Client

Hartenbos Hills Propco (Pty) Ltd

ERF 3122, HARTENBOS HEUWELS RESIDENTIAL DEVELOPMENT

SCOPING ASSESSMENT OF FRESHWATER ECOSYSTEMS

DRAFT FOR COMMENT

Submitted to

Cape EAPrac (Pty) Ltd

Prepared by

Freshwater Consulting

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DECLARATION OF SPECIALIST INDEPENDENCE

I, Justine Ewart-Smith, as a partner of Freshwater Consulting cc hereby confirm my independence as a specialist and declare that I do not have any interest, be it business, financial, personal or other, in any proposed activity of the client and their consultants. All the opinions expressed in this document are my own, based on professional judgement.

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STATEMENT OF COMPETENCE

Title: Dr

Position: Member and freshwater ecological specialist at Freshwater Consulting cc

Qualification(s): BSc, BSc Hons, MSc, PhD (zoology – freshwater ecosystems)

Experience: 22 years in freshwater ecosystems

Experience in study area: Freshwater specialist on a number of assessments in the Southern Cape Region, including both river and wetland assessments within the Gouritz Catchment within the vicinity of the site and the broader catchment as a whole.

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1 INTRODUCTION

1.1 Background

Hartenbos Hills Propco (Pty) Ltd proposes to develop ERF 3122 (Hartenbos Heuwels) as a residential estate, which would be known as Hartenbos Garden Estate. Cape EAPrac are currently overseeing the environmental authorisation process which includes three phases. Phase 1, the Constraints (Sensitivity) Analysis was undertaken in 2017, during which Freshwater Consulting cc identified a number of freshwater ecosystems within the study area. These were evaluated in terms of their Ecological Condition and Ecological Importance and Sensitivity, which informed recommendations for development of a layout plan for the site. A preferred development layout plan was compiled in late 2017 and the project thus entered the Scoping Phase (phase 2) of the Environmental Authorisation process. In March 2018, a proposed development layout plan was assessed relative to the no-go alternative as the basis for further assessment of potential impacts from a freshwater ecological perspective.

Subsequent to the initial Scoping Assessment in 2018, a new development layout plan was compiled in December 2020 and an updated Services Report was submitted in June 2021 (LJR Civil 2021). This report therefore includes an assessment of the proposed new development layout plan with consideration of changes to Stormwater Management and the Sewer Network Layout Plan included in the Services Report (LJR Civil 2021). This report is therefore an updated version of the initial Scoping Freshwater Report submitted in March 2018.

1.2 Terms of Reference

In terms of the Scoping Study, Freshwater Consulting cc were contracted to:

1. Review the Botanical and Faunal Constraints Analysis and liaise with the respective specialist to ensure an integrated approach to the baseline / scoping report;
2. Overlay the draft layout onto the freshwater sensitivity map and submit comments on where the layout does not conform to the sensitivity map;
3. Consider the amended/revised layout if necessary and submit comment on changes made to accommodate the freshwater constraints;
4. Evaluate the No-Go and development alternative (inclusive of access routes and bulk service plans) and motivate for the determination of the preferred alternative from a freshwater ecological perspective;
5. Identify any reasonable/feasible alternative that should be considered;
6. Identify remaining direct, indirect as well as cumulative impacts/issues/concerns (positive as well as negative) that may require further amendments to the layouts, or specify the necessary mitigation measures necessary to reduce impact significance;
7. Consider the development proposal in terms of its regional as well as local impact;
8. Compile a draft Scoping Freshwater Report with Terms of Reference for the detailed Impact Assessment;
9. Record recommendations for further mitigation if necessary;

10. Ensure that the Scoping Report complies with the relevant regulations / guidelines for the management or protection of freshwater ecosystems;
11. Engage with the relevant Authorities regarding the findings of the scoping report to ensure that their input/advice is accommodated as part of the Scoping Report;
12. Compile a PowerPoint presentation for presentation to the Project Team detailing the findings and recommendations of the Freshwater Scoping Report;
13. Review and respond to submissions / comments received from stakeholders and I&APs in response to the Freshwater Scoping Report;
14. Update the Freshwater Scoping Report from draft to final for inclusion with the overall Final Scoping Report;
15. Participate in scoping meetings with the public and/or authorities

The first three of these items were completed towards the end of 2017, resulting in several iterations of the draft layout plan that culminated in a single initial layout plan. That layout plan was a product of specialist inputs with recommendations and suggestions to minimise impacts as far as possible, particularly with regards to minimizing encroachment into sensitive areas. The boundary of the new layout plan produced in December 2020 does not differ from that of the initial proposed layout, although various configurations, including changes to the location of stormwater outlets, have changed in the updated development proposal for consideration in this report.

1.3 Use of this Report

This report reflects the professional judgement of its author. It is Freshwater Consulting's policy that the full and unedited contents thereof should be presented to the client and included in any application to relevant authorities. Any summary of the findings should only be produced with the approval of the author.

