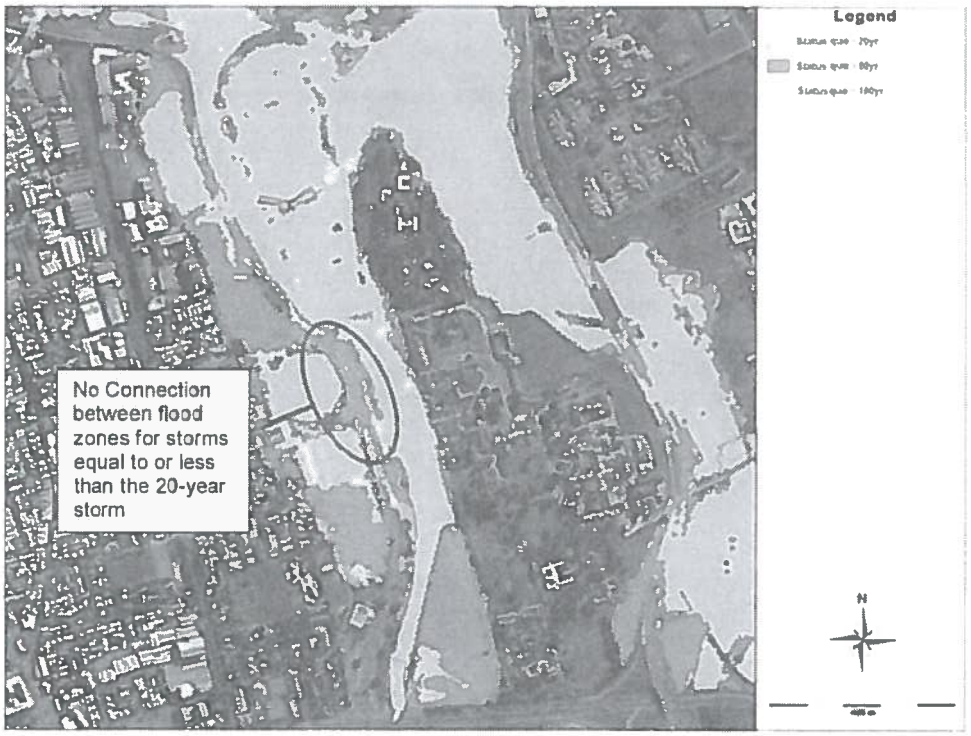

Figure 16: Flooding as a result of overland flow / minor system surcharging (Source: Aurecon)

c. Impact on water surface elevations

The impact on water surface elevations was assessed for the post-development scenario that includes the proposed River Club, TRUP, PRASA railyard and NRF (Rem. Erf 26423 Cape Town to the immediate south of the River Club site) developments. **Table 6** overleaf provides a high-level overview of the differences in modelled water surface levels at 10 of the 12 monitoring points shown in **Figure 15** (the results for all scenarios are provided in Appendix A of **Annexure H**).

Table 6: Summary of differences (m) in water surface elevation at the different monitoring points (Figure 12) between the existing status quo and the post development scenario (including TRUP, PRASA and NRF)

Recurrence interval (Description)	Monitoring Point									
	1	3	4	5	7	8	9	10	11	12
0.5-year	-0.04	0	0.01	0.01	Filled 'old' Liesbeek	-0.01	0.02	0	0.02	-0.02
1-year	-0.03	Has surface water	0	0.01		-0.03	-0.02	0	0	-0.01
2-year	0.02		0.02	0.04		0.01	0.04	0.03	0.04	0.01
5-year	0.02	0.08	0.02	0.04	-0.01	0.04	0.11	0.11	0.12	0.04
10-year	0.01	0.01	0.02	0.05	0	0.06	0.12	0.12	0.14	0.06
20-year	0.02	0.01	0.02	0.05	0.01	0.07	0.11	0.11	0.12	0.07
50-year	0.02	0.01	0.02	0.08	0.04	0.1	0.13	0.13	0.12	0.1
100-year	0.02	0.02	0.01	0.07	0.07	0.09	0.11	0.11	0.11	0.09
200-year	0.01	0.01	0	0.07	0.1	0.1	0.13	0.13	0.13	0.1
100-year (PRASA overland route closed)	0.02	0.01	0.01	0.08	0.1	0.1	0.12	0.12	0.12	0.1
100-year (Opened Salt River mouth)	0.02	0.01	0.01	0.07	0.07	0.09	0.11	0.11	0.11	0.09

Table 6 indicates the following:

- For the 0.5-year and 1-year recurrence interval storm events the combined impacts of the developments would be small, possibly even reducing the water levels slightly. This is due to the small flows during these storms and the additional capacity, and perhaps to the local attenuation volume that would be provided by the proposed new Liesbeek Canal design.

- The proposed developments would have an impact on the water levels but these impacts would be minimal along the Salt River canal due to overtopping (monitoring points 1-4) except at point 3 during the 1 in 5 year flood event.

- The greatest increases in water levels would be in the immediate vicinity of the River Club – monitoring points 5 through 12 – with the maximum expected increase in water level of about 0.13 m (13 cm).

- The impact of discharging runoff from the suburb of Observatory into the Liesbeek Canal (post-development scenario) rather than into the old Liesbeek channel, as well as cutting off the overland flow route connecting the Liesbeek Canal and the 'old' Liesbeek River channel appears to increase flow down the Liesbeek Canal and contributes to the increased water levels.

The increases in water surface elevations shown in **Table 6** need to be seen in the context of the uncertainties associated with modelling, the effects of wave action, the size of the storm event

and the extent of inundation. In the light of all these considerations the increase in the modelled water surface elevations is relatively insignificant.

d. Impact on the extent of inundation

The increases in water level shown in **Table 6** would result in limited changes in the extent of inundation for all recurrence intervals.

While the results for all the different scenarios are available (refer to Appendix B of **Annexure X**), the only scenarios that would cause additional flooding of already developed properties are the 1 in 50-year flood event (refer to **Figure 17** and **Figure 18**) and the 1 in 100-year flood event (refer to **Figure 19** and **Figure 20**), which would affect a number of properties whether the additional developments take place or not.

Figure 17 to **Figure 20** show insignificant changes to the extent of flooding (i.e. the area that would be flooded post-development). The most noticeable changes are highlighted (red circles) and mainly comprise very shallow flooding on the PRASA site. The very small increases in the extent of flooding do not appear to compromise any infrastructure that is not already affected – most of the additional areas that would be flooded being railway lines. The other noticeable change is to the south of the modelling area as indicated in **Figure 20**, which would not have a significant impact.

Figure 17: Maximum extent of inundation for the 50-year flood (whole model) (Source: Aurecon)

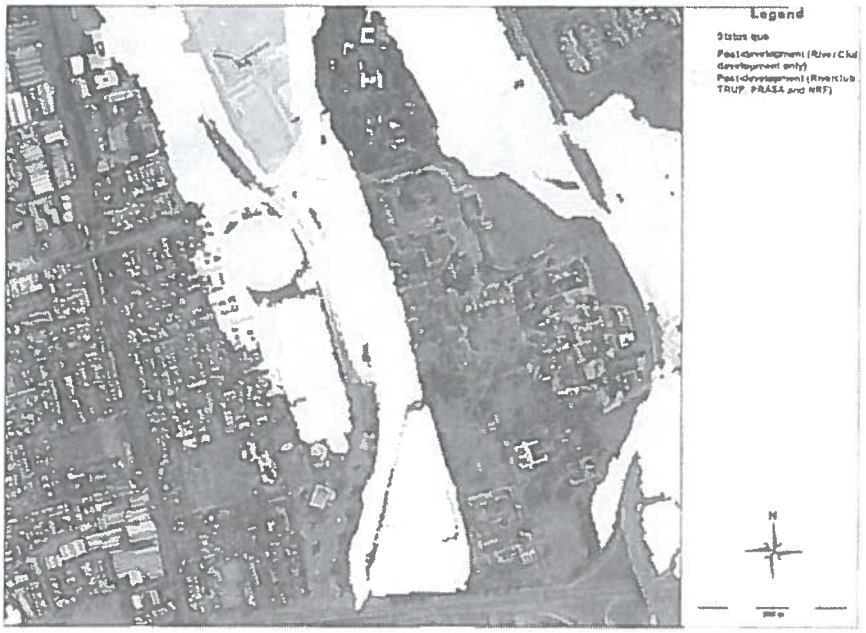

Figure 18: Maximum extent of inundation for the 50-year flood (vicinity of River Club) (Source: Aurecon)

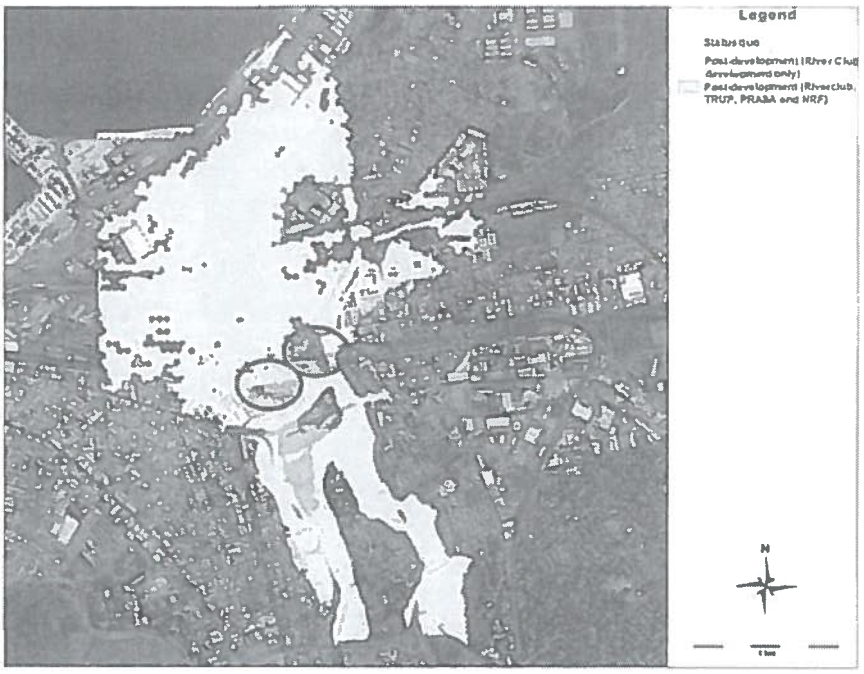

Figure 19: Maximum extent of inundation for the 100-year flood (whole model) (Source: Aurecon)

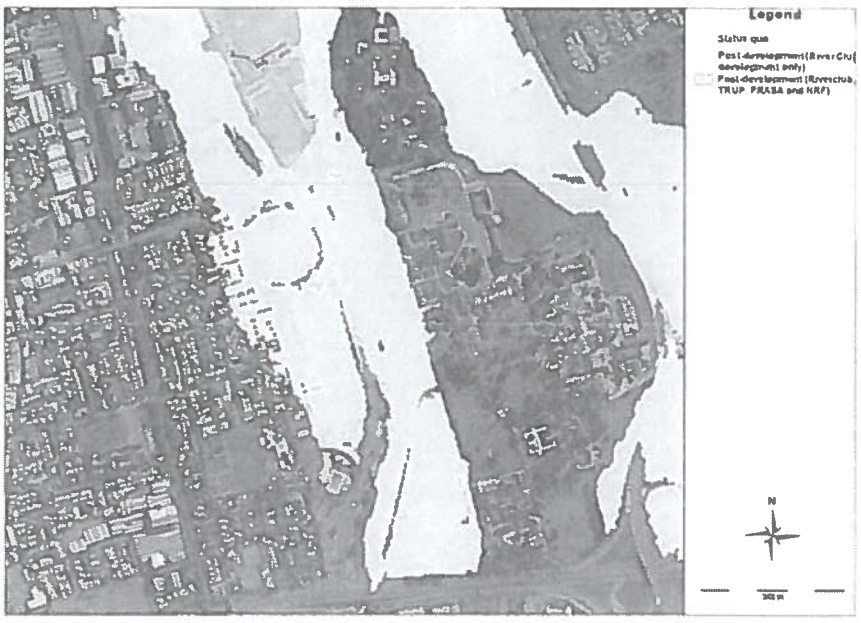

Figure 20: Maximum extent of inundation for the 100-year flood (vicinity of River Club) (Source: Aurecon)

e. Changes in flow

The flows were assessed at the seven locations around the site, as shown in **Figure 21** overleaf. Changes in the characteristics of the 1 in 100 year flood would occur at various locations on account of the proposed developments. The main increases in flows would occur at the "Salt Left" and at the "Black@River_Club" locations identified in **Figure 21**.

The total volume of the flood at the "Salt Left" location would increase by 4% as a result of the 7% increase in the peak flow. This change would have little effect on the aerial extent of flooding, as it would have little impact on the depth of flooding. The additional flooding would also have little impact on the extent of the high hazard zone further downstream. The flood peak would occur marginally earlier, however this equates to a few minutes earlier rather than hours earlier and is thus of little significance.

The flow at the "Black@River_Club" location shows a significant increase (24%) in the peak flow that would occur for a couple of hours. This increase in peak flow would occur because the proposed River Club development would effectively block the existing flow route that would have connected to the 'old' Liesbeek River channel. This would force all the flow down the Liesbeek Canal route. This increased flow results in the slightly greater increases in the increased flow. The effect though is localised along the course of the Liesbeek Canal (i.e. alongside the River Club site as is evidenced by the flow characteristics upstream – "Black_River" and "Liesbeek" locations – and downstream at the "Salt@Railway" location). **Figure 21** overleaf clearly demonstrates that the flow, and timing of the peak, under the railway bridges immediately downstream ("Salt@Railway") is largely unaffected. As such, the effect is localized and does not significantly affect any properties, and as such the impact is considered small. It is worth noting that the design of the rehabilitated Liesbeek Canal, and the Berkley Road extension bridge over the Black River would need to account for the changes in flow.

Figure 21: Locations at which flow was analysed (Source: Aurecon)

f. Environmental and proposed development considerations and constraints

The increased water levels at monitoring point 5 shown in **Figure 15** and in **Table 6** above arise mainly from the additional losses at the railway bridges on account of the higher flows. The additional increases in water levels further upstream appear to arise from the following:

- The increased flow in the channel between monitoring points 5 and 8 with no improvements to the channel; and
- The proposed configuration of the channel from points 9 and 10 which was determined in accordance of the environmental constraints which include the approximately 25 m wide buffer strip to be provided within the boundary of the proposed River Club development (i.e. along the edge of the rehabilitated Liesbeek Canal).

g. Hazard analysis

The hazard analysis indicates that currently a significant portion of the River Club site falls within the "High Hazard Zone". In terms of the CoCT's Floodplain and River Corridor Management Policy, development would not normally be allowed in this zone. Should the development be elevated out of the flood plain – as is proposed – and there be adequate, safe access onto the site, the development would no longer fall within the High Hazard Zone. This would however require a deviation from section 9.2 of the Floodplain and River Corridor Management Policy,

which prohibits new or existing rights within the High Hazard Zone (and considers 'filling' as development). This deviation has been applied for as part of this application (refer to section 10).

The analysis indicates rather limited changes to the type and extent of flood hazards relating to the site following development (refer to highlighted areas highlighted in **Figure 22** below).

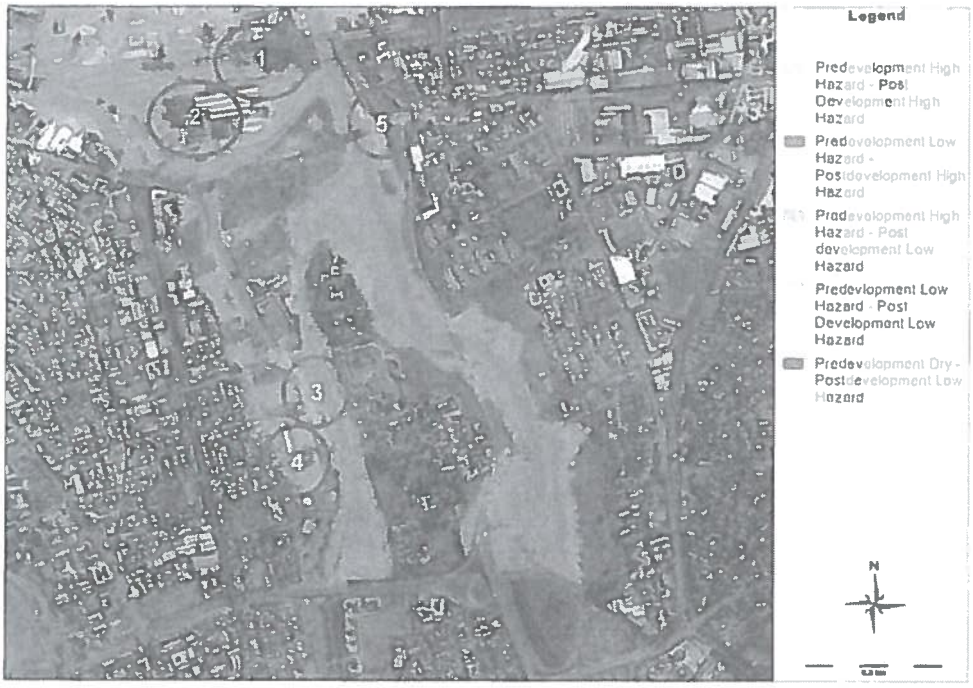

Figure 22: Impact of the development of the hazard of flooding (in the vicinity of the River Club) (Source Aurecon)

The impacts at the locations of the numbered circles in **Figure 22** are described below:

- 1 & 2 highlights the affected area on the PRASA site (as highlighted in **Figure 19** earlier). This increase would have little or no impact.

- 3 highlights a potential change in hazard that appears to border / incorporate one lane of Liesbeek Parkway. This could have a significant impact. It is necessary to raise the road locally – where the hazard changes and for a short distance (e.g. 50m either side), as agreed with the CoCT, to eliminate the potential high hazard caused by flooding in the 1 in 100-year. There would also be value providing warning signs.

- 4 highlights the increase hazard evident in the vicinity of the Hartleyvale sports complex. This increase hazard is very localised and unlikely to have any impact (the area would normally be flooded and is unlikely to be used during extreme events such as the 1 in 100 year storm event).

- 5 highlights that the existing Berkley Road is within the 100-year flood line and low hazard zone. This is section of road is also affected in storm events greater that the 1 in 20-year event. This should be considered and analysed in the final design of the Berkley Road extension.

h. Impact of the closure of the PRASA overland escape

The analysis of the impact of closing the PRASA overland escape route indicated that it would have an insignificant impact on the extent of inundation during a storm event (as indicated in **Figure 23**) assuming the flow through the bridges downstream of the site remained unobstructed.