1.4 Definitions

According to the National Water Act (36 of 1998) wetlands are areas: "...where the water table is usually at or near the surface, or the land is periodically covered with shallow water, and which land in normal circumstances supports or would support vegetation typically adapted for life in saturated soil." Essentially, this means that wetlands are areas where water is the primary driving force. Therefore, wetlands develop in areas where water is present for prolonged periods of time but soils are saturated or inundated with water for varying lengths of time and at different frequencies.

- Many wetlands also comply with the National Water Act (NWA) (Act 36 of 1998)'s definition of a ***"watercourse", namely*** -

  (a) a river or spring;

  (b) a natural channel in which water flows regularly or intermittently;

  (c) a wetland, lake or dam into which, or from which, water flows; and

  (d) any collection of water which the Minister may, by notice in the Gazette, declare to be a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks;

1.5 Assumptions and limitations

The site was visited in August 2017 following an extended dry period and during one of the most severe droughts experienced by the Western Cape in recent history. Many of the wetland and riparian vegetation species were therefore dead and thus difficult to use as indicators for the delineation of wetlands and watercourses. Nevertheless, it is Freshwater Consulting's option that these issues did not significantly affect our ability to address the objectives outlined above.

1.6 The study area

The proposed Hartenbos Garden Estate comprises a single property, Erf 3122 (Figure 1) in an area known as Hartenbos Heuwels. It is situated on the low hills to the west of the town of Hartenbos within the Mosselbay Municipal Area, about 1.5 km west of the N2 highway. Erf 3122 is currently zoned for agriculture, although the study area and immediate surrounds are largely natural but with some evidence of historic farming activities to the west of the dirt road that traverses the site from north to south.

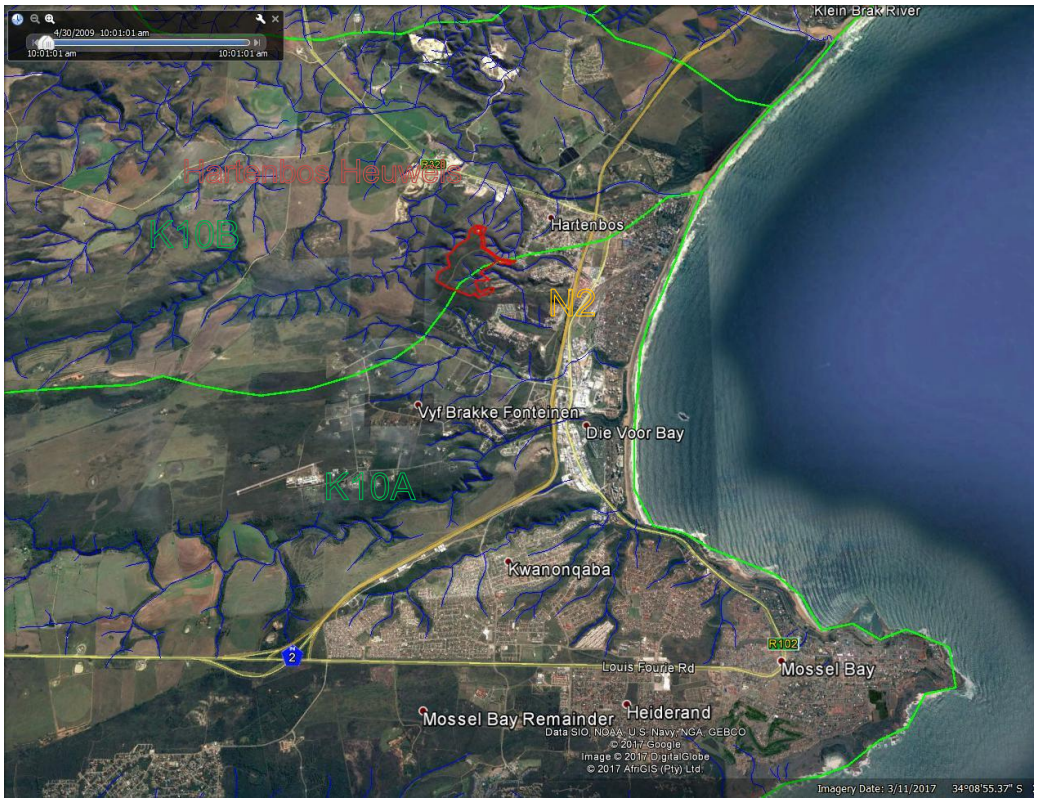

Figure 1 **The study area, Hartenbos Heuwels (Erf 3122) is situated to the west of Hartenbos and straddles two quaternary catchments within the Breede-Gouritz Water Management Area (WMA).**

2 IDENTIFICATION AND DESCRIPTION OF FRESHWATER ECOSYSTEMS

2.1 Regional context

Hartenbos Heuwels is situated within the Breede-Gouritz Water Management Area (WMA) and straddles two quaternary catchments, namely K10B and K10A (Figure 1). It therefore lies on the watershed between these two catchments which drain to the north and west (K10B) forming ephemeral watercourses beyond the study area that enter the Hartenbos River system, as well as to the south and east (K10A) via a series of ephemeral channels within the study area. These drain into the stormwater system of Bay View east of the N2.