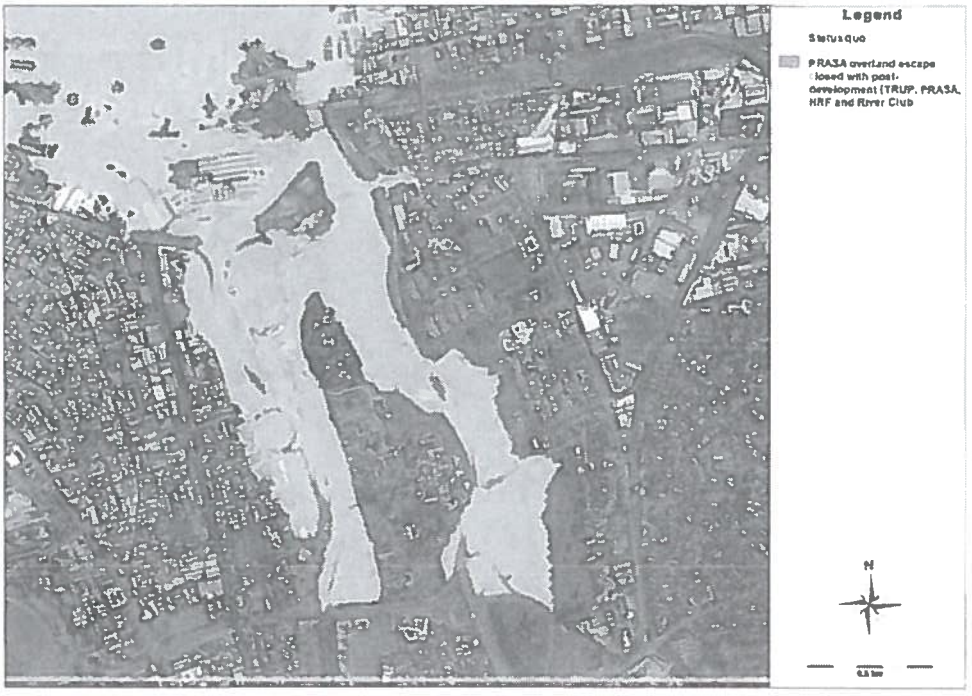

Figure 23: Impact on flooding of possible PRASA escape route during the 100-year storm event (Source: Aurecon)

Should the flow through the bridges become obstructed then the importance of the PRASA escape flow route would increase. Therefore it would be preferable for the CoCT to ensure that this escape route is maintained for the following reasons:

- should, for any reason, the railway bridges immediately downstream of the River Club site become blocked, the PRASA escape route would become critical (as shown in **Figure 24** overleaf); and
- once such a flood route is closed it is unlikely that it would be possible to re-establish it.

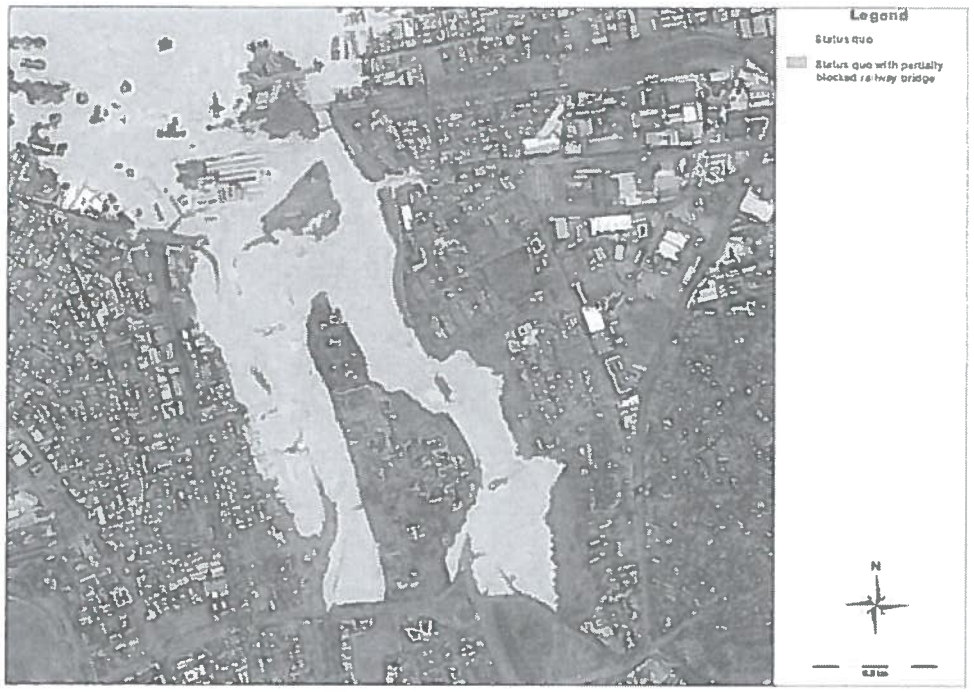

Figure 24: Impact of partially blocking the railway bridge immediately downstream of the River Club site (Source: Aurecon)

i. Impact of sea level rise

The results of the modelling with respect to the impact of sea level rise indicate very little difference in the extent of flooding.

j. Impact of widening the Salt River Canal

The CoCT requested that this study should also consider the possible effect of widening the Salt River Canal and removing any restrictions (e.g. bridges).

The analysis shows that widening of the canal would potentially have a negative environmental impact on the Raapenberg Wetland & Bird Sanctuary due to the lower water levels which would result in the wetland being flooded less frequently. Therefore, unless the value of development on the PRASA site was significant or critical as part of a long-term spatial planning intervention and the CoCT was to undertake further modelling of the design of any widened channel, it is unlikely that widening the Salt River would be an economic or practical solution to flooding in the Salt River catchment – whether the River Club development goes ahead or not.

Impact of the proposed River Club development on the SAAO buildings

Assessing the impact of flooding on the SAAO buildings is complicated for two primary reasons:

- the SAAO has constructed its own berm; and
- some of the buildings (some which might also have heritage value) were developed in what is clearly the flood plain and are therefore prone to flooding (refer to **Figure 25**).

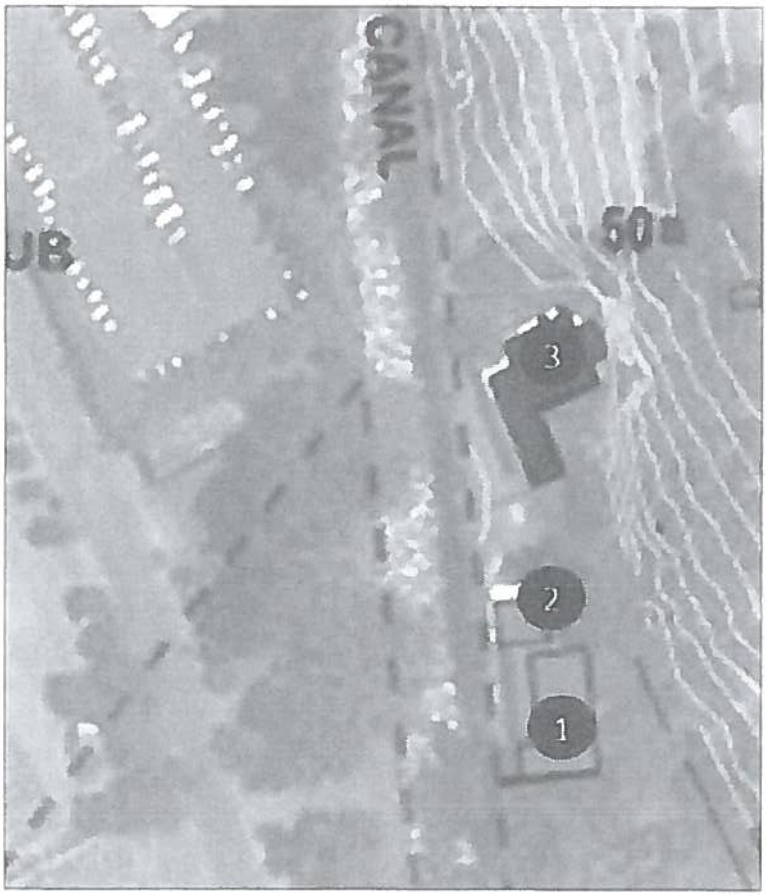

Figure 25: SAAO buildings on the edge of the Liesbeek Canal. Dark blue buildings are considered to have possible heritage value (Source: Aurecon)

The modelling indicated that for the 1-year recurrence interval storm event, none of the buildings would be flooded under any development scenario and that there would be no flooding onto the SAAO property. The modelling indicates that for the 1 in 2 year recurrence interval storm event the land surrounding the buildings would be inundated and that there is a high likelihood that water would enter Building 1 indicated in **Figure 25**. For the Status Quo scenario the water level around the building (floor level 3.36 mamsl) would be just below floor level (3.33 mamsl) during the 1 in 2 year flood whereas for the post-development scenarios the modelled water surface elevation would be 3.6 mamsl and 3.7 mamsl. Therefore for the post development scenario the frequency of damage would be increased. Quantifying the differences in damage is not possible, except to indicate that this would be marginal.

For the 5-year recurrence interval storm events, all the buildings of concern would be inundated by flood water. The differences between the status quo and the post-development scenarios is an increase in depth of 0.12 m (12cm). It is worth noting that the floor level of Building 3 indicated in **Figure 25** (which has heritage value) is 3.50 mamsl and therefore the building would be inundated about once in 5 years to a depth of about 0.15 m deep. Although the increased depth would have an impact, this would not have a significant impact on the cost of repairs as the 1 in 5 year water depth in the building would be less than 0.3 m.

For larger storm events the pre- and post-development impacts would be similar with very slightly higher flood levels for the post-development scenarios.

Notwithstanding the above, it is important to recognise that these properties were built within the 1 in 2 to 1 in 5 year flood plain and therefore are prone to flooding. The only real option to protect these buildings would be to construct a protective berm. It appears that the SAAO has already constructed a berm along the boundary of its property. The top of the berm varies between 3.6 mamsl and 4.14 mamsl. It is likely that this will only protect the SAAO buildings from the 1 in 2 year recurrence interval storm events. This berm could be raised to protect these properties from larger storm events. Raising the crest the berm to about 4.8 mamsl would provide protection for the 100-year recurrence interval event although this would pose a significant risk to the occupants of the buildings if the berm failed. The berm would probably not have any significant impact on flooding elsewhere.

Impact of the proposed development on flooding in the surrounding ecosystems

Based on the modelling undertaken as part of this study, it would appear that the Raapenberg Wetland & Bird Sanctuary would receive inflows from the Liesbeek Canal when the water surface elevation is in the region of about 2.5 mamsl (as indicated in **Figure 26** overleaf). This would equate to the wetland filling in a storm with a recurrence interval of between ½-year and 1-year. Once water enters the wetland, and the wetland is filled to +-2.5 mamsl the wetland becomes an ineffective flow area offering limited offline storage. The wetland does not appear to drain below a level of +-2.5 mamsl (the level at which flow enters the wetland). This would equate to approximately 1 m of standing water at the deepest points in the wetland. It seems that this water evaporates over time. Evaporation at Observatory is estimated to be approximately 1.5 m/annum, and rainfall about 0.6 m/annum. This would suggest that over a typical / average year the water levels would fluctuate in the wetland. If there were successive droughts – as in 2015, 2016, 2017 – it is possible that the wetland could dry out should there not be a storm of sufficient magnitude to result in flooding into the wetland.

While Dr. Liz Day (freshwater ecology specialist on the project team) has addressed the potential impacts of the increased frequency of inundation on the ecology, the intervention effectively has the impact of adjusting the level to which the wetlands would drain after flooding to about 2.25 mamsl (instead of about 2.5 mamsl). This equates to 250 mm lower. Assuming an evaporation rate of about 4 mm/day, the reduced water level would equate to a reduction of about 60 days before the water volume stored in the wetland is evaporated away (refer to sub-section 4.2 for more information on the effect of increased frequency of inundation on the ecology of the Raapenberg Wetland & Bird Sanctuary).

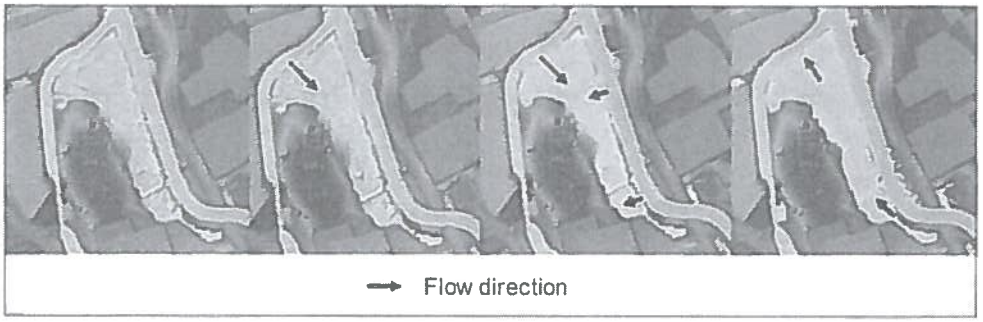

Figure 26: Overview of how flow enters and then leaves the Raapenberg Wetland & Bird Sanctuary (Source: Aurecon)

While not specifically tested, the attenuation benefits of the wetland are clearly limited. Prior to canalisation the wetlands would have been far more extensive and offered significantly more attenuation capacity. Unfortunately this situation is not reversible.

An interesting outcome of the analysis is that the current post-development scenario would suggest that the water level would drop – albeit by 0.03 m – for the 1-year storm event. Therefore it is possible that the proposed wider canal channel (as redesigned) would offer some attenuation benefits over the existing situation for this event although this is within the margin of error and relatively insignificant.

Opportunity cost of not using the River Club for attenuation of runoff

Based on a review of the previous studies conducted on the benefits of using the River Club site being used for attenuation purposes, it is apparent that the potential benefits of using the site for flood attenuation purposes would be negligible. It was also evident that the construction of an attenuation facility would require the CoCT to invest significant resources in design, operation and maintenance with limited benefit in terms of reduced impacts of flooding. If an alternative to flood attenuation is required, it would likely be more appropriate to implement the original long-term plan of widening the Salt River canal channel.

4.1.4 Conclusions and recommendations

The study concludes that – based on a review of all the available studies, the extensive modelling, and engineering judgement – the proposed development would have an insignificant effect on flooding in the vicinity of the existing River Club site. Further, although the development would have some limited effect on the flows and water levels in the Liesbeek and Black Rivers, the modelled impacts are insignificant and can be considered negligible.

Although the proposed development might not appear to have a significant impact on flooding, it would nonetheless require the following deviations from the CoCT's Floodplain and River Corridor Management Policy:

- Section 9.2 Flood management and public safety: permission to develop / obstruct the free flow of water within the 20-year flood line area would need to be granted.

- Section 10.5 Table 1: as the proposed development falls under the 50-year flood line, a deviation from the policy allowing the developer to fill (considered development) would need to be granted.

Further, the following recommendations are *inter alia* made:

- The design of changes to the Liesbeek Canal should aim to maintain the existing hydraulic functioning of the wetland. The current proposal would have little to no effect, but further design refinements, especially any changes that might affect the SAAO side of the canal, should be reanalysed.

- PRASA should not be allowed to close the existing overland flood route that extends across its property.

- The bridge extension to Berkley Road should be designed in such a manner as to not impact on the water levels (as assumed for this study) and any changes to the existing preliminary design would need to be re-evaluated.

4.2 Biodiversity

4.2.1 Overview

Dr. Liz Day of the Freshwater Consulting Group compiled a comprehensive assessment of potential biodiversity impacts associated with the proposed development (refer to **Annexure I**). The report, which is still in the draft stage, incorporates the findings of the aquatic ecosystems (i.e. rivers and wetlands) study conducted by Dr. Day, the botanical assessment conducted by Coastec, faunal study done by Sungazer Faunal Surveys, avifaunal assessment conducted by Dr. Tony Williams and a geohydrological report compiled by SRK Consulting.

4.2.2 Affected Natural Systems

a. Aquatic ecosystems on and near the site

All of the rivers and their associated riparian wetlands that pass along the site boundaries were assessed as highly transformed from their natural condition, and associated with the following Present Ecological State (PES) (or condition) ratings:

<u>The Black River</u>

PES Category F, indicative of a system that has undergone Extreme changes from its natural condition, being affected by (amongst others) channelization, long-term inflows of treated and (at times untreated) sewage effluent, major changes in flow regime from a seasonal to a perennial system, nutrient enrichment, largescale loss of indigenous vegetation and invasion by alien aquatic plants

The Liesbeek River

- The western channel (or 'old' Liesbeek River channel): PES Category E, indicative of a system that has undergone a serious change from its natural conditions, with changes in natural river morphology being major contributors to this poor condition rating, along with water quality impacts from urban and suburban landuse, changes in natural flow regime (upstream river flows have been largely diverted away), extensive loss of indigenous vegetation and invasion of the river channel by alien plants.

- The eastern (concrete lined) current channel of the Liesbeek River (i.e. Liesbeek Canal): PES Category F, indicative of a canalised system that has lost almost all natural stream function

Raapenberg Wetlands

These include seasonal clay flats renosterveld wetland, with nine endemic or near-endemic wetland plant species being associated with them within the adjacent SAAO site alone. Water quality assessments and mapping of wetland vegetation indicated that these wetlands are at times highly saline and comprise a mosaic of wetland plant communities, the distribution of which is driven by subtle changes in water depth as well as by salinity. The Raapenberg wetlands have also been rated as of importance from an avifaunal perspective, supporting mainly waterfowl and have been identified as providing breeding habitat to endangered Western Leopard Toads. PES: Category C.

Artificial golf course ponds

A number of seasonally to perennially inundated ponds have been created on the golf course. These artificial water features may provide suitable breeding sites for western Leopard Toads and other amphibians, but are easily replaceable habitats, and of low current habitat quality.

b. Terrestrial botanical and faunal

The terrestrial areas of the site were described as highly disturbed by all specialists, and rated as of no importance from a botanical, faunal or avifaunal perspective. Notwithstanding, the botanical study indicated that there was a possibility that they could contribute to renosterveld conservation if they were rehabilitated by bringing fill of a shale nature onto the site, with local quarry areas being suggested as possible suitable donor areas.

The Western Leopard Toad (WLT) represents the most significant faunal concern in respect of the proposed River Club development intentions. The following is relevant to the study area:

- The only known WLT breeding sites in the region of the River Club are the wetlands of the Raapenberg Bird Sanctuary / Raapenberg Wetlands and about 1.5 km south-east in the Oude Molen area.

- The WLT population of this specific area appears to be somewhat disjunct and seemingly completely separated from breeding populations further south on the Cape Peninsula.

- The following four components are critical for the viability of any WLT population:

  - Availability of suitable breeding habitat: In this case, the conservation and management of the Raapenberg Wetlands are of outmost importance.
  - Availability of habitat to provide shelter and food (forage): Enough natural or semi-natural habitat must be available within at least a 2 km radius of breeding habitats to sustain WLT individuals for the non-breeding period (i.e. about 10 months of the year). Such sectors must provide the adequate shelter and foraging requirements to sustain the WLTs until the next breeding season. Thus substantial green belts must remain undeveloped, especially in the areas near to the Raapenberg Wetlands and along the rivers and also within an dispersal corridors.
  - Availability of dispersal corridors: Multiple dispersal options between breeding habitat and year-round occupancy habitat must be maintained (i.e. barriers must be limited). Connectivity must be maintained between the Raapenberg Wetlands and the river regions to the west, including the area of the 'old' Liesbeek River channel, which must either be rehabilitated as an accessible high quality wetland habitat or converted into high quality terrestrial habitat with some pools/ponds that would retain water into the summer and could be used as WLT breeding grounds. One broad (>70 m wide) east/west belt must be established in the northern reaches of the property, and additional minor (>10m wide) east/west corridors must also be created along the northern and southern site boundaries.
  - Limiting the extent of hazardous features and high-risk areas: Toad exclusion barriers must be erected to prevent/limit toad access to high-risk zones such as roads, large unvegetated areas and various pitfall structures.

- Mitigation measures implemented for WLTs will by default also serve to mitigate for the other faunal assemblages that are not of significant conservation concern.