The site falls within the Southern Coastal Belt Ecoregion which is described by Kleynhans *et al*. (2005) as an area of hills and mountains with moderate to high relief and surrounding plains varying in altitude from sea level to 700 MASL. The natural vegetation of the site is described in Helme (2012) as Mossel Bay Shale Renosterveld which is listed as a threatened vegetation type.

Figure 2 indicates that two NFEPA priority wetlands occur within the study area. According to the NFEPA data, both these wetlands are classified as natural wetland flats and considered either in good condition (Class AB) or moderately modified (Class C). Both wetlands form part of a significant wetland cluster (Box 1).

Box 1: NFEPA wetland clusters:

Wetland clusters include wetlands that are embedded in a relatively natural landscape such that fauna can disperse and migrate among several different wetlands. These systems and the processes they support are threatened by fragmentation due to transformation of the landscape surrounding individual wetlands. Therefore one of the goals of NFEPA is to ensure protection of wetland clusters within specific vegetation types through management of these areas in a manner that supports connectively between wetlands within these clusters to promote dispersal and maintain their condition (Nel *et al*. 2011).

The 2017 Western Cape Biodiversity Spatial Plan (WCBSP) identifies the two NFEPA wetlands as Critical Biodiversity Areas (CBAs) (Figure 3). In particular, these aquatic habitats are rated as CBA1 areas because of their relatively natural condition. According to the land use guidelines described in the WCBSP handbook (Pool-Stanvliet *et al.* 2017), the desired management objective for CBA1 wetlands is to maintain them "in a natural or near-nature state with no further loss of natural habitat. Degraded areas should be rehabilitated". The guidelines indicate further that "only low-impact, diversity-sensitive land uses are appropriate" (Pool-Standvliet *et al.* 2017). Despite the identification of several ephemeral streams in and surrounding the study area as CBAs in 2014, none of these were identified as CBAs in the most recent (2017) WCBSP.

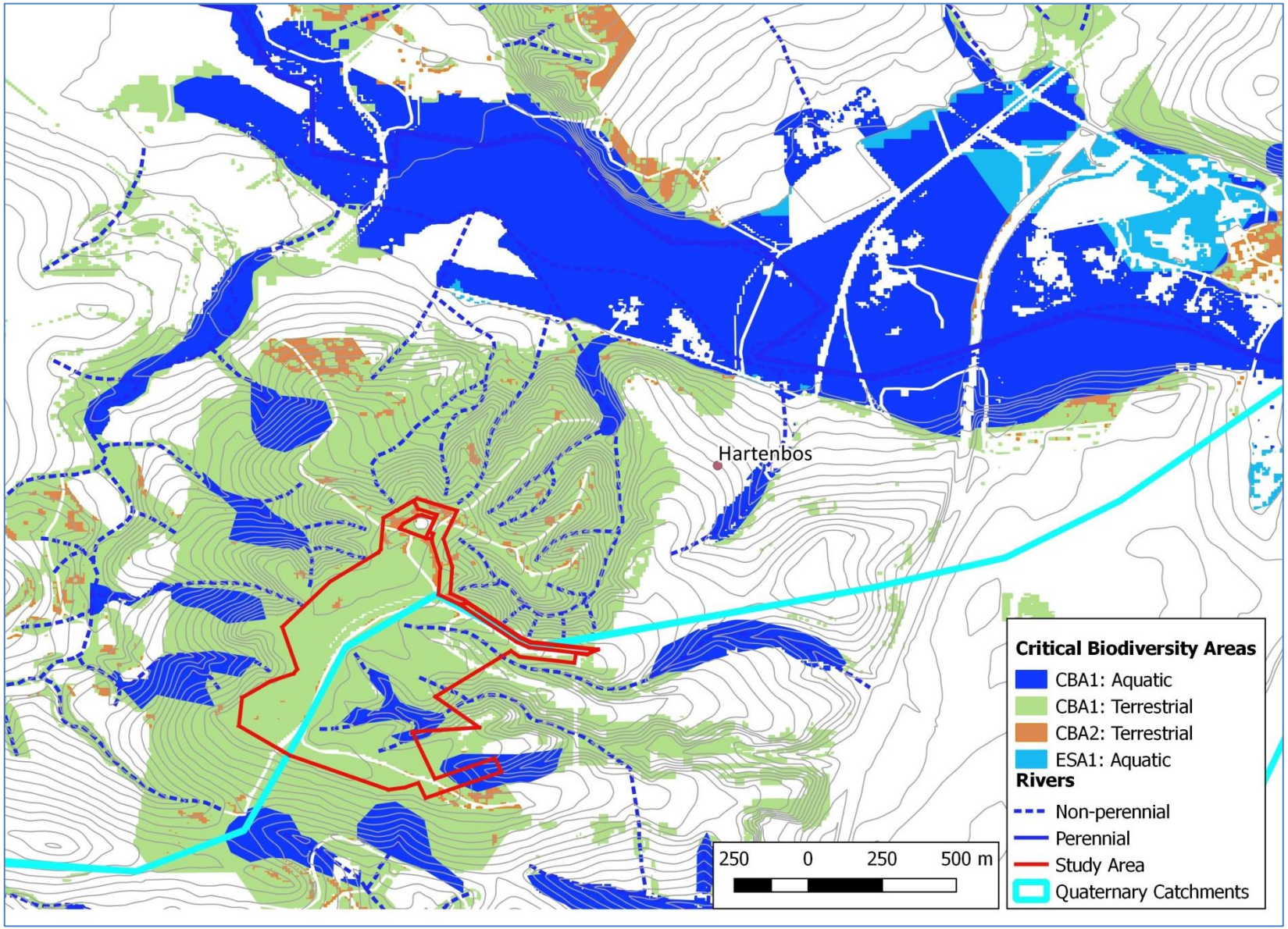

Figure 2 **NFEPA wetlands for the Hartenbos area showing priority wetlands located within the study area.**

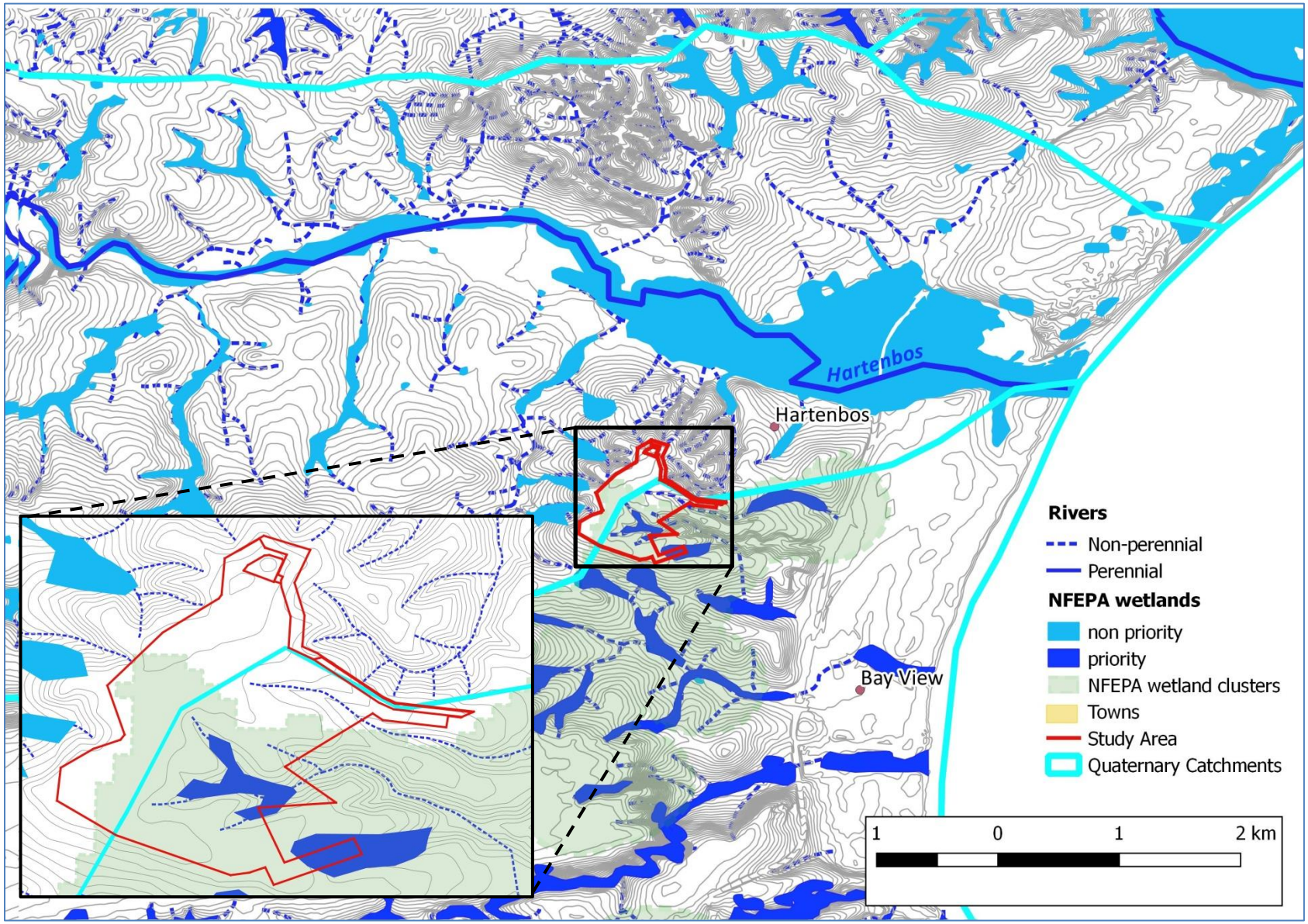

Figure 3 **Critical Biodiversity Areas for the Hartenbos area showing aquatic CBA1's located within the study area.**

3 DESCRIPTION OF WETLANDS AND WATERCOURSES WITHIN AND SURROUNDING THE STUDY AREA

3.1 Wetlands identified and evaluated during the sensitivity analysis

Erf 3122 was visited in early August 2017. Six wetland habitats were identified and delineated within the study area based on vegetation and soil indicators (Figure 4). All six were classified as seep wetlands feeding downstream water courses typical of hillslopes of the region. Considering that Erf 3122 is situated on a hilltop, numerous watercourses immediately beyond the study area boundary were also identified as areas of potential concern for development within the study area.