4.2.3 Summary of Key Ecological Sensitivities

Based on the information provided in the report, the key findings relating to biodiversity sensitivities of the River Club and its immediate natural surroundings can be summarised as:

- The Raapenberg Wetlands, which include important remnant seasonal clay flats renosterveld wetland, of high conservation importance, would be particularly vulnerable to impacts such as increased hydroperiod / prolonged or more frequent wetting.

- The Raapenberg Wetlands also support numerous birds as well as amphibians such as the endangered Western Leopard Toad. Maintenance of habitat quality for indigenous fauna requires maintenance of seasonal flow regimes and inundation patterns, which in turn affect salinity and other water quality issues. The wetlands are thus highly sensitive to:

  - increased flood velocity, frequency, duration, or magnitude (depth);
  - channelisation / drainage of water from the wetlands;
  - diversion of (particularly fresh) water into the wetlands; and
  - removal of existing berms / other structures that have "accidentally" protected the wetlands from hydrological and/or water quality impacts associated with the changed hydrology, hydraulics, position and water quality of the Black River.

- The SAAO site, which accommodates important threatened terrestrial renosterveld vegetation (Peninsula Shale Renosterveld) including several endemic and/or red data species.

- The Liesbeek Canal is not sensitive as a riverine habitat in its current form.

- The natural channel of the Liesbeek River is disconnected from the Liesbeek River and now functions as a backwater wetland. It does, however, provide habitat to important bird species and may provide breeding areas to western leopard toads.

- Connectivity across the site, especially from the Raapenberg Wetlands & Bird Sanctuary across to the natural channel of the Liesbeek River (and *visa versa* in an east-west direction across the site) is important for wetland fauna, in particular Western Leopard Toads.

- Provision of adequate safe, vegetated terrestrial habitat for Western Leopard Toads during their non-breeding season is critically important for the sustainability of this species on and near the site.

4.2.4 Recommendations and Conclusions

The proposed development is acceptable from an ecological perspective, since it addresses the key concerns potentially associated with development of the River Club site, namely:

- The potential risks of development to the resilience of important indigenous fauna – in this case, populations of endangered WLTs occurring on and adjacent to the site, and requiring safe migration routes through the site as well as access to both breeding and non-breeding habitats;
- The likelihood of impacting negatively on adjacent watercourses and/or wetlands;
- The need to improve ecosystem resilience through rehabilitation and /or remediation activities aimed at improving terrestrial and aquatic (river and wetland) habitat quality.

Both terrestrial and natural ecosystems associated with the site are considered degraded, having suffered a long history of manipulation, including (in the case of aquatic ecosystems) variously, diversion, channelization, fragmentation and canalisation. Terrestrial ecosystems have been assessed by the faunal, avifaunal and botanical specialists as highly altered and affording very low levels of habitat quality. No indigenous flora of any concern was found on the site, although important renosterveld communities including red data species did occur on the adjacent SAAO site and Raapenberg Wetlands. These communities were not, however, considered likely to be affected by development of the River Club site.

Despite the level of infilling that would be associated with development of the site, the adjacent Raapenberg Wetlands were shown by the stormwater hydrology assessment conducted by Aurecon (refer to sub-section 4.1 and **Annexure H**) to be unlikely to be impacted by changes in flood height, frequency or duration.

The proposal to rehabilitate the currently canalised reaches of the lower Liesbeek River, and create in its place an unlined vegetated channel that has sufficient space to function as a natural river within a broad connecting riverine corridor (and which would significantly improve faunal

connectivity and toad migration routes across the site), is supported from a biodiversity and general aquatic ecosystems perspective, and its implementation is recommended.

Against rehabilitation of the canal is also set the infilling and landscaping of the remnant (but historically fragmented and highly altered / diverted) "natural" channel of the Liesbeek River. This loss is considered ecologically acceptable in the context of substantial river rehabilitation, and the proposed development of vegetated swales in landscaped terrestrial areas suitable for colonisation by western leopard toads in their non-breeding season is considered an acceptable use of this space without significant negative biodiversity or other ecological costs.

4.3 Visual Implications

4.3.1 Overview

The visual impact of the proposed development has been assessed by SRK Consulting. The Draft Visual Impact Assessment (VIA) report is contained as an annexure in the DBAR (refer to **Annexure J**).

Within the context of the Draft VIA, visual resources were carefully considered and integrated as informants to the development proposal. The visual specialist identified the following visual resources to be important in relation to the River Club site:

- Liesbeek River, the Black River, and the banks of these rivers;
- Raapenberg Wetland & Bird Sanctuary;
- Observatory hill and the SAAO complex;
- Alexandra Mill;
- Existing (large) trees, albeit exotic; and
- Devils Peak.

The Draft VIA includes an analysis of, *inter alia*, view-sheds, view catchment areas and 3D modelling simulations.

4.3.2 Analysis of Magnitude of Visual Impact

The following factors were considered when determining the magnitude or intensity of the overall visual impact of the project.

a. Visual exposure

Visual exposure is determined by the zone of visual influence or viewshed. The viewshed is the topographically defined area that includes all the major observation sites from which the project *could* be visible[10]. The boundary of the viewshed connects high points in the landscape and demarcates the zone of visual influence.

[10] Notwithstanding, it is important to remember that the project is not necessarily visible from all points within the viewshed as views may be obstructed by obtrusive elements such as trees, dense scrub, built structures and/or localised variations or irregularities in topography. The viewshed also considers the visibility of the development based on the distance of the viewer from the object (in this case, the development).

The viewshed for the proposed development is shown in **Figure 27** below. Analysis of the viewshed of leads to the following observations:

- Based on topography only, the development would be exposed and would be visible across large areas of the city;
- Observatory hill provides partial visual screening to receptors to the south-east; and
- With the inclusion of the large buildings adjacent to the site in the viewshed, the zone of visual influence is reduced considerably as these buildings provide effective visual screening.

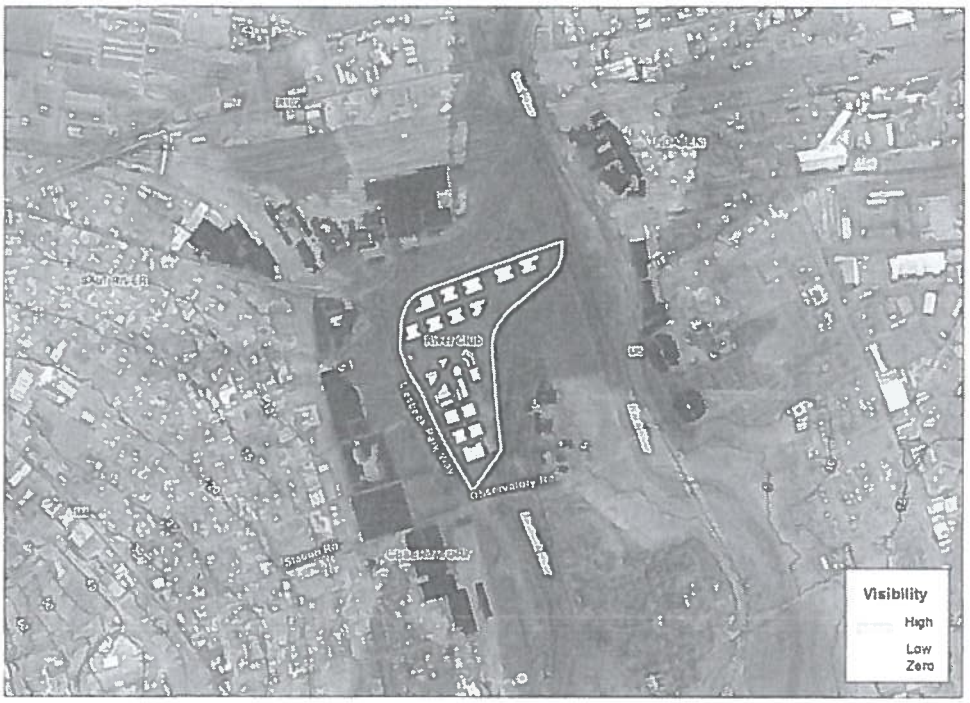

Figure 27: Viewshed (Source: SRK)

b. Visual absorption capacity

The Visual Absorption Capacity (VAC) is the potential for the area to conceal the proposed project. Factors contributing to the VAC include:

- Topography and vegetation that is able to provide screening and increase the VAC of a landscape;
- The degree of urbanisation compared to open space. A highly urbanised landscape is better able to absorb the visual impacts of similar developments, whereas an undeveloped rural landscape will have a lower VAC; and
- The scale and density of surrounding development.

The VAC is increased by the built fabric of the surrounding development areas particularly the PRASA rail yard to the north, the commercial buildings of Black River Park to the west, and the industrial buildings and M5 Park (on a raised platform) to the east. Local variations in topography also increase the VAC.

The dense urban fabric of Observatory and Salt River obstruct views beyond the very immediate foreground, thereby increasing the VAC of these areas.

The large trees, the Observatory complex, and the institutional buildings on the ridgeline east and south of the site provide partial visual screening.

c. Visual receptors

Receptors are important insofar as they inform visual sensitivity. The sensitivity of viewers is determined by the number of viewers and by how likely they are to be impacted upon. Potential viewers of the River Club development include:

- Motorists (particularly those using Liesbeek Parkway and the M5 freeway);
- Employees and residents in the local area; and
- Visitors (e.g. visitors to the SAAO complex, Valkenberg Hospital complex, TRUP etc.).

The sensitivity of viewers or visual receptors potentially affected by the visual impact of the development is considered to be *moderate* because the location of the proposed development in the city will increase the exposure factor, although receptors may attach a low value to private open space compared to housing and employment opportunities. However, some receptors (e.g. residents of Observatory) may attach a high value to the visual open space provided in an urban environment.

d. Viewing distance and visibility

The distance of a viewer from an object (in this case the development) is an important determinant of the magnitude of the visual impact. This is because the visual impact of an object diminishes as the distance between the viewer and the object increases.

A range of (reasonably) accessible viewpoints were selected from the surrounding areas, in order to provide an indication of the likely visibility of the development from local vantage points. The viewpoints were not randomly selected but were chosen because they are likely to afford optimal views of the development (i.e. the development is likely to be less visible from other accessible viewpoints, especially those further afield and at a similar elevation). The viewpoints are listed below and their respective locations shown in **Figure 28** overleaf.

- Viewpoint 1: M5 north of site
- Viewpoint 2: Along the Black River at the Berkley Way on-ramp to the M5
- Viewpoint 3: M5 Business Park
- Viewpoint 4: Observatory Road near the intersection with Liesbeek Parkway
- Viewpoint 5: Liesbeek Parkway at the entrance to Black River Park
- Viewpoint 6: Black River Park

- Viewpoint 7: Malta Road / Liesbeek Parkway
- Viewpoint 8: River Club driving range
- Viewpoint 9: River Club mashie course on the bank of the Liesbeek River
- Viewpoint 10: River Club parking area
- Viewpoint 11: River Club

Figure 28: Viewpoints (Source: SRK)

Photomontages and superimposed 3D imagery was used to create digitized imagery of what the proposed development could potentially look like from selected viewpoints (i.e. viewpoints 1, 2, 3, 6 and 7 located within a 1km radius of the site). Before and after perspectives of these viewpoints are displayed in **Figures 29a – j**. Note that these images illustrate potential urban massing, not architecture. The final architectural resolution will involve detailed design and articulation of the buildings.

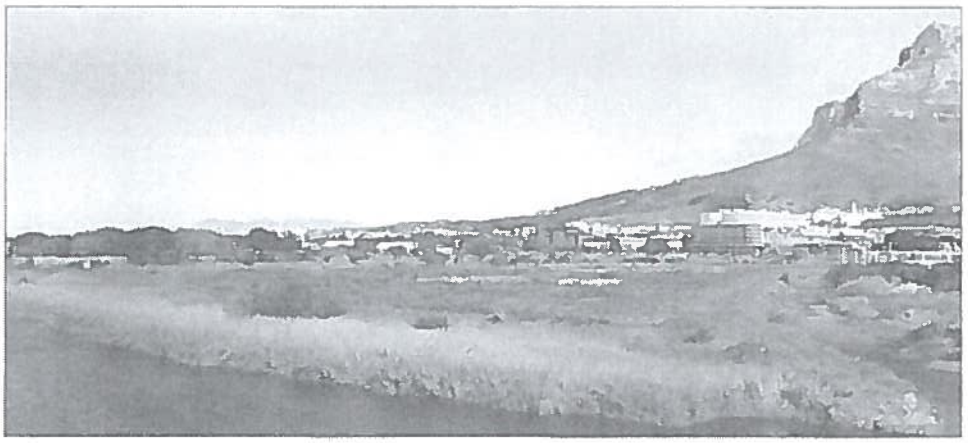

Figure 29a: Viewpoint 1 – view from M5 freeway looking southwards (Source: SRK)

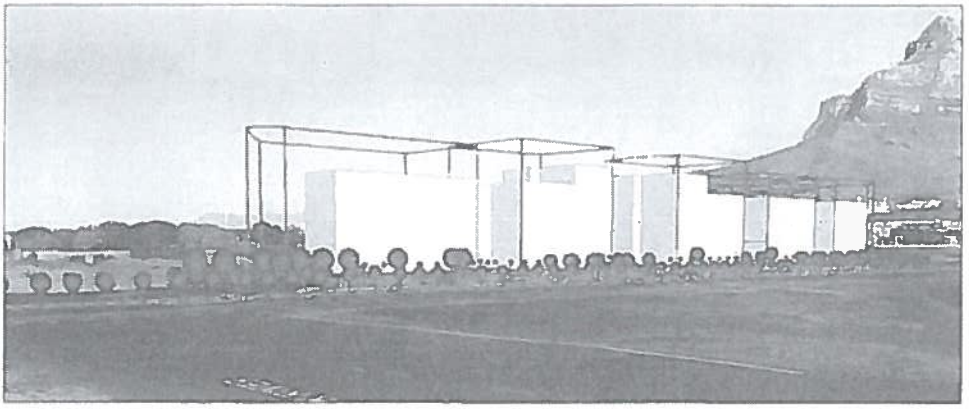

Figure 29b: Viewpoint 1 – photomontage from M5 looking southwards (Source: SRK)

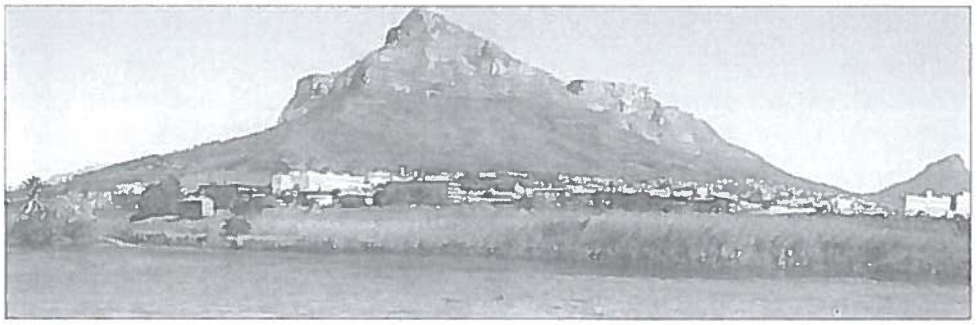

Figure 29c: Viewpoint 2 – view from top of Berkley Road extension looking westwards (Source: SRK)

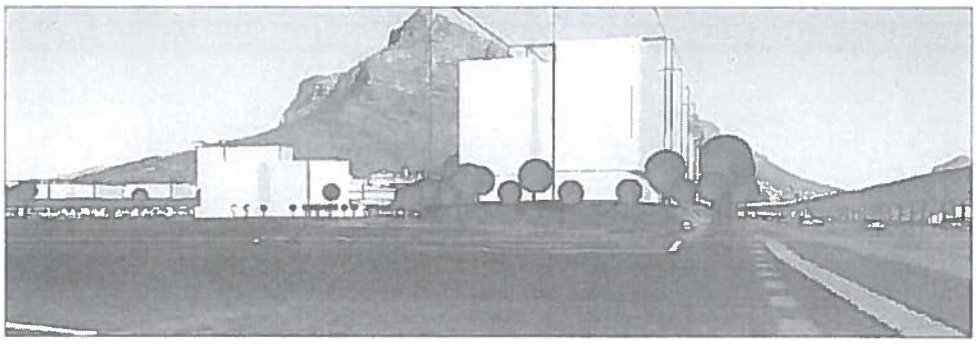

Figure 29d: Viewpoint 2 – photomontage from top of Berkley Road extension looking westwards (Source: SRK)

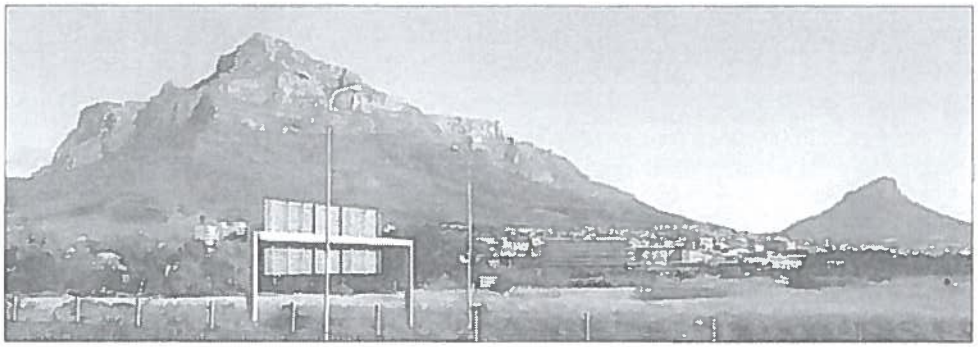

Figure 29e: Viewpoint 3 – view from M5 freeway looking westwards (Source: SRK)

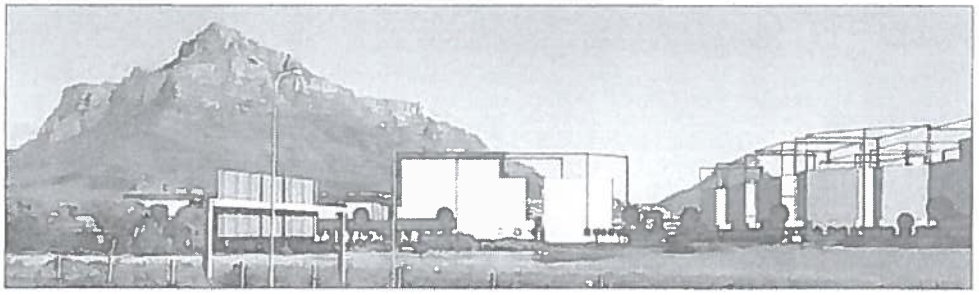

Figure 29f: Viewpoint 3 – photomontage from M5 freeway looking westwards (Source: SRK)

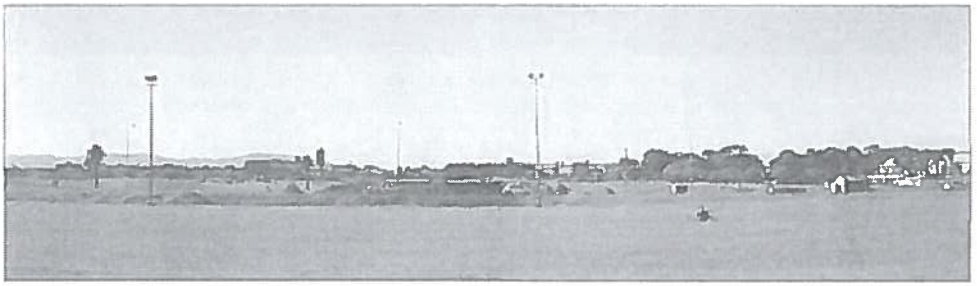

Figure 29g: Viewpoint 6 – view from Black River Park looking eastwards (Source: SRK)

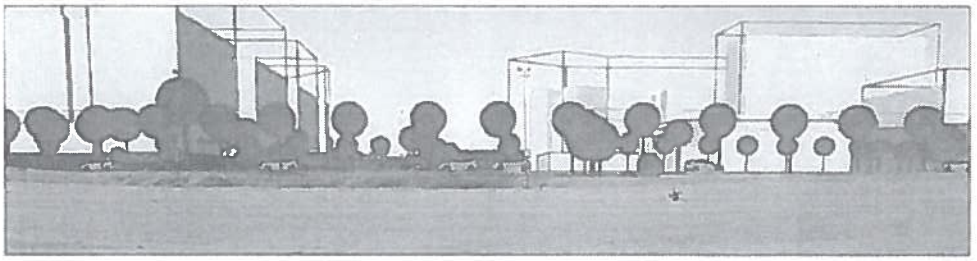

Figure 29h: Viewpoint 6 – photomontage from Black River Park looking eastwards (Source: SRK)

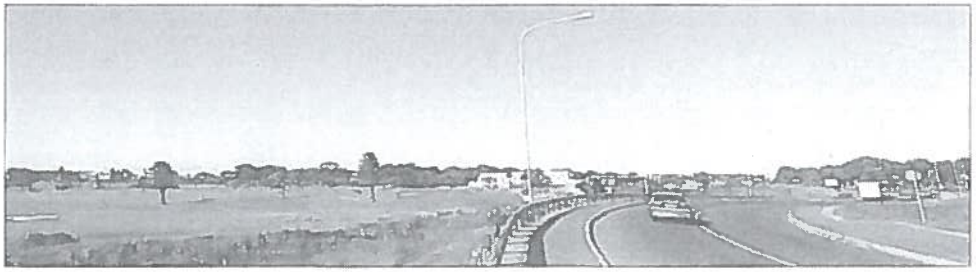

Figure 29i: Viewpoint 7 – view from Malta Road looking southeast (Source: SRK)

Figure 29j: Viewpoint 7 – photomontage from Malta Road looking southeast (Source: SRK)

e. Compatibility with landscape integrity

Landscape (or cityscape) integrity refers to the compatibility of the development / visual intrusion with the existing landscape.