All freshwater ecosystems within and surrounding the study area were assessed in terms of their ecological condition, importance and sensitivity. The approach to the assessment is given in detail in the Constraints Analysis report (Ewart-Smith 2017).

The key characteristics, condition, importance and existing impacts of the six seep wetlands are summarised from Ewart-Smith (2017) and given in Table 1.

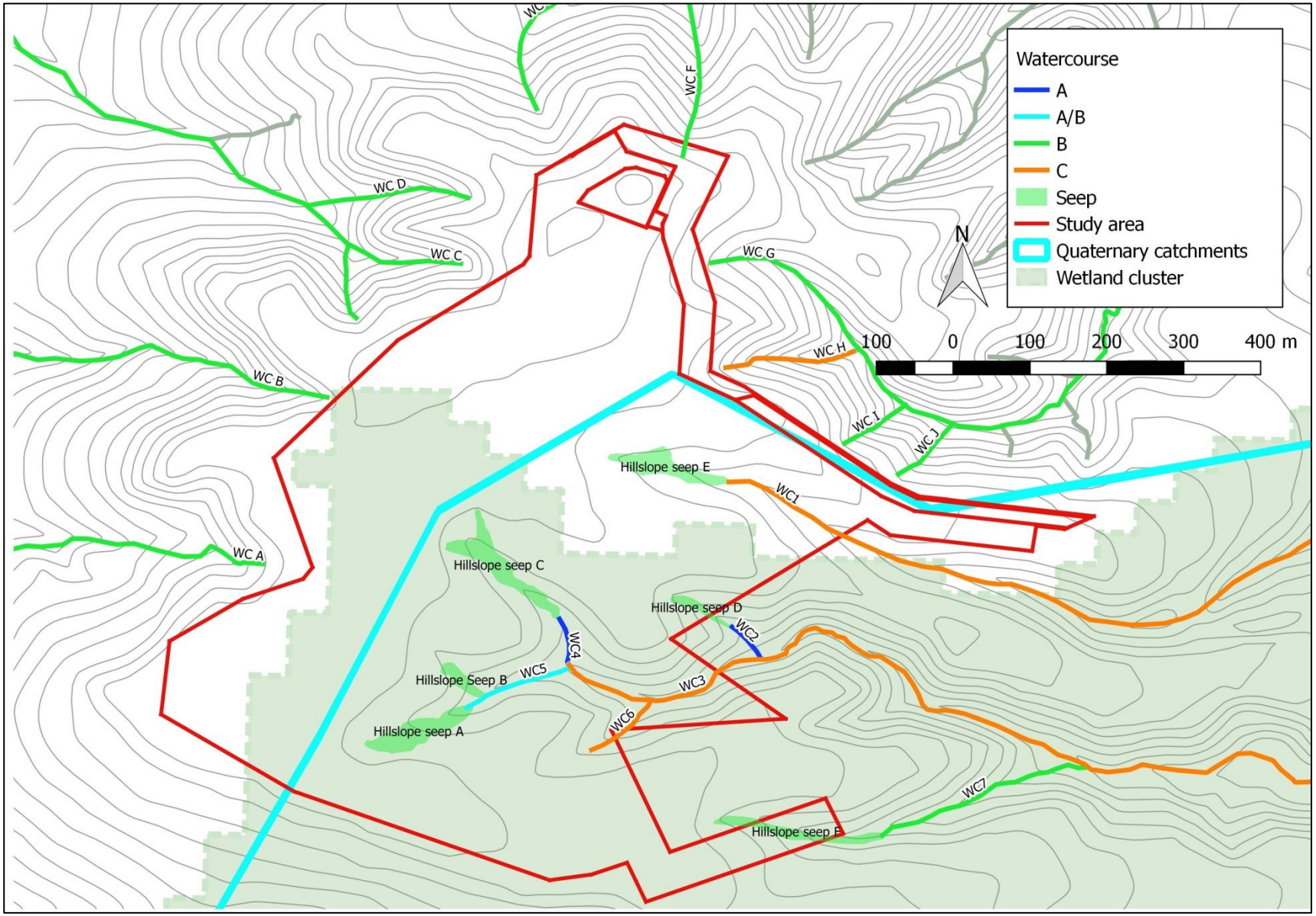

Figure 4 **Seeps and watercourses identified and delineated within and surrounding the study area during this study.**