The proposed development is consistent with the existing land uses of the surrounding area (mainly the commercial and industrial activities towards the north of the site), although the scale and size of the development will be considerably larger than neighbouring developments. As the site is located wholly in an urban environment, the development is compatible with the overall cityscape of the area.

Although described as a "green" space, the site and the adjacent river systems are degraded. The development can therefore be considered to be somewhat sensitive to the "natural" environment, rehabilitation of the river systems is proposed.

Overall, the cityscape integrity of the proposed development is rated as *moderate* to *high*.

4.3.3 Impact Assessment

Construction phase

It is anticipated that the construction phase will result in visual intrusion from construction activities resulting from the following:

- construction activities such as vegetation stripping and earthworks (which can cause scarring);
- the presence of construction infrastructure, plant and materials on site (e.g. site camp, cranes and stockpiles); and
- dust generated at the site.

It is further anticipated that the construction phase will result in an altered sense of place as a result of:

- high volume of trucks transporting construction material to the site (e.g. increased visual clutter, noise), and
- the change in the state of the site (e.g. scarring, construction equipment, construction traffic and dust generation) when compared with the current nature of the site (i.e. green open space) and use of the site (i.e. recreation).

The impact during the construction phase is assessed to be of *medium* significance. However, with the implementation of mitigation measures this impact is reduced to *low* (refer to mitigation measures in sub-section 4.3.4 below).

Operational phase

It is anticipated that the operational phase will result in an altered sense of place as a result of the change in the state of the site (i.e. highly developed) when compared with the current nature of the site (i.e. green open space) and use of the site (i.e. recreation).

The impact of this altered sense of place is assessed to be of *high* significance. However, with the implementation of mitigation measures this impact is reduced to *medium* (refer to mitigation measures in sub-section 4.3.4 below).

In addition, it is anticipated that the operational phase will result in enhanced visual intrusion, with the following factors considered pertinent:

- views of Devils Peak from the M5 freeway and immediately adjacent vantage points (e.g. M5 Park and Alexandra Institute) may be affected by new large buildings introduced in the foreground; and
- views from Black River Park will likely change from that of an open green expanse (when looking across towards to the Black River) to large built structures in the foreground.

The impact of this visual intrusion during the operation phase is assessed to be of *high* significance. However, with the implementation of mitigation measures this impact is reduced to *medium* (refer to mitigation measures in sub-section 4.3.4 below).

Further, it is anticipated that the sense of place and visual quality of the site will be altered by an increase in light pollution. The impact of this light pollution is assessed to be of *medium* significance. However, with the implementation of mitigation measures this impact is reduced to *low* (refer to mitigation measures in sub-section 4.3.4 below).

Cumulative impact

The sense of place of the study area is strongly influenced by the rivers, and an "island" of open space in a highly developed urban environment of mixed land use. The area has experienced an increase in high-density development (commercial and residential) in recent years, owing to the proximity of the site to the CBD and good connectivity to a number of highways and major roads. Recent developments include the Black River Park and the redevelopment of the M5 Business Park. The SKA building is also proposed to be constructed on the property immediately south of the River Club site.

The River Club development will add to the cumulative visual impact of high density developments in the area and the related loss of green open space in the city. However, there is an opportunity to convert the transformed private open space to higher quality, more accessible (albeit smaller) open space for the general public.

The severity of the impact on the visual landscape and sense of place is rated as *moderate*, and is assessed to be of a medium extent. The cumulative impact is thus assessed to be of *medium* significance.

4.3.4 Mitigation Measures

The Draft VIA contains mitigation measures that should be adhered to in order to mitigate the visual impact of the proposed development. These mitigation measures cover the construction phase, operation phase and lighting interventions and are fully outlined in the Draft VIA contained in **Annexure J**.

4.3.5 Conclusion

The Draft VIA concludes with following statement:

"Though tools are available to more scientifically and dispassionately assess visual and sense of place impacts, VIAs require a large degree of professional, subjective judgment. This is more difficult for a project such as the River Club development, which is located in the midst of a wholly transformed urban environment on land very well located for development, but which has remained undeveloped and conferred a natural sense of place to surrounding (urban) receptors. In many respects, the visual impact is pronounced, but not inconsistent with a cityscape. However, the sense of place impact is more significant and difficult to mitigate. Receptor perceptions are also important: for some, retention of the open space might be critical to retaining the sense of place; for others, urban development, especially if celebrated by iconic structures, may be valued. The development could both alter sense of place and, at the same time, deliver a functional development with interesting structures with their own visual appeal."

4.4 Heritage

4.4.1 Overview

Dr. Stephen Townsend and Tim Hart, in collaboration, have compiled a comprehensive Draft Heritage Impact Assessment (HIA) report in relation to the proposed development (refer to **Annexure K**).

The Draft HIA is currently our for public comment, and upon finalization will be included as part of a NEMA process.

4.4.2 Site History

The site has a complex and varied history. The following is a summary of the pertinent points in relation to this history:

- The early inhabitants of the Cape Peninsula farmed with cattle. Cattle need good quality soil, good grass and fresh water, which was in abundance at the confluence of the Salt and Liesbeek River's. As such, groups of indigenous Khoekhoe people (e.g. the Cochoqua) would bring their herds of cattle to graze in this area, particularly during the summer months.

- The arrival of European mariners and explorers in the Cape *circa.* 1500 brought about conflict. The Khoekhoe did not tolerate unfair conduct, so when Francisco D'Almeida, the Portuguese Viceroy of India, overstepped the mark in 1510 the Khoekhoe attacked and killed D'Almeida and more than fifty of his men in a battle which took place in close proximity to the present-day River Club site[11].

- The Dutch, under the leadership of Jan Van Riebeeck, established the VOC in 1652 in order to set up a permanent station at the Cape for the purposes of cattle trading, crop farming, and provision of water to passing ships. The land that Van Riebeeck identified in 1652 for farming was the best grazing land in terms of the limited resources that the Peninsula had to

[11] It is important to note that evidence indicates that this battle did not take place on the River Club site.

offer. The Liesbeek River valley and tributaries were the best land on the Peninsula. Slowly but surely, the Peninsula Khoekhoe were gradually moved from the vicinity by the Dutch farming activities. Small conflicts arose as a result. Because of the skirmishes between the Dutch and the Peninsula Khoekhoe, van Riebeeck decided to build a physical border around the VOC farmlands. It is clear from the archival excerpts that the fence was intended to keep cattle in, and not primarily to keep Khoekhoe out. But nevertheless, the effect of this barrier was the exclusion of Peninsula Khoekhoe from their main grazing lands that the VOC reserved exclusively for the use of the VOC and the freeburghers.

- All of the Dutch farms along the Liesbeek River have been the subject of a complex sequence of land transfers. The character of this part of the Liesbeek River catchment remained rural until well into the 20th century. Valkenberg was converted into a reformatory in the late 19th century but still functioned as a farm during this time. Shortly after this, Valkenberg Hospital was built accommodating patients newly transferred from the Robben Island infirmary. By as late as 1937, there were still extensive cultivated lands on the on the East Side of the Liesbeek River. On the west side, suburban development and sports fields had encroached on previously cultivated land.

- More recently the site currently occupied by the River Club was used by the South African Railways & Harbours (SAR&H) as the Liesbeek Park Recreation Club, which was established in the late 1920s and was subsidized by SAR&H for the benefit of its employees. The site was administered by Propnet, a division of Transnet. The original facilities of the club which consisted of playing fields and some small structures were built towards the end of the 1920s, with the main building completed in 1939. Transnet's occupation of the site ceased in the early 1990s, when it was converted into a golf driving range / recreational facility.

- The land's appearance in the past was very different to that of today. While the valleys of the Liesbeek and Black Rivers remain quite well defined (used as a conduit for some of Cape Town's major roads) and essentially have not changed, the rivers themselves have been straightened and canalized (the Liesbeek River was canalized in 1952), in places draining what were significant areas of marshland. The present-day wetland, at the confluence of the Liesbeek and Black Rivers, with the small area of high ground occupied by the Royal Observatory and the River Club, amount to the last surviving elements of the historical landscape.

4.4.3 Identification of Heritage Resources

a. Heritage resources relating to the River Club site

Although the site is historically important in terms of the role this area played in the history of the Cape, there is no or very little physical heritage on the site: it has been transformed and reclaimed from estuary mud. The only element on the site that has been a constant through both pre-colonial and colonial period history is the Liesbeek River. Although its alignment and course has been altered to the point that not much of the original course survives, the main elements and confluence exists today and is a strong symbol of past events. The Liesbeek River is therefore identified as the surviving physical heritage indicator that deserves significant celebration. Also attached to the river are intangible and imprecise associations, the sense of deep-time that the history of the area gives.

The heritage resources on the site are identified and summarised as follows:

The Liesbeek River and its confluence with the Black River

The Liesbeek River and its confluence with the Black River is important as a place on the landscape. Its 'physicality' is too transformed to be argued to be anything like it may have been during its historically important moments, however the historical and symbolic significance of the river is very high.

Early crossing point

River Club land was possibly the site of an early crossing point where an informal road passed along and over the confluence to a point to the west (near where the bird hide is today) before continuing into the hinterland (although this spot may be just north of the property where the Berkley Road extension is planned or it may be where the current Station Road axis crosses the raised spine of land between the Royal Observatory and Valkenberg Hospital). There is no physical evidence of this crossing today.

Open space character

Although the River Club site is effectively a recreational area and a golf course, is has a park like quality (green open space) which is a quality shared by the broader Liesbeek – Black River corridor. This however belies that fact that much of the land has been subject to prior transformation.

Cultural landscape qualities

The cultural landscape qualities of the site are a combination of its history and context as summarised above. The context is historic and symbolic. The site is set within a situation where there are significant heritage sites nearby, however the physical properties of the site are that it contains a club house and sports related facilities that is of moderate significance, a bland landscape for sporting activity, but very little else.

b. Heritage resources relating to the surrounding area

South African Astronomical Observatory

The most significant heritage resource in close proximity to the site is the South African Astronomical Observatory (SAAO) (nominated for Grade 1 status) which is situated on a ridge between or at the confluence of the Liesbeek and Black Rivers. The core historic structure (built 1822) is centrally situated. It is, however, surrounded by a plethora of structures of various ages – these range from 19th century staff buildings to telescope domes, as well as recent late 20th century structures. The area is well planted in that most structures are obscured from view by a combination of oak and eucalyptus and pine trees. Essentially, the SAAO is not visible from its surrounds, including from the River Club itself, due to the dense tree cover. The best views to the SAAO are from across the Black River to the east.

The Observatory was built on this raised spine of land that was visible from the Castle (where the 12 o'clock signal gun was located before 1900), as well as from Table Bay where mariners could observe fall of the (now defunct) time ball for chronometer setting. These views from the Observatory to the Castle and Table Bay, which were central to the functioning of the Observatory, are now obscured by development. Lions head, Signal Hill and Devils Peak remain visible, but the view has to be sought from vantage points below the trees, and is clearly not of any importance in the day-to-day life of the SAAO; and these vistas have not been of importance since the beginning of the 20th century; and the mid-day gun (previously at the Castle) at the Lion Battery on Signal Hill has been electronically triggered for most of the 20th century. While the line of sight between the SAAO and Signal Hill is historically interesting, it is of no current relevance.

Other tangible resources within TRUP

In addition to the SAAO, the greater TRUP area contains a variety of heritage resources of variable grade including:

- the Valkenburg Hospital complex, noted for the newly restored psychiatric hospital and its various facilities dispersed through an open park-like environment;
- the Valkenburg Manor site, which stems from one of the earliest Dutch land grants in the area;
- Oude Molen's mid-early 19th century wards set in an open environment adjacent to the broad open valley of the Black River. Here one of the ancient Oude Molen farm buildings has survived (although in very poor condition).
- the Alexandra Institute and historic mill; and
- Maitland Garden Village.

The accumulative significance of the area is derived from the history of, and concentration of historic elements on this landscape as well as the symbolic values of the Black and Liesbeek Rivers. Given this, the TRUP clearly contains components of high significance, not only on account of its built, cultural environment and setting, but also its place in the very early history of the Cape. However, it is also clear that the TRUP is a very large area ranging considerably in use, built-form and in significance.

4.4.4 Heritage Significance

The River Club site and its surrounds is regarded by some as being of high environmental / topographical / ecological and historical significance, both as the flood plain of the Liesbeek River and as the site of the early confrontations between indigenous peoples and settlers. This significance, taken as a single complex of significance and symbolic meaning, is of the highest order in the current socio-political climate.

There are, however, two future interventions on land within the Liesbeek River floodplain and immediately abutting the River Club site that will transform the perception of the floodplain, the sense of place, and the heritage significance of this site:

a. The NRF, the owner of Remainder Erf 26423 Cape Town (i.e. the property immediately abutting the southern boundary of the River Club), is currently procuring a development

tender for a substantial new building (± 8 000m² of floor space) on this site for the SKA project. This forthcoming building will be a very considerable imposition into the floodplain and have a marked impact on its reading and sense of place.

b. To the immediate north of the site is a long-planned arterial road connecting the Malta Road-Liesbeek Parkway junction across the floodplain, over the Salt River-Black River-Liesbeek River confluence and to Berkley Road in Maitland (i.e. Berkely Road extension). This roadway will be a very considerable imposition on the floodplain and have a marked impact on its reading and its sense of place.

These two future interventions are taken as given, even if their impacts are hard to imagine now. Notwithstanding, they will radically affect the reading and significance of the floodplain, of the surrounds and, in particular, of the land in between them (i.e. the River Club site).

4.4.5 Heritage Related Design Indicators

The following heritage related design indicators are proposed in the Draft HIA:

a. The Liesbeek Canal can and should be 'rehabilitated' and repaired, even 'restored', so that it is read and experienced as a river with its floodplain rather than a canal. In this case restoration means to reform the extant river course, removing the 1952 canal-sides, giving it banks and a width at least as wide as that immediately above the 1955 diversion, and a new and appropriate sense of "river-ness", extending a broad sense of river and its immediate floodplain / banks down to the confluence. The intention of this design indicator is to ensure the recreation of the lower reaches of the Liesbeek River as a properly ecologically functional and visually convincing river course with adequate banks and space to enable both the ecological systems for faunal and floral well-being and the continuation of the recreational amenity of walking and cycle-tracks that already exist upstream of the site.

b. The topography and natural and built components of the low hill that the SAAO occupies should influence the future form of development and any new development should respond in terms of height and be lower than the height of the development in the northern part of the site adjacent to Berkley Road extension.

c. The old pre-1952 river course (i.e. the old Liesbeek channel), although historically interesting, is of relatively low historical significance given the 1952 redirection, the future impositions of the proposed SKA building and the Berkley Road extension and, most importantly, its limited capacity to serve as a riverine corridor. As such its restoration is neither possible nor desirable. It is, however, necessary that its historical presence be reflected in future development.

d. The west bank of the Black River immediately below / at the confluence of the Liesbeek and Black Rivers at the northern-most point of the River Club site is the closest site (or river bank) to the most likely siting of the pre-colonial crossing of the Black River by the indigenous people and their cattle. Considering that there are no verifiable crossing sites remaining, but given the necessity for the establishing of a symbolic site, a substantial setback from the river bank should be left to enable an imagined river-crossing of the indigenous people and that

this land be set aside for the siting of some form of identification and celebration of that pre-colonial history.

e. It is noted that the preliminary heritage studies listed several 'design indicators' intending to guide the development of the River Club site in rather more prescriptive detail including heights, scale, density, retention of trees, etc. It is contended that such prescriptions do not / should not follow from the heritage-related cultural significances of the site (as articulated above); and such direction should flow out of the urban design framework articulated by the urban designer as outlined in the urban design indicators and recommendations report prepared by Urban Concepts.

f. The historical factors determining the siting of the Royal Observatory included sightlines to the roadstead in Table Bay, to the Castle and to Signal Hill. The views to the sea and Castle are no longer extant; but there are potential views from the Observatory to Signal Hill and the gun emplacement. However, these glimpses are only from the lower banks of the spur and are not publicly accessible; indeed, nor are they enjoyed by occupants of the SAAO. Given this it is considered unnecessary, even fruitless, to attempt to preserve a view cone or shaft of space over the River Club site towards Signal Hill.

4.4.6 Assessment of Impacts on Heritage Significance

Construction impacts on archeological and paleontological resources

Given the degree of surface disturbance on the current site, it is not expected that any impacts on archaeological or paleontological resources will occur. However, monitoring of these aspects will be necessary when bulk earthworks are carried out.

Impacts on existing structures on the site

The existing buildings on the site are of a very low significance and are not regarded to be of a grade higher than Grade IIIC. The loss of these structures would therefore have very little or no impact on the significance of the site or environs.

Operational impact on the sense of place

The current sense of place at and along this section of the Liesbeek River, reliant on the topography alone, is that of a wide flat floodplain severely degraded by a history of development and infill.

The sense of place will be transformed by the forthcoming SKA building and the Berkley Road extension. The substantial changes on the site, as experienced from Liesbeek Parkway, Station Road and from the sports fields along Liesbeek Parkway will transform this sense of place, and this change will be highly perceptible to persons familiar with the area. Whether this change is perceived as negative or positive is dependent of the personal aesthetic and values of the observer.