Table 1 Description of **WETLANDS** identified within the study area

Wetland Type	Description	PES	Key existing impacts	
Hillslope seep A Seasonal	Dominated by graminoids, particularly *Erogrostus curvula*, together with shrubs such as *Helicrysum pandurifolium* and *Hermannia Althaeifolia*. Besides *Conyza scabrida, Selago dolosa*, typically found in moist loamy sands, was also present as an indicator of saturation within this habitat. *Osteospermum monolifera*, together with S*earsia glauca,* which are both often found in the temporary zones of wetland habitats, were present in patches.	PES = A EIS = HIGH	• Sparse invasion by *Acacia cyclops* along margins • Burning (recent fires) • Previously farmed along outer margins (evidence of ploughing).	
Hillslope seep B Seasonal	Small seasonal seep with no clear channel. The habitat is invaded with *Acacia cyclops* but natural vegetation includes *Helicrysum cymosum, Helicrysum pandurifolium, Hermannia althaeifolia* and *Searsia glauca.*	PES = B EIS = HIGH	• Invasion by *Acacia cyclops* which has impacted on the hydrological and geomorphological functions • Burning (recent fires)	

Hillslope seep C Seasonal	This seasonal habitat is dominated by small scrubs, particularly *Helicrysum cymosum* and *Helicrysum pandurifolium*, together with larger shrubs such as *Osteospermum monolifera* and *Searsia glauca* along the margins. Other species included *Muralitia* sp. and *Erica* sp. with some graminoids such as *Eragrostus curvula*. Although not limited to the seep habitat, *Bobartia robusta,* characteristic of the south facing hillslopes of the region was growing densely at the downstream extent of the habitat where it transitions to a channel at the head of the watercourse.	PES =A EIS = HIGH	• Sparse invasion by *Acacia cyclops*	

Hillslope seep D Seasonal	This is a narrow, relatively steep wetland dominated by shrubs, particularly *Osteospermum monilifera*. Although not limited to this habitat, relatively dense stands of *Bobartia robusta* were evident at the upstream extent of the habitat**.** No invasion by alien *Acacia cyclops* was evident within this habitat**.**	PES = A EIS = HIGH	• Burning (recent fires along the margins)	

Hillslope seep E Seasonal	This habitat is dominated by graminoids such as *Eragrostus curvula* interspersed with shrubs such as *Helicrysum pandurifolium* and sparse individuals of *Conyza scabrida* and is thus similar in character to Seep A. Patches of *Osteospermum monolifera* and *Searsia glauca* were evident, particularly near the source of the seep. Unlike seep A, invasion by *Acacia cyclops* was greater and other invasives such as *Hakea sericea* were also present along the margins. Also, the downstream extent of the wetland is impacted somewhat by a dirt road which traverses the site. Besides loss of habitat, the road impedes runoff and thus impacts on the hydrological functioning of the habitat. Access to the area via the road has led to localised dumping which has also impacted on the habitat.	PES = B EIS = HIGH	• Invasion by alien trees along margins • Change in hydrological functioning due to road through the habitat • Some localized dumping of building rubble • Road crossing	

Hillslope seep F Seasonal	This habitat supports a mixture of shrubs such as *Osteospermum monolifera* and *Searsia glauca* and grasses such as *Thamnochortus fruticosus*. Other species include *Metalasia densa* and *Hyperrhinia Hirta* with dense stands of *Bobartia robusta* at the downstream extent where the seep enters the water course and flows are more concentrated. Some alien invasion by *Acacia cyclops* is evident but limited and thus impacts minimally on the ecological integrity of the system. Similar to Hillslope seep E, the seep is traversed by a dirt road which impacts to some extent on its hydrological functioning. Some dumping close to the road has impacted on the quality of habitat but this is limited	PES = B EIS = HIGH	• Invasion by aliens (mostly *A. cyclops)* • Change in hydrological functioning due to road through the habitat • Rubble dumping • Road crossing	

3.2 Watercourses identified and evaluated during the sensitivity analysis

A number of ephemeral watercourses were identified and mapped within the study area as well as along the eastern and northern boundary of the Erf 3122 (Figure 4). These were assessed in terms of their key characteristics, condition and ecological importance during the Constraints Analysis Phase of the project and details of the assessment are included in Ewart-Smith (2017) and summarised below.

Watercourses within the study area are fed by seep habitats (Figure 4 and Table 1) and the transition from seep to watercourse in all instances was identified by the change from diffuse runoff to the presence of a channel carrying concentrated flows during rainfall events. Watercourses within the study area were characterised by a narrow riparian fringe, dominated by shrubs such as *Searsia glauca* and *Osteospermum monolifera*.

Watercourse (WC) 2, WC4, and WC5 (Figure 4) are largely unimpacted ephemeral systems characterised as narrow (<1 m wide), shallow (<50 cm deep) channels with stable banks due to a dense, intact riparian fringe (Figure 5). Of these, WC 2 and WC 4 were rated as Category A (i.e. unmodified or near natural) in terms of their ecological condition (Table 2), although their riparian status scores were rated as a Category B, largely due to some invasion by alien *Acacia cyclops* and slight changes to the channel associated with loss of indigenous riparian fringe components.

By contrast, WC 1, WC 3 and WC 6 (Figure 4) are significantly impacted by erosion which has promoted invasion by alien *Acacia cyclops* and the loss of natural vegetation typical of the riparian fringe. In particular, watercourse 1 (WC 1) fed by hillslope seep E is characterised as a deep (approximately 2 m) gully with steep unstable banks. *Acacia cyclops* has invaded the riparian fringe with a loss of natural riparian species and there is evidence that the headcut of the channel is moving upstream towards the seep habitat (Figure 6). This system was rated as a Category C watercourse due to large channel and bed modifications associated with erosion (Table 2).

Table 2 Ecological Condition and Ecological Importance and Sensitivity (EIS) of watercourses within the study area

Watercourse	Instream	Riparian	Overall PES	EIS
WC 1	B	C	C	HIGH
WC 2	A	B	A	HIGH
WC 3	B	C	C	HIGH
WC 4	A	B	A	HIGH
WC 5	A	B	A/B	HIGH
WC 6	B	C	C	HIGH
WC 7	B	C	B	HIGH

A number of watercourses originating on the steep east and north facing slopes of Hartenbos Heuwels, beyond the study area were identified and assessed. These watercourses originate as channels without seeps

at their upslope extent, probably because the steep terrain on these slopes does not permit the formation of wetland habitats. With the exception of WC H which is heavily eroded, these watercourses are still largely intact (i.e. Category B PES), despite varying levels of invasion by *Acacia cyclops*. In particular, watercourses E and F draining northwards from the northern boundary of the site were heavily invaded with *Acacia cyclops*.

Table 3 Ecological Condition and Ecological Importance and Sensitivity (EIS) of watercourses surrounding the study area

Watercourse	Instream	Riparian	Overall PES	EIS
WC A	A	B	B	HIGH
WC B	A	B	B	HIGH
WC C	B	B	B	HIGH
WC D	A	B	B	HIGH
WC E	B	B	B	HIGH
WC F	B	C	B	HIGH
WC G	B	C	B	HIGH
WC H	C	C	C	HIGH
WC I	B	C	B	HIGH
WC J	B	C	B	HIGH

Figure 5 Watercourse immediately downstream of Hillslope Seep C (i.e. WC 4) showing a) the shallow active channel of the ephemeral stream with a sandy loam substratum that remains unvegetated due to intermittent, intense runoff and b) the intact riparian fringe of the active channel.