In other words, the sense of place, already transformed over the past 80 years or so, will be radically transformed. However, it is contended that the sense of place attributed to this area relies

on the Liesbeek riverine corridor for its significance, and that the Liesbeek River will be significantly enhanced by the restoration of the corridor to match the corridor upstream.

The impacts of the restoration of the Liesbeek River from canal to riverine corridor and the establishing of a wetland ecological corridor across the site are positively beneficial in three important senses: first, the heritage-significance of the Liesbeek River will be restored by making it visible and functional as a riverine corridor and establishing a visible symbolic pre-colonial crossing point; second, the ecological functioning and significance of this low-lying wetland environment abutting the river-confluence and the Raapenberg Bird Sanctuary will be enhanced; and, third, the continuation of the pedestrian and cycle paths from above the site down to the confluence and to the supposed pre-colonial crossing will result in enhanced amenity for the public.

Impacts on significant parts of the site

While it is a reasonable deduction that the land at the northern end of the River Club site is a likely location of the pre-colonial river crossing, there is no archaeological or other evidence of the crossing. It is suggested in the Draft HIA that this part of the site is outside the development footprint and should not be impacted on; and it is ideally suited as an area for future commemoration in consultation with First Peoples Groupings.

Operational visual impacts on the significance of nearby heritage resources

The SAAO is well screened within a well-treed and leafy land parcel of its own, and is effectively invisible. It is therefore not anticipated that its significance will be affected by the proposed development. Further, the historical sightlines to Table Bay, the Castle and to Signal Hill are no longer as important as they once were. Therefore the development will not have an undue impact on the significance of the SAAO.

Given the distance of other heritage resources from the site, as well as the future presence of the SKA building immediately south of the site, it is contended that the proposed development will not have any impact on Valkenberg Hospital or the Valkenberg Homestead. Further, given the presence of the Black River Park office complex and the large sports facilities in lower Observatory, the development will not impact on the residential environment in heritage terms.

With regards to the view from apex of the Malta Road bridge towards the Niewe Molen Mill in the Alexander Hospital site, this is not considered a significant view for two primary reasons, *viz.*:

- the Mill is set in a very cluttered visual field and is barely noticeable from this vantage point;
- the Malta Road bridge will be completely reconfigured when the Berkley Road extension meets it, thus creating a very visually confusing immediate environment of traffic lights etc., which will effectively obviate this already barely noticeable view.

4.4.7 Mitigation

In essence, besides the pre-colonial river crossing site and the riverine corridor associated with the Liesbeek River, there are no heritage resources on the site that will require intervention. Determining the quality of the site is considered an urban design issue; and, in this context, it is

suggested that the role heritage informants can play in the urban design of the site is limited due to the fact that the identified indicators are relatively weak in determining architecture and townscape character.

The one heritage feature of high significance that has been identified is the Liesbeek River corridor itself and the confluence which is the common feature that runs through the project area and beyond. It is a powerful historic symbol and place-mark that refers to early landscape of pre-colonial transhumance use, colonial settlement and agriculture, and contestation. The river itself needs to be respected, enhanced and made accessible.

The following mitigation measures are regarded as necessary:

The Liesbeek River

The canalised section of the Liesbeek River should be rehabilitated in such a way as to create a "sense of river-ness" and engender conditions favourable to creating biodiversity and engendering natural qualities. This action will result in a powerful positive contribution to the overall commemoration of this feature and enhance and celebrate its symbolic significance.

Riverine buffer zone

A riverine buffer that is pedestrian- and fauna-friendly is required along both the old and new river courses (as recommended by the biodiversity related specialists). A pedestrian walk along the buffer zone will provide an enhanced view of the SAAO, the river, wetlands and Raapenberg Wetland & Bird Sanctuary. Furthermore, it will enhance the quality of the development area.

Commemorative zone / event area

Consideration must be given to establishing a green zone or open area close to the confluence of the old Liesbeek and Black Rivers. This is close to the historic crossing point (Varsche Drift) and should serve as a commemorative and celebratory area in terms of the history of contestation.

4.5 Socio-economic Study

The socio-economic impact of the proposed development has been assessed by SRK Consulting. The Draft Socio-economic Impact Assessment report is attached as **Annexure L**.

The report includes *inter alia* the following pertinent findings:

- The River Club development delivers significant socio-economic benefits in the form of investment in the economy, increase in employment and increase in government revenue, as well as provision of publicly accessible open space and commercial cross-subsidisation of public infrastructure and providing critical mass for and catalysing further infrastructure provision and implementation of TRUP. The development will also provide additional residential use and contribute further to a trend of rising property prices by increasing investor interest in the area.

- Negative socioeconomic impacts are primarily associated with rising property prices, which can lead to gentrification. Observatory is more exposed but less vulnerable to gentrification due to the River Club development, whereas poorer neighbouring suburbs such as Woodstock, Salt River and Oude Molen are more vulnerable but less exposed to the development.

- The project will increase 'busy-ness' in the area, create a (vibrant) urban node and accessible higher-quality open space system. The net impact of the above elements on quality of life in the area, and whether this is perceived as positive or negative, will depend on personal values and preferences and likely differ for residents in the area.

The following conclusions are drawn in the report:

- The River Club development provides a number of key socioeconomic benefits, notably increased investment, employment, State revenue and provision of housing at a regional scale, and access to open space and increase in property values at a local scale.

- Potential adverse impacts are primarily associated with (limited) gentrification as a result of rising property prices, assuming the River Club development will increase attractiveness of and investor interest in the area.

- The River Club development is expected to intensify and accelerate existing development trends in the area, especially if it acts as a catalyst for the development of TRUP. Densification and an increase mixed-use development and property prices will continue without the River Club development, albeit at a slower pace.

- The nature of certain impacts, such as how the River Club development affects quality of life of surrounding residents, will depend on personal values and preferences.

- On balance, the socioeconomic benefits of the River Club development to the local and wider Cape Town community may outweigh the impacts.

5. URBAN DESIGN INDICATORS & RECOMMENDATIONS

5.1 Overview

An urban design indicators and recommendations document for the River Club site has been prepared by Urban Concepts (refer to **Annexure M**). This document contains *inter alia* the following:

- The identification of key observations and design indicators for the spatial systems of the site, the built form aspects such as scale, height and gateways, as well as aspects related to the connectivity of the site;
- Urban design recommendations for the spatial systems, heritage significance, built form components, and connectivity and accessibility; and
- A concept plan which captures the potential design interpretation of the site.

5.2 Design Indicators

The urban design indicators and recommendations document contains an analysis of the existing urban environment, and this analysis resulted in a range of urban design indicators (including *inter alia* natural environment, vistas and view corridors, public realm, heritage, connectivty, built form and height) being identified. A synthesis map illustrating design informants for the site is shown in **Figure 30**.

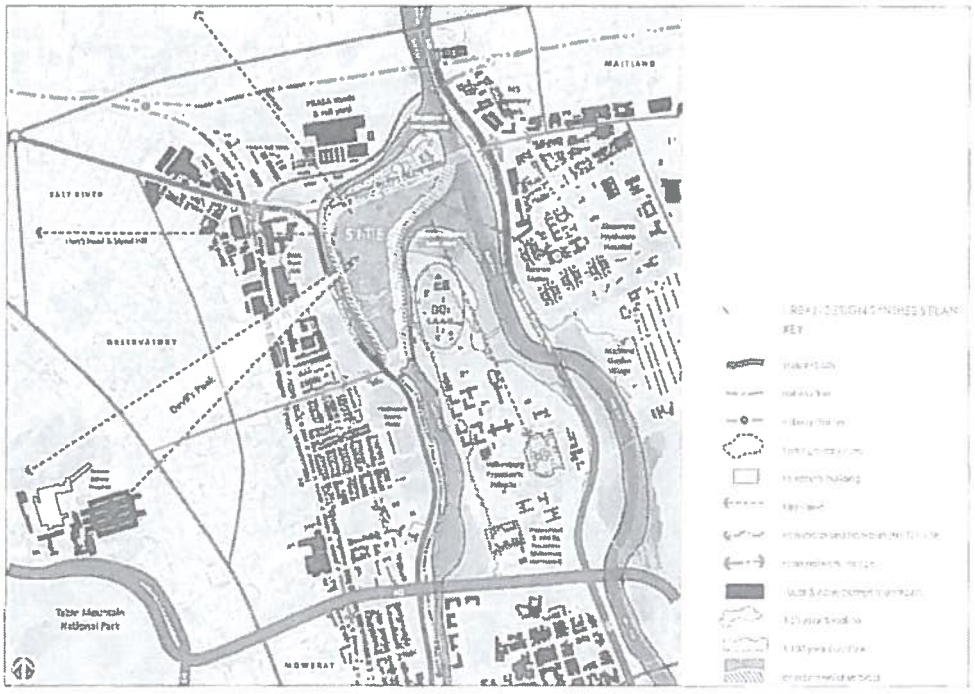

Figure 30: Synthesis of urban design indicators (Source: Urban Concepts)

For a full understanding of the design recommendations presented in sub-section 5.3 it is suggested that the analysis and design indicators contained in **Annexure M** are consulted.

5.3 Urban Design Recommendations

5.3.1 Spatial System

Integration of environmental aspects and view corridors

Design recommendations relating to environmental aspects (including view corridors) are listed below and are spatialized in **Figure 31** overleaf.

- Rehabilitate the canalized river course, and include the experience of this, the Raapenberg Wetland & Bird Sanctuary and the SAAO complex as an integral part of a continuous public space system.

- Enhance the physical connection with the Liesbeek River – both the old channel and the rehabilitated canal – and the Raapenberg Wetland & Bird Sanctuary by creating and defining spaces for people.

- Maintain a substantial open green space in the heart of the site as a pedestrian and ecological link between the two river corridors, to celebrate the experience of Devil's Peak and maintain visual permeability and a sense of openness.

- Locate publicly accessible amenities throughout the site, along the edges of the central open space and the green riverine corridors.
- Ensure legible, integrated pedestrian movement system which is in line with the NMT networks and plans for the surrounding areas. It is recommended that this forms part of the river interface.

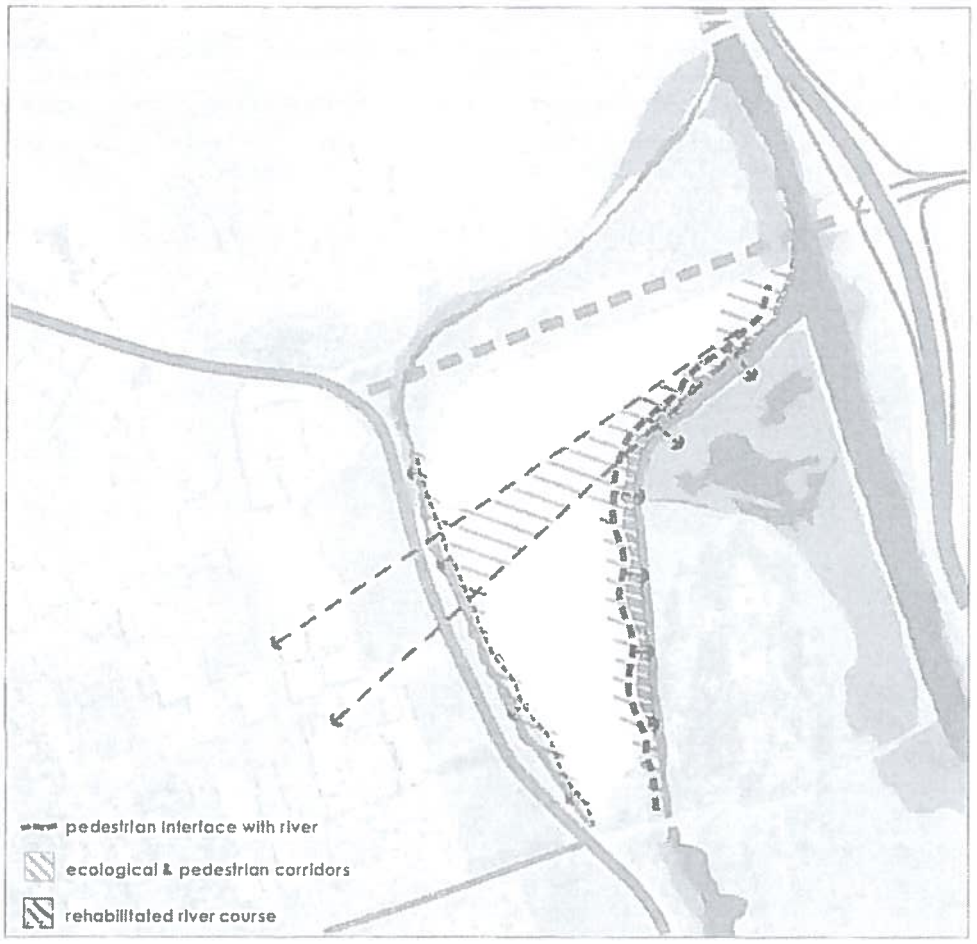

Figure 31: Environmental related design recommendations (Source: Urban Concepts)

Public realm continuation

Design recommendations relating to the public realm are listed below and are spatialized in **Figure 32** overleaf.

- A significant publicly accessible open space system is recommended in order to welcome people into the site, maintain the site's sense of openness and continuity, and to add value to the broader urban realm.

- Provide public space along the edge of the rehabilitated canal as well as the earlier river course, for walking, cycling and leisure, as a continuation of the existing public space network south of the site (see indicators). Use staggered building footprints to define spaces along the rehabilitated river course.

- Extend this space across the site, connecting the two river corridors, bringing people into the development. The central area has the potential to be used for public recreation, as it is less ecologically sensitive than the river edges.

- The recommended development parcels should be visually and physically permeable to pedestrians, to help integrate the different spaces within and around the site.

- Land uses to include a combination of commercial, residential, retail, as well as public facilities.

Figure 32: Public related design recommendations (Source: Urban Concepts)

5.3.2 Built Form

Fragmentation of building form

Design recommendations relating to building form are listed below and are spatialized in **Figure 33** overleaf.

- A variety of building forms should be introduced to ensure varied grain and fragmentation.
- The larger building forms be located to the north of the site. The street grid proposed for this area of the site relates to the rectilinear grid of surrounding urban fabric. It is however important to create another level of fragmentation with a variety of roofs, at varying heights.
- A finer grain in building form is recommended to the south, in proximity to the SAAO.
- Buildings adjacent to the rehabilitated canal (opposite the SAAO) to be free-standing in areas with small footprints. No continuous perimeter block buildings are recommended along this edge.
- Buildings along the public open space on rivers and central open space to have a level of continuity in façade treatment to ensure a well-defined edge condition, enabling active edges in areas.

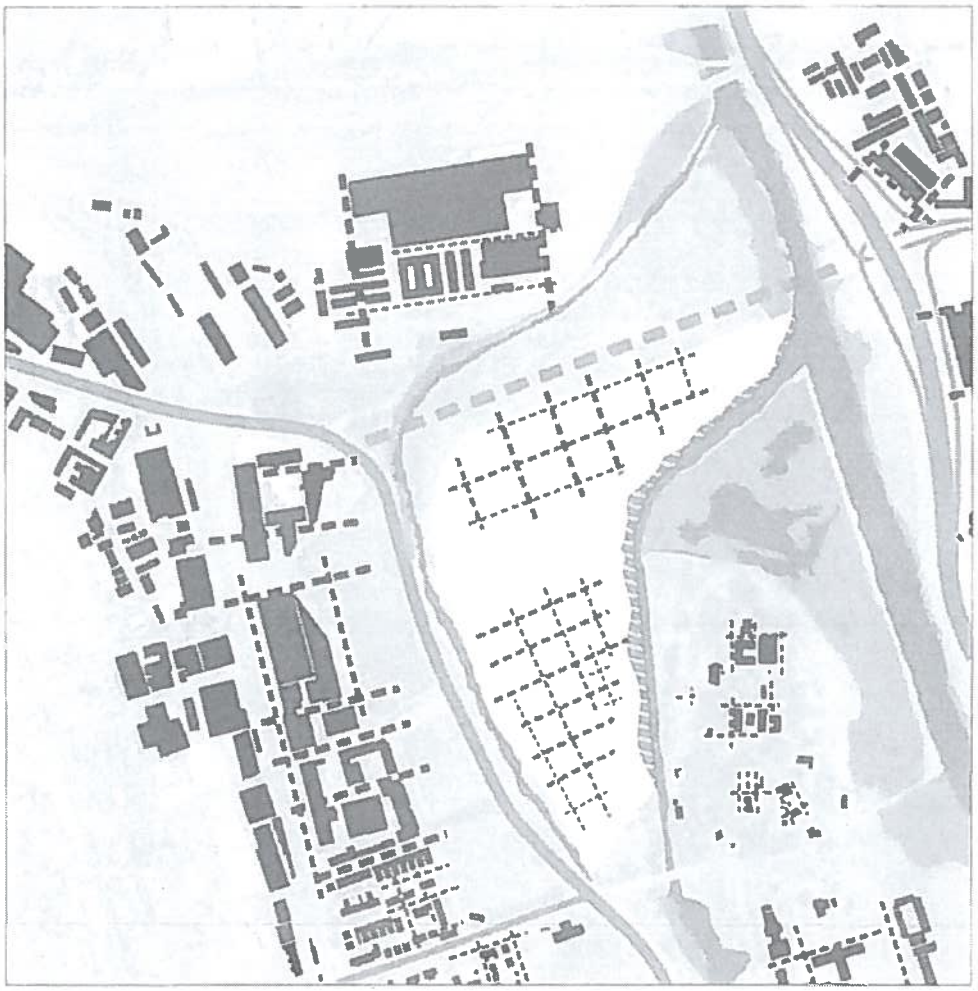

Figure 33: Built form related design recommendations (Source: Urban Concepts)

Building heights

Design recommendations relating to building heights are listed overleaf and are spatialized in **Figure 34** overleaf.

- The taller building forms be located to the north of the site. This will assist in defining the Berkley Road edge, and will play a role in defining public areas on this very exposed, noisy site.

- Lower buildings are recommended to the south (in proximity to the SAAO). The tree canopy of the SAAO site is most prominent, and should not be overshadowed (the SAAO itself is not clearly visible from the site).

- The opportunity to include focus buildings (taller than adjacent built form) is noted. Two key positions are identified: the first is to signal the entrance point from Berkley Road; the second is proposed in close proximity to the other entrance to the site from Liesbeek Parkway, and suggests a focus building on the new public park. It is recommended that this building has a mix of uses, for example retail and hotel/conferencing.

Figure 34: Building height related design recommendations (Source: Urban Concepts)

5.3.3 Connectivity

Site integration and accessibility

Design recommendations relating to site integration and accessibility are listed below and are spatialized in **Figure 35** overleaf.

- The ability to traverse the site, and integrate the site with surroundings, without creating a 'rat-run' for vehicles.
- Continuity of public access and pedestrian movement throughout the site.
- The vehicular system to include public transport node(s) to alleviate private transport pressures.
- The proposed Berkley Road extension has been identified as a Class 3 road in the transport & planning frameworks and this will become the primary access point onto the site. From a planning and urban design perspective it is recommended that multiple intersections be considered into the site, as this will encourage more of an activity-type road (integrator).

Figure 35: Site integration and accessibility related design recommendations (Source: Urban Concepts)

5.4 Conclusion

The indicators and recommendations provided in the urban design report establish guidelines for the responsible development of the site. The spatial recommendations seek to provide a coherent urban form which relates to its surroundings while retaining the site's unique sense of place, and enhancing the views from, into, and through the site. Emphasis is placed on well-defined public space allowing pedestrians access to the rivers and through the site, with commercial and other activity considered as a way to increase safety and vibrancy.

The most important recommendation from urban design, heritage and environmental perspectives, is the revitalization of the Liesbeek River by removing the concrete canal, reintroducing planted banks and widening its course to create a more natural river-like environment. This is an opportunity to improve its ecology and the surrounding ecosystems, as well as creating a special place for pedestrians to experience the river.

The interpretation of heritage indicators is intended to respect and enhance the major historical and cultural significance of this resource, most notably the Liesbeek River. The experience of this landscape should be made more accessible to the public, and its historical importance made legible. As such, the manner in which buildings are designed and respond to the rehabilitated riverine corridor will be important.

6. DEVELOPMENT PROPOSAL

6.1 General Development Framework

A general development framework for the River Club is illustrated in **Figure 3**. Axonometric views of the development framework are provided in **Figures 36 – 38** overleaf. Sections through the development are illustrated in **Figure 39a** and **Figure39b**.

The River Club will comprise of approximately 150 000m² of mixed-use development, including retail, office, residential (including inclusionary housing), hotel, community and place of instruction. Development will occur in 2 precincts: Precinct 1, located in the southern portion of the site, will contain approximately 65 000m² of mixed-use floor space (office, retail, hotel, community and residential) in buildings of between 2 - 6 storeys; and Precinct 2 in the northern portion of the site will accommodate approximately 85 000m² of office floor, residential and (potentially) place of instruction floor space in buildings of between 5 - 9 storeys. Both precincts will be set upon "super basements"[12] containing parking.

The development proposed at the River Club is made possible by the following:

- Berkley Road extension will ultimately be implemented to link Berkley Road (to the east of the site beyond the Black River) with Liesbeek Parkway / Malta Road (to the west)[13]; and
- Approximately 80 000m² (± 55%) of the site will be raised above the 100-year flood elevation to approximately 7m above mean sea level[14].

Primary access points to the development will be located along the new Berkley Road extension. An additional access point will be established via a link road emanating from Liesbeek Parkway. The right of way access over Remainder Erf 26423 Cape Town will remain in place.

A major feature of the proposal is to rehabilitate the existing canal adjacent to the eastern boundary of the site and implement a riverine buffer of approximately 25 - 40m along its course. This will allow for a visually and ecologically congruent / continuous riverine corridor to be established that will stretch from the lower reaches of the Liesbeek River to the confluence with the Black River adjacent to the River Club site. This intervention will serve to establish a more logical alignment of the lower Liesbeek River in the landscape, whereby it will read as one river system (and not a disconnected alignment as is currently the case).

In order to give maximum effect to the new river alignment it is proposed to infill the degraded old Liesbeek River channel adjacent to the western boundary of the site, leaving a vegetated stormwater swale along its existing course. This will serve to integrate the site with the existing urban landscape to the west (and effectively end the impression of the River Club as an island in

[12] These are not technically basements in terms of the definition of "basement" as contained in the DMS. Refer to footnote 4 on pg. 17.
[13] The River Club proponent is prepared to enter into a services level agreement with the CoCT whereby a portion of the development contribution applicable to the River Club development will be offset against the cost of constructing a portion of one carriageway of this road link up to the primary access point to the development off Berkley Road extension.
[14] This is in keeping with the requirements of the City of Cape Town Floodplain and River Corridor Management Policy (2009).

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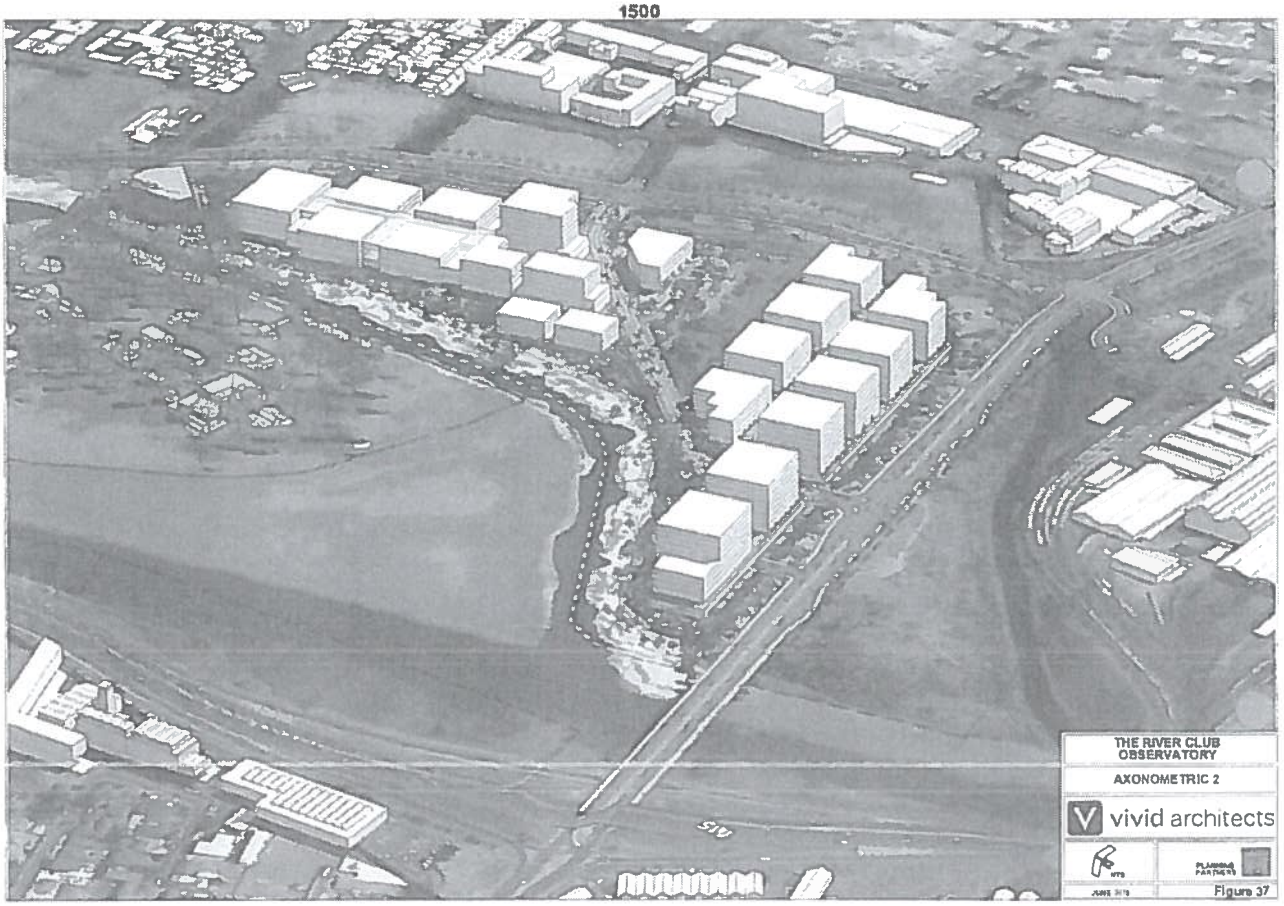
THE RIVER CLUB
OBSERVATORY
AXONOMETRIC 2
vivid architects
Figure 37

1501

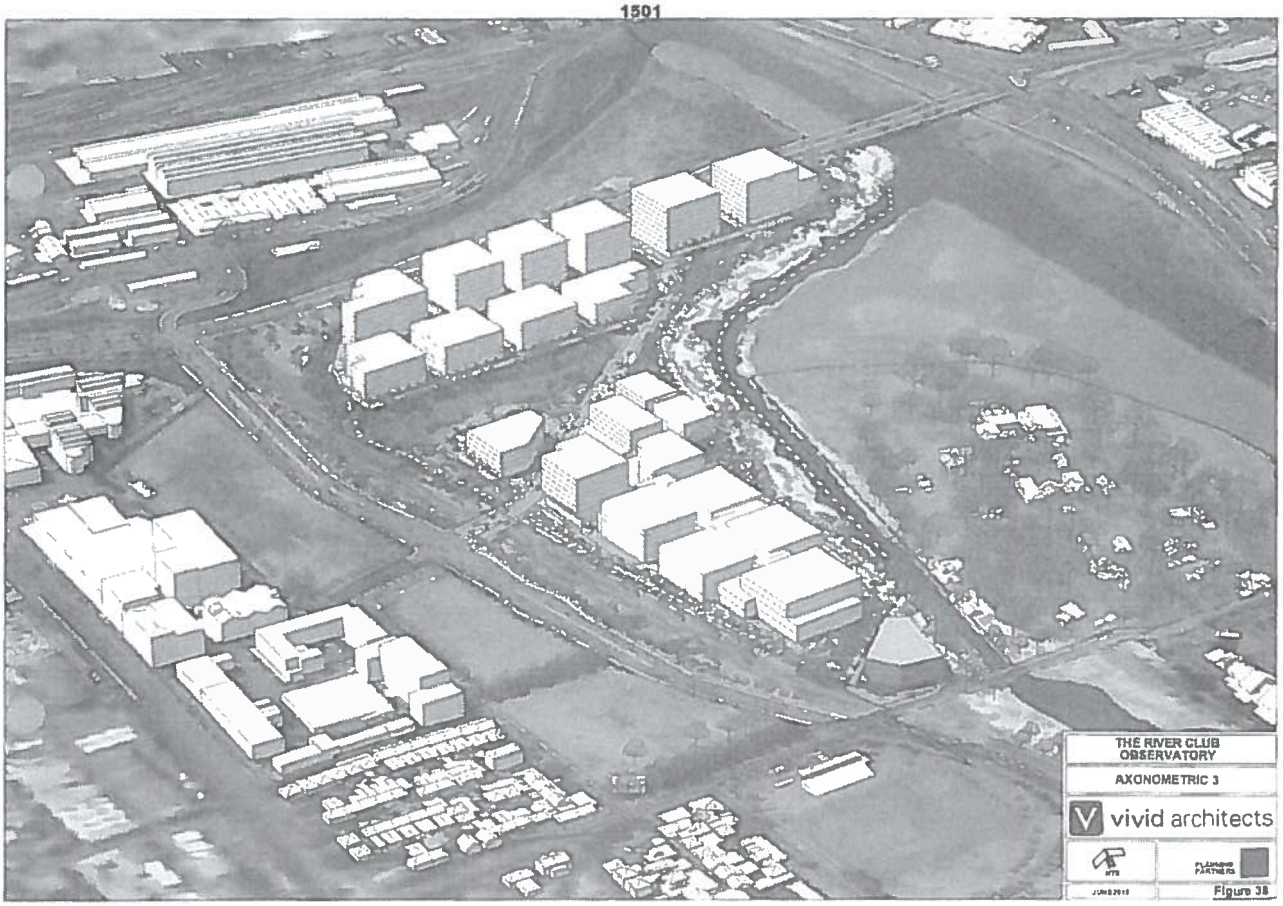
THE RIVER CLUB
OBSERVATORY
AXONOMETRIC 3
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Figure 38

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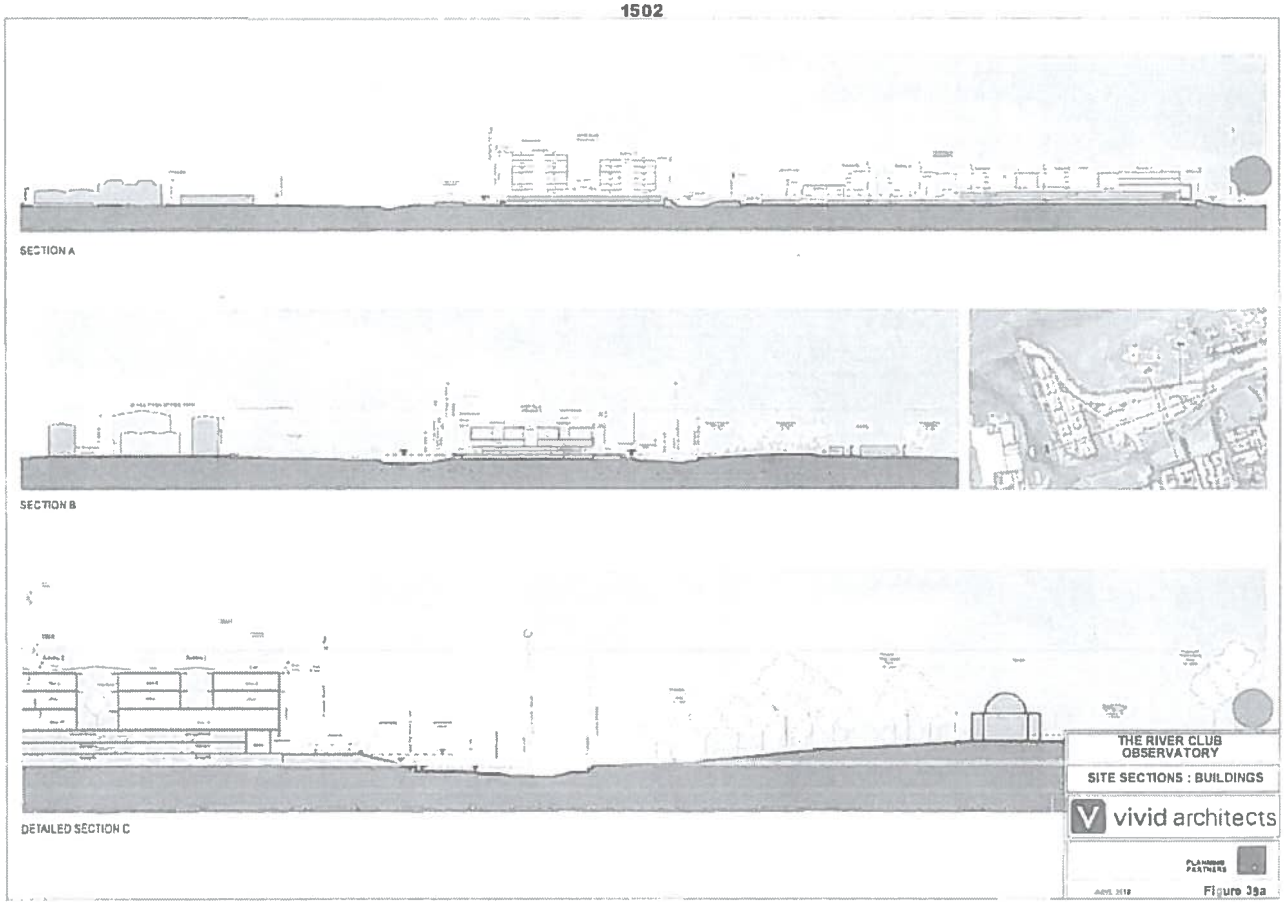
SECTION A
SECTION B
DETAILED SECTION C
THE RIVER CLUB
OBSERVATORY
SITE SECTIONS : BUILDINGS
vivid architects
PLANNING
PARTNERS
Figure 39a

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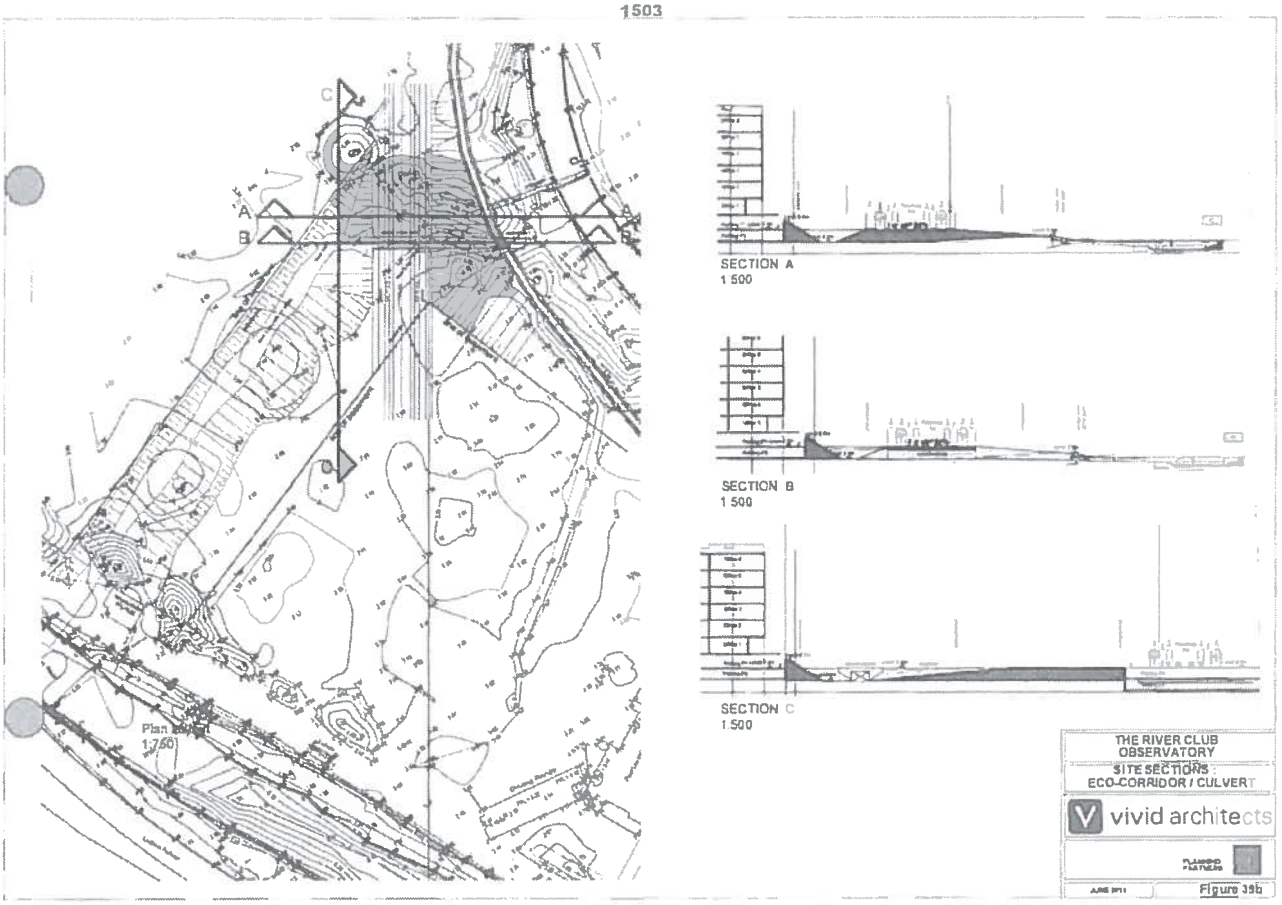


Figure 39b

the landscape). A buffer area of approximately 10 - 20m between the stormwater swale and development is proposed.

The reconfiguration of the river courses as proposed will result in the rehabilitated riverine corridor on the eastern boundary of the site taking on more ecological and recreational significance.

An open space corridor extends across the site in an east-west direction between the development parcels of Precinct 1 and Precinct 2, connecting the rehabilitated riverine corridor (to the east) and the stormwater swale (to the west). This 'eco corridor' will form a 'green link' between the River Club site and the remaining TRUP open space system, and will allow for faunal movement through the River Club site, particularly that of the Western Leopard Toad. This space will also allow for flood attenuation during periods of high rainfall, as well as perform the function of a landscaped public space on the site.

High quality landscaping will be a feature throughout the development, including NMT pathways that will meander throughout the development, including along the river course and in the 'eco-corridor'.

6.2 Development Statistics

6.2.1 Land use

Table 7 below provides a preliminary statistical overview of land use for the developed site.

Table 7: Land use summary

Land Use	Approx. Land Area (m²)	Site %
Mixed use development (including "super-basement"[15] areas)	79 500	54%
Soft open space (including river buffers, eco corridor and parkland)	61 500	41%
Hard open space (including roads and sidewalks)	7 500	5%
Total	148 500	100%

6.2.2 Floor space

The development is planned to accommodate approximately 150 000 m² of floor space across two precincts. This represents a floor factor of approximately 1.0 across the whole site. The breakdown of floor space across the two precincts is provided in **Table 8** overleaf.

[15] Refer to footnote 4 on pg. 17.

Table 8: Use and floor space summary

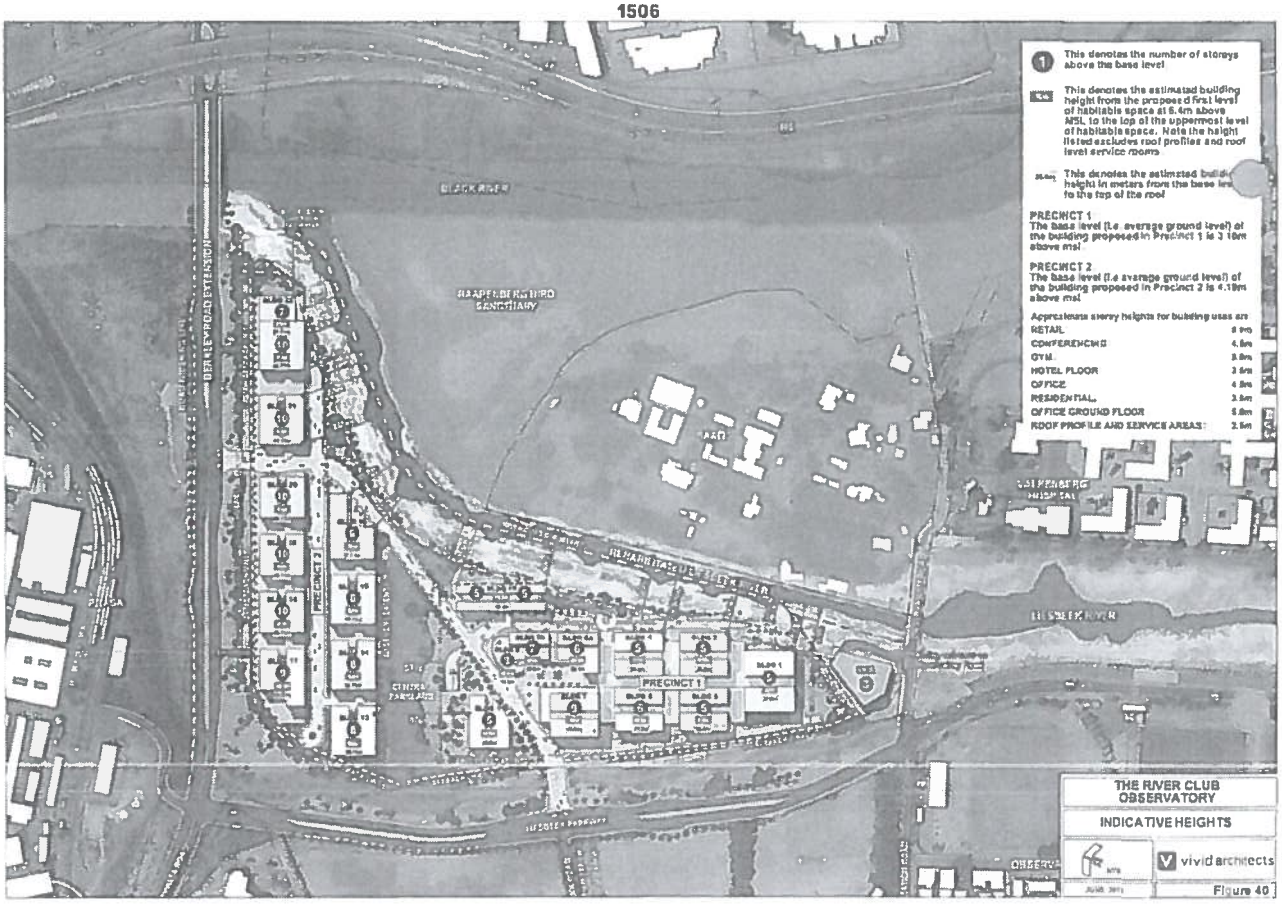
Use	Approx. Floor Space (m²)
Precinct 1	
Retail	15 700
Office	15 100
Restaurant	9 200
Residential	8 400
Hotel	8 200
Gym	4 100
Ancillary	2 100
Conference	1 200
Events Pavilion	1 000
Total	**65 000**
Precinct 2	
Office	44 500
Residential	23 500
Place of Instruction	10 000
Retail	5 000
Ancillary	2 000
Total	**85 000**
Total	**150 000**

6.2.3 Indicative Heights

Indicative heights are shown in **Figure 40** overleaf. Three heights have been shown, *viz.*:

a. Height from 'base level' (i.e. average of the highest and lowest existing ground levels immediately abutting the external elevational plane or wall cutting into the ground of a building) to 'top of roof'. This height is shown in yellow and indicates height as per the requirements of the DMS. Confirmation of 'base level' is provided in **Annexure N**.
b. Height from the base of the first level of habitable space. This height is shown in blue and indicates the approximate height of the buildings in relation to the new ground level to be created at the River Club site.
c. Height in storeys (measured from 'base level' and indicated in black).

Buildings in Precinct 1 range between approx. 16m – 45m in height above base level, with an average height across the precinct of approximately 28m; buildings in Precinct 2 range between approx. 27m – 46m in height above base level, with an average height across the precinct of approximately 40m.


1 This denotes the number of storeys above the base level
This denotes the estimated building height from the proposed first level of habitable space at 5.4m above MSL to the top of the uppermost level of habitable space. Note the height listed excludes roof profiles and roof level service rooms
This denotes the estimated building height in metres from the base level to the top of the roof
PRECINCT 1
The base level (i.e average ground level) of the building proposed in Precinct 1 is 3.18m above msl
PRECINCT 2
The base level (i.e average ground level) of the building proposed in Precinct 2 is 4.18m above msl
Approximate storey heights for building uses are
RETAIL 5.0m
CONFERENCING 4.5m
GYM 3.6m
HOTEL FLOOR 3.6m
OFFICE 4.0m
RESIDENTIAL 3.6m
OFFICE GROUND FLOOR 5.0m
ROOF PROFILE AND SERVICE AREAS 2.5m
BLACK RIVER
RAAPENBERG BIRD SANCTUARY
PRECINCT 1
PRECINCT 2
THE RIVER CLUB OBSERVATORY
INDICATIVE HEIGHTS
vivid architects
Figure 40

It is evident that building heights will be lower in Precinct 1 than in Precinct 2. There are two primary reasons for this: firstly, building heights are lower in Precinct 1 in order to respect the adjacent SAAO; secondly, building heights in Precinct 2 are higher so that they frame and respond to the Berkley Road extension.

6.3 Phasing

Indicative phasing of the development is illustrated in **Figure 41** overleaf. The phasing is described as follows:

Phase 1

- Portion of Berkely Road extension, including connecting bridge over the Black River;
- Diagonal link road between Berkley Road extension and Liesbeek Parkway, including connecting bridge over the 'old' Liesbeek River channel;
- Rehabilitation of the Liesbeek Canal into a riverine corridor, as well as associated landscaping;
- Transformation of the 'old' Liesbeek River channel into a vegetated stormwater channel, as well as associated landscaping; and
- Development of Precinct 1, as shown in **Table 8** above.

Phase 2

- Landscaping of the open space corridor linking the rehabilitated Liesbeek River riverine corridor and the vegetated stormwater swale along the old Liesbeek River channel;
- Development of Precinct 2, as shown in **Table 8** above.

Phase 3

- Implementation of the remaining portion of the Berkley Road extension, including the intersection with Malta Road / Liesbeek Parkway.

6.4 Future Zoning

This application is to rezone the property to *Subdivisional Area*. After approval the bulk infrastructure for Phase 1 of development will be installed and an internal "block subdivision" plan will be prepared. This will involve an application to the Municipality in terms of the MPBL. Once that subdivision has been confirmed, a deemed zoning will apply to the subdivided land units. It is intended for the development areas to have a deemed zoning of *General Business*, but different sub-zones may apply to different precincts / portions of development.

All of the uses listed in **Table 8** above can be accommodated by the *General Business* zone. The specific sub-zonings of the future individual land units will depend on the development parameters envisaged for each specific land unit. For example, land adjacent to the SAAO in Precinct 1 may carry a deemed zoning of GB3 whereas land along Berkley Road extension in Precinct 2 may carry a zoning of up to GB7.

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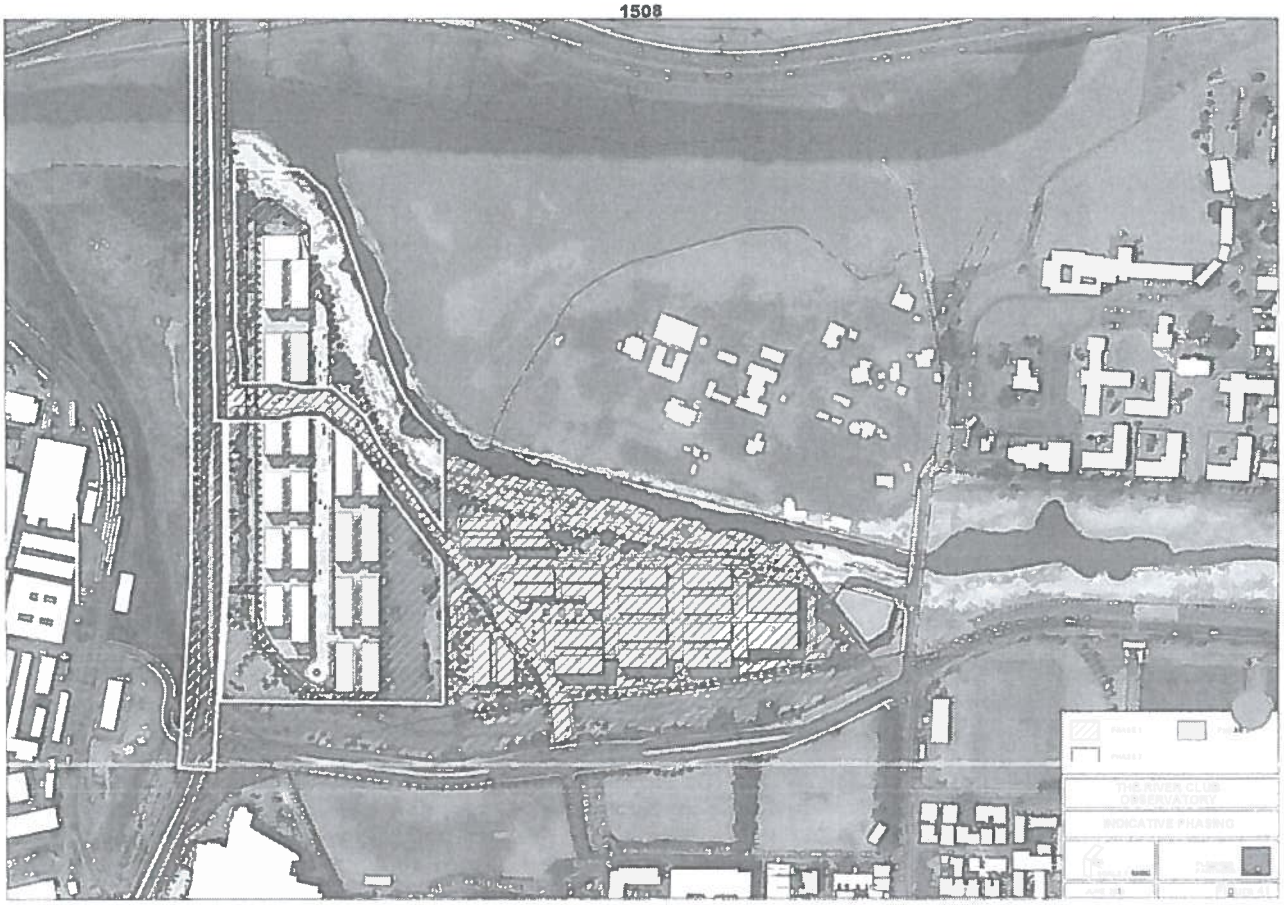

In addition to the General Business zone, other deemed zonings may apply to different parts of the site following future subdivision, such as *Open Space Zoning 3* (to accommodate the river buffers and open space corridor). It is noteworthy that the road system on the property will be private road and not public street (because much of the roads will be located above "basement"[16] parking). A private road is permitted as a primary use in both the *General Business* and *Open Space 3* zones.

6.5 Access

6.5.1 Overview

Access to the River Club is currently gained off Observatory Road via Remainder Erf 26423 (the access road to the River Club traverses this property). However, this property has been earmarked for development and consequently the River Club has had to consider alternative vehicular access options for its own development. Consequently, no vehicular access will be taken via Remainder Erf 26423.

Primary access to the site will occur off the newly constructed Berkley Road extension (via a newly constructed bridge extending over the Black River). There will be three opportunities for access off this road: one major signalised intersection and two left-in, left-out intersections (refer to sub-section 6.5.2 for more information).

A secondary access point is proposed via a new culvert crossing the vegetated stormwater swale (i.e. in lieu of 'old' Liesbeek River channel) from Liesbeek Parkway (opposite Link Road).

More information regarding the proposed access positions is contained in sub-section 8.2.

The river crossings (i.e. the bridge over Black River and the culverts over the 'old' Liesbeek River channel) have been designed by the civil engineering team at Aurecon, and have been given specific design attention in respect to stormwater hydrology and ecological requirements. More details regarding the design specifications of the bridge / culvert structures is available on request.

6.5.2 Road Upgrades in the Vicinity of the Site

Background: Berkley Road extension

Berkley Road extension was originally indicated as a Proclaimed Main Road (MR149), in terms of the Roads Ordinance 1949 (Ordinance 12 of 1949), in Provincial Gazette 385 of 1968 (i.e. item 27 in an extract of the Provincial Gazette attached as **Annexure O**).The Berkley Road extension has since appeared on the CoCT's Road Network Plan on numerous occasions, including that adopted in 1997 (refer to **Annexure P**), as well as the latest version published in the Comprehensive Integrated Transport Plan (CITP) 2018 – 2023 (refer to *Figure 3.14: Public right of way road network classification* contained in the CTIP, as well as an extract provided in **Figure 12**).

[16] Refer to footnote 4 on pg. 17.

The Berkley Road extension falls on Remainder Erf 15326 Cape Town, which is owned by the City of Cape Town (as per title deed T28883/1988). The portion of Remainder Erf 15326 Cape Town identified to accommodate Berkley Road extension has a split zoning of Transport Zone 2 (TR2), Community Zone 1: Local (CO1) and Open Space 2: Public Open Space (OS2) (refer to **Figure 6**).

Implementation

Final details regarding the implementation of road upgrades in the vicinity of the site, including Berkley Road extension, are still to finalized (this is largely owing to negotiations regarding cost offsets in relation to development contributions). However, it is anticipated that the road upgrades will be implemented as follows:

a. Phase 1

- Construction of half Berkley Road extension (i.e. servicing only the River Club), including bridge over Black River and 2 lanes (i.e. one lane in each direction);
- Intersection upgrades to the following intersections:
  - Berkley Road / M5;
  - Station Road / Liesbeek Parkway;
  - Link Road / Liesbeek Parkway; and
- Widening of Liesbeek Parkway adjacent to the River Club site.

These upgrades are conceptually illustrated in **Figure 42a** overleaf. [Note that the alignment of this phase of Berkley Road extension corresponds with the area zoned TR2 in **Figure 6**].

Figure 42a: Conceptual Phase 1 upgrades of the road network in the vicinity of the site (Source: Aurecon)

b. Phase 2

- Construction of full Berkley Road extension (i.e. linking Berkley Road and Malta Road), including bridge over Black River and culvert over 'old' Liesbeek River channel, with 2 lanes (i.e. one lane in each direction);
- Upgrade and optimization of Malta Road / Liesbeek Parkway / Berkley Road extension intersection; and
- Further widening of Liesbeek Parkway adjacent to the River Club site.

These upgrades are conceptually illustrated in **Figure 42b** overleaf. [Note that the preliminary alignment of this portion Berkley Road extension (i.e. towards Malta Road) does not correspond with the area zoned TR2 in **Figure 6**, and therefore it will be necessary to go through a rezoning application to facilitate the construction of this portion of road].

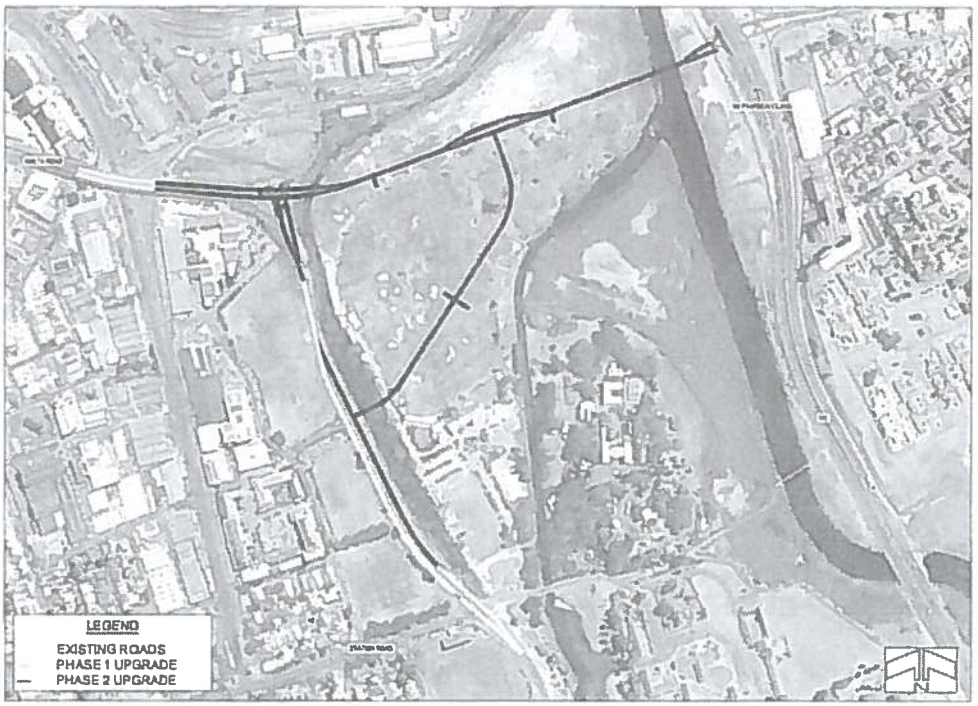

Figure 42b: Conceptual Phase 2 upgrades of the road network in the vicinity of the site (Source: Aurecon)

c. Phase 3

- Construction of full Berkley Road extension (i.e. linking Berkley Road and Malta Road), including bridge over Black River and culvert over 'old' Liesbeek River channel, with 4 lanes (i.e. two lanes in each direction); and
- Further widening of Liesbeek Parkway adjacent to the River Club site, as well as widening of this road between the Station Road intersection and the N2 intersection.

These upgrades are conceptually illustrated in **Figure 42c** overleaf. [Note that the preliminary alignment of this portion Berkley Road extension (i.e. towards Malta Road) does not correspond with the area zoned TR2 in **Figure 6**, and therefore it will be necessary to go through a rezoning application to facilitate the construction of this portion of road].

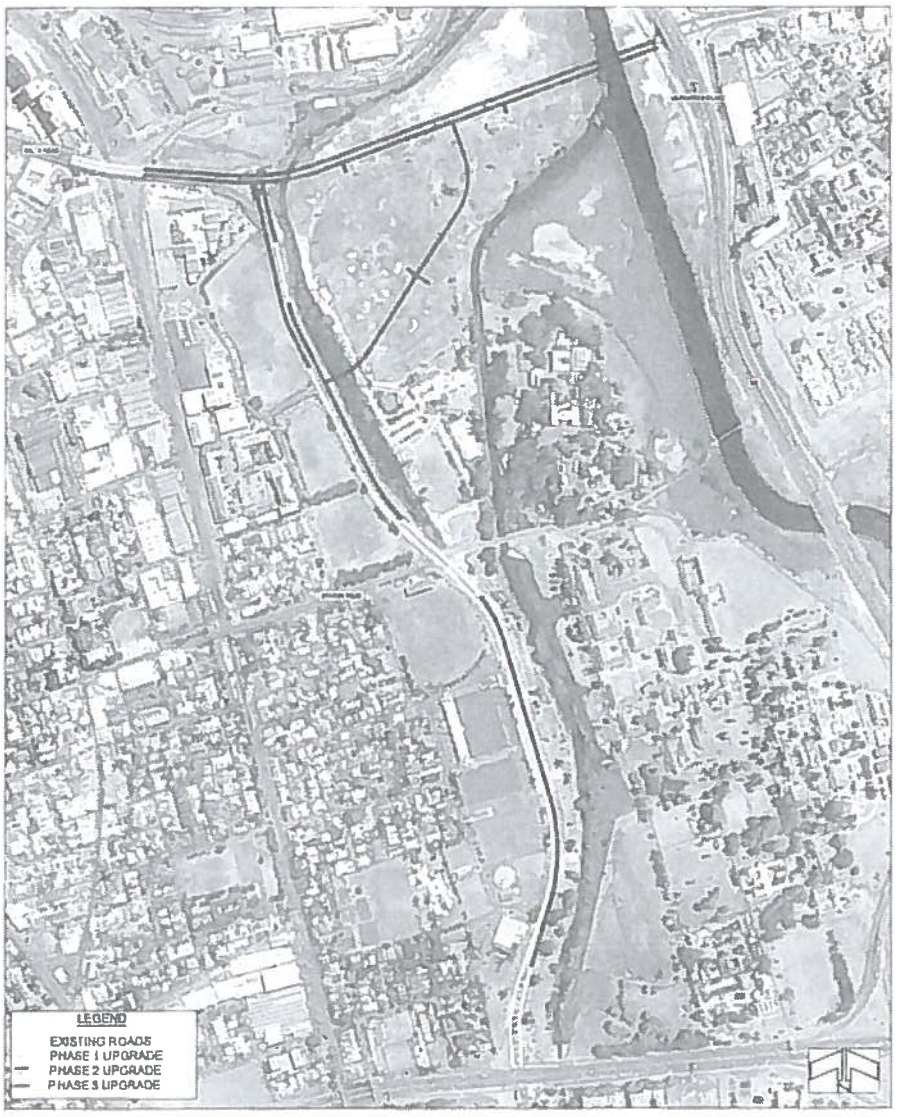

Figure 42b: Conceptual Phase 3 upgrades of the road network in the vicinity of the site (Source: Aurecon)

More information relating to road upgrades is provided in section 8.

6.6 Architecture

The overall design aesthetic will be contemporary. Building forms, scale and finishes will take cues from buildings surrounding the site (e.g. Black River Park).

The design intent behind the massing of Precinct 1 is to fragment the development into a collection of individual building components, with the aim of creating a varied but harmonious streetscape. Building facades and forms will be articulated, varied in scale, form and finish in order to avoid any extensive monotonous facades. Precinct 1 will contain a significant retail element but will not be a typical shopping centre arrangement. Rather, a collection of buildings will form around a central pedestrianised street, with retail positioned on the ground floor and offices on the levels above. Portions of the pedestrianised street will be covered by an extensive glass roof. This is required in order to create a sustainable retail trading environment all year round. In essence, the glass covered pedestrian street will form a galleria. Additional retail is located around an urban square at the intersection with the main public street thoroughfare, as well as along perimeter roads.

The massing of Precinct 2 positions individual buildings either side of a central, landscaped boulevard above the parking podium level. The buildings will vary in height to emphasise gateways and significant locations. The final form of the buildings in Precinct 2 will be driven by market demand, however it is anticipated that buildings located along the Berkley Road extension will be taller than others in this precinct and will form a prominent street scape. The buildings facing onto the open parkland between the two precincts will be well articulated in order to present a pleasant façade overlooking this open space.

It is anticipated that parking in both Precinct 1 and Precinct 2 will be provided on two levels, one level as a "semi-basement" structure[17] (i.e. will protrude more than 1.5m above existing ground level) and the second in the form of a parking podium. Due to the shallow groundwater table and poor founding conditions on the site, deep excavations will be avoided where the underlying bedrock is deep below the existing ground level and the water table. Therefore, where the rock is deep, "basement" structures[18] would be constructed on grade with fill placed around them. Where the bedrock is at relatively shallow depth (e.g. on the southern portion of the site) consideration will be given to constructing one basement level below the existing ground level[19]. This would entail taking foundations and perimeter walls down to the underlying rock levels. Alternatively, the same procedure can be followed as for basements where the underlying bedrock is deep. The podium level of parking is intended to be screened by landscaped berms to minimize the extent of the parking structures visible to pedestrians at street level.

The prevailing market means that the provision of parking for the development is a necessity. However, this may not always be the case and so the parking levels will be designed in such a way so as to allow for the conversion into other uses (e.g. office, storage etc.) as and when the demand for parking begins to decline.

Sustainable design principles will be incorporated where possible, including renewable energy generation, grey water harvesting, water recycling and energy efficient technology.

[17] Semi-basement structure son this site will actually technically be at first floor level. Refer to footnote 4 on pg. 17.
[18] Refer to footnote 4 on pg. 17.
[19] This is subject to further geotechnical and engineering review.

6.7 Landscape Architecture

6.7.1 Landscape Concept

The River Club site as a whole comprises a highly disturbed site. Nevertheless, the site does provide opportunities to rehabilitate the river edges and retain connectivity into the wider open space system. Rehabilitation of the river edges and connectivity were thus used as the basis for the landscape philosophy for the site, which is essentially to enhance public access and amenity in relation to the water features, in particular the rehabilitated Liesbeek Canal and the Raapenberg Wetland.

The Landscape Concept is shown in **Figure 43** overleaf, with the following features being noteworthy:

- The existing Liesbeek Canal will be rehabilitated into a functional river channel. The eastern side (i.e. the SAAO bank) will be edged with gabions (but allowing for plant establishment). The western bank will grade gently up from the river channel and be vegetated with a range of indigenous wetland plant species. An ecological buffer area of minimum 15m extending to 40 m has been allowed upslope from the 1:1 year floodline associated with this river channel.

  The old Liesbeek channel will be transformed into system of vegetated stormwater swale wetlands (<300mm deep), with the swale discharging into the extant remaining channel downstream of the site. These small wetlands will be seasonally inundated for short periods of time, however allowance will be made for the creation of occasional weirs in the swales to allow longer term ponding of water so as to create improved wetland habitat for aquatic insects and other fauna, and additional lined deepwater ponds in the area have been recommended as essential mitigation measures, to provide breeding habitat for western leopard toads. Appropriate indigenous wetland plant species will be utilised in the vegetated stormwater swale. A minimum setback of 10m from the swale will be implemented as an ecological buffer.

- Both the rehabilitated riverine corridor and the vegetated stormwater swale will be lined with gabion walls (at the edge of the ecological setback) that step up to a cyclist / pedestrian pathway. The gabion wall is intended to restrict the passage of fauna such as Western Leopard Toads out of the ecological buffer areas and into the development area.

- A landscaped public space lies between Precinct 1 and Precinct 2. Besides being an area of high landscape quality, this area will also act as an 'ecological corridor' that provides connectivty between the rehabilitated riverine corridor / Raapenberg Wetland / Black River and the vegetated stormwater swale. This area will include wide swathes of indigenous planted vegetation that ensure continuous vertical cover along the length of the corridor, allowing connectivity between the rehabilitated Liesbeek Canal and the vegetated swales. Well-spaced, multiple culverts under the planned road across the corridor would ensure corridor function.

1516

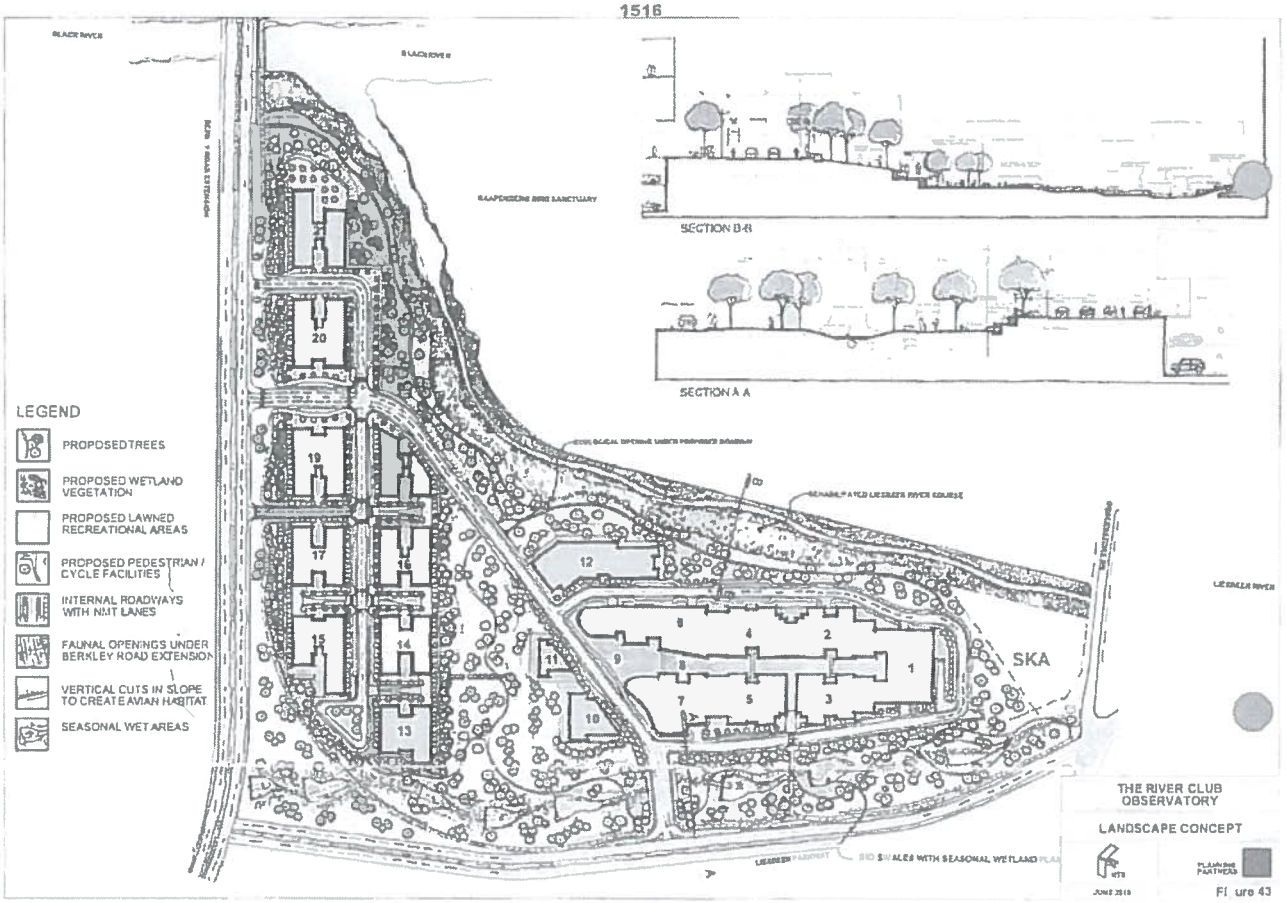

Figure 43

- Cyclist / pedestrian pathways will be a feature throughout the development and will provide access and amenity. The pathways are envisaged as either paved or laterite (gravel) at the same level as the surrounding ground.

- Generous tree planting is anticipated, which will not only provide aesthetic appeal, but will help to reduce the scale of the buildings for pedestrians at ground level and will also provide shade.

- A largely indigenous plant / lawn palette will be chosen and included in the Landscape Guidelines to be submitted with the Landscape Masterplan at a future stage of the development approval process.

6.7.2 Maintenance

The irrigation and soft landscape installation of all common areas will be carried out by the developer and will form part of the infrastructure development of the site. Alternative sources of irrigation will be sought (e.g. borehole water).

Once the construction phase of the development is completed, maintenance of all internal road verge landscaping will fall under the responsibility of the developer or POA (as applicable).

6.8 Environmental Management

SRK has been appointed by the developer to compile an Environmental Management Program (EMPr), which is a legal requirement in terms of Section 24N of NEMA. It describes environmental management measures and mitigation to limit environmental impacts on the site and includes specifications for planning / design, construction, operational and decommissioning phases of the project. The EMPr, which will be submitted to DEA&DP for consideration in due course, is intended for use by the developer, his principal agents and contractors during construction, the subsequent property owners / management agents and the DEA&DP. The Construction Phase Environmental Management Plan (CEMP) and the Operational Phase Environmental Management Plan (OEMP) are both contained within the EMPr and are particularly pertinent to the proposal presented.

a. Construction Phase Environmental Management Plan (CEMP)

The CEMP section of the EMPr will describe mitigation measures and identify specific people or organisations to undertake specific tasks, in order to ensure that impacts on the environment are minimised during the construction phase of the project. The CEMP will be applicable to all construction works comprising the development of this project, including works outside of the site boundaries that form part of the project works. The CEMPr will include specific input from biodiversity specialists regarding the details of construction phase mitigation, and will draw on essential mitigation and additional (essential) authorisation measures included in the biodiversity and other specialist reports.

The management specifications applicable to the construction phase of the development will include, *inter alia*, the following:

- Site Establishment;
- Site clearance, bulk earthworks and blasting;
- Restriction of working areas and protection of sensitive areas;
- Housekeeping and waste management;
- Water use;
- Stormwater management and erosion control;
- Dust control;
- Materials transport, storage and traffic management;
- Hazardous material handling and storage;
- Landscaping requirements;
- Wildlife on site;
- Noise and nuisance control;
- Fire preparedness and response;
- Emergency management; and
- Site cleanup and rehabilitation.

The developer shall appoint an Environmental Site Manager (ESM) who will fulfil the role of Environmental Control Officer (ECO). The ESM will monitor and facilitate compliance with the CEMP and other conditions of approval as they relate to environmental matters. All identified responsible parties are expected to co-operate closely to minimise or avoid unnecessary environmental impacts.

The key role-players during the construction phase of the development, for the purposes of environmental management on site will include, but are not limited to: the developer, the principal agents for civil and building works respectively, the landscape architect, the principal contractors (direct appointments including civil works contractor, building contractor, landscaping contractor etc), the ESM and representatives of the relevant Authority/ies.

b. Operational Phase Environment Management Plan (OEMP)

The OEMP will describe mitigation measures and identify specific people or organisations to undertake specific tasks, in order to ensure that impacts on the environment are minimised during the operational stage of the development. The requirements contained in the OEMP will come into effect simultaneously with completion of the development. The OEMP will be updated once the development has been completed, so as to include detailed, practical guidelines as to how to achieve the over-arching requirements of the OEMP. This document would be informed by detailed input from the biodiversity and other appropriate specialists.

7. ENGINEERING SERVICES

7.1 Overview

A civil engineering services report, including a conceptual stormwater management plan, has been compiled by Aurecon and is attached as **Annexure Q**. A report outlining electrical services has been prepared by Selkirk & Selkirk Electrical Engineers and is attached as **Annexure R**.

The site is situated in an existing urban area with full municipal utility services and can be connected to these services at the developer's cost. A summary of each of the utility services is provided below.

7.2 Water

7.2.1 Existing Bulk Infrastructure

The site falls within the Molteno Reservoir area of supply. From this reservoir, there is an existing 450mm dia. main located in Liesbeek Parkway which supplies water to the larger Observatory area and surrounds. The River Club, SAAO and the Valkenberg Hospital complex are all currently supplied by a 110mm dia. main which branches off from this 450mm dia. main.

7.2.2 Demand

The AADD (Average Annual Daily Demand) for the development is estimated at 876 kl/day which equates to an instantaneous demand of 10.14 l/s. The peak instantaneous demand is 40.7 l/s and when considering the firefighting flow the total peak demand increases and is calculated as 90.7 l/s. The findings are summarized in **Table 9** below.

Table 9: Potable water demand – net additional demand

Description	Unit	Amount
Annual Average Daily Demand (AADD)	kl/day	876
Instantaneous Demand	l/s	10.14
Peak Factor	-	4
Peak Instantaneous Demand	l/s	40.7
Allowance for Fire Flow	l/s	50
Peak Flow	l/s	90.7

7.2.3 Proposed Bulk Infrastructure

No bulk infrastructure upgrades (inclusive of storage, treatment or conveyance) are required to service the development and the potable water supply can be drawn from the existing 450mm dia. main located within Liesbeek Parkway.

7.2.4 Proposed Link Infrastructure

A new connection to the existing bulk main and link potable main to the site boundary is required. Based on the peak flow of 90.7 l/s, a 200mm dia. connection is anticipated to be adequate to service the development. This indicative size is based on the assumption of a minimum velocity of at least 0.7m/s being available at the point of connection. The size of the connection can only be confirmed once the flow and pressure at the tie in point can be ascertained and the remainder of the network modelled.

A bulk metered connection, in accordance with municipal standards, is to be provided at a suitable point near the entrance to the development.

7.2.5 Proposed Internal Infrastructure

Preliminary estimates indicate that a network comprising of 200mm and 150mm dia. pipelines would be sufficient to service the development. However, this can only be confirmed upon detailed modelling and the confirmation of fire flow requirement to buildings. The network will be designed to supply domestic and fire-fighting demand, whilst maintaining the necessary pressures and velocities as prescribed by the CoCT.

7.2.6 Strategies for Reduction of Potable Water Uses

a. Green buildings

One of the strategies to reduce the demand for potable water is to implement a Green Star rating for specific building types. Office buildings have been potentially earmarked and will as far as possible be earmarked for 4 or 5-star ratings. In addition, efficient water fixtures will be utilized in line with the CoCT bylaws and requirements and alternatives sources to potable water will be used for uses like irrigation.

b. Water re-use

In terms of the water re-use and the conservation of a non-renewable resource, the following has relevance:

- The abstraction of surface and/or groundwater to reduce the demand for potable water is being considered.
- As per correspondence received from CoCT Water Demand Management & Strategy Department, no onsite treatment of wastewater will be permitted and thus treatment of wastewater is not being pursued, however smaller scale opportunities for greywater recycling will be considered.
- The possibility of supply from the CoCT's Treated Sewer Effluent Network (which is currently being expanded) was explored. There are however concerns that using treated effluent for irrigation may comprise river health due to the close proximity to the water courses.