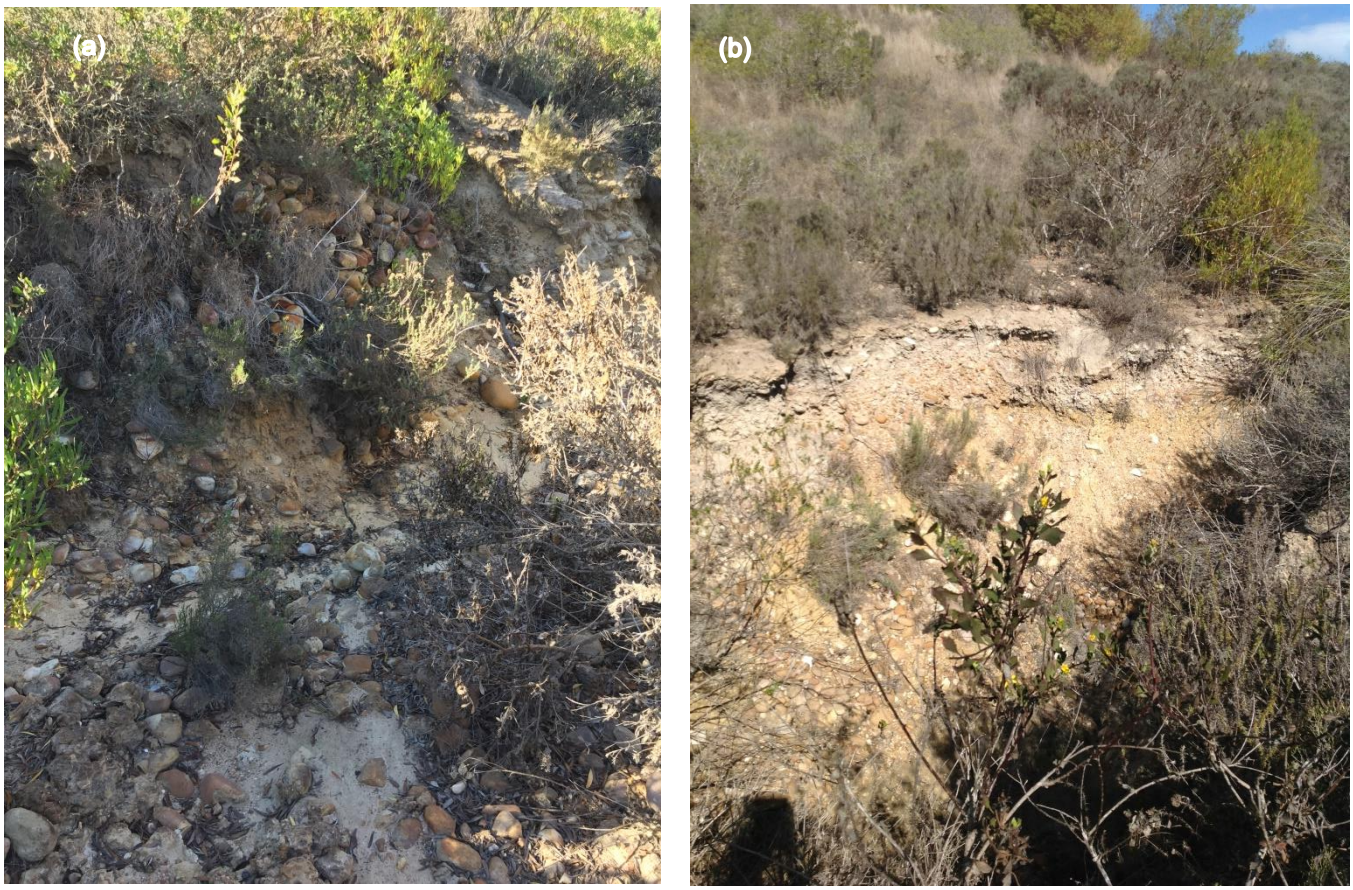

Figure 6 **Severe gully erosion within a) WC 1 and b) WC 6 has led to a significant change in the hydraulic and geomorphological character of these watercourses. These ephemeral systems are also impacted by alien invasion (mostly *Acacia cyclops*) and the loss of natural riparian fringing vegetation which has affected their habitat integrity.**

3.3 Ecological Importance and Sensitivity of Freshwater Ecosystems

Most hillslope seeps and watercourses within the study area are largely natural with little invasion of alien vegetation. They support vegetation communities that are denser than the upslope terrestrial habitats and thus contribute to ecosystem services such as flood attenuation, streamflow retention, sediment trapping and erosion control. Also these systems fall within a regionally threatened vegetation type and, despite some degradation, still provide ecologically functional habitat for the provision of shelter and food and the movement of fauna. Considering that Erf 3122 straddles two watersheds and thus the watercourses and seeps represent the source zones of watercourses further downstream, these systems are particularly important for connectivity and genetic dispersal of both fauna and flora between catchments at a landscape level. Besides their ecological importance, ephemeral systems such as those on Erf 3122 are highly sensitive to anthropogenic disturbance. Even small changes in peak flows, runoff intensity and channelization can exacerbate erosion and bank destabilisation and elicit the knock-on effects of ecological degradation. Collectively therefore, these habitats are rated as having a ***high Ecological Importance and Sensitivity.***

4 INITIAL RECOMMENDATIONS FOR DEVELOPMENT PROPOSED DURING THE SENSITIVITY ANALYSIS PHASE

Based on an assessment of freshwater ecosystems identified and described during the sensitivity analysis and summarised in Section 3 of this report, it was recommended that:

- All wetlands and watercourses be retained and are not fragmented through development such that dispersal and migration of fauna is compromised.

- Only low-impact, diversity sensitive land-use alternatives are considered for development of Erf 3122. It was recognised that, besides the hillslope seep habitats, the watercourses that they feed within the site and those that drain north and eastwards as source zones for river systems downstream also provide ecologically and hydrologically important habitat that should be protected for the maintenance of freshwater ecological integrity of the region.

- A minimum buffer of 50 m surrounding mapped freshwater features is included in the development layout to minimise disturbance of fauna and protect the hydrological functioning of these systems (Figure 7).

- Buffers be used for recreation and the management of stormwater associated with residential developments.

- That stormwater on site is managed through the construction of swales and attenuation facilities. This is in keeping with the principles of Water Sensitive Urban Design (WSUDS), which promotes the management of stormwater quality and quantity to protect the receiving water course. While implementation of these measures would minimise risks to natural freshwater ecosystems within the area, swales through the study area may promote connectivity and reduce fragmentation of these systems thus minimising associated potential impacts.

Through an iterative process, these recommendations were considered in the compilation of the proposed development layout for Erf 3122 for further consideration herein.

5 DESCRIPTION OF THE PROPOSED RESIDENTIAL DEVELOPMENT

5.1 Development Alternative

Of a total area of 60.52 ha, the proposed alternative has a total development footprint of 24.2 ha. The development consists of residential erven, a care centre, sports facilities with a club house and associated infrastructure. In terms of residential erven, 117 are relatively large (350-600 m^2), 122 are moderately sized (≤ 350 m^2), while 40 “garden houses” are small (200 m^2). There are 218 sectional title stands, including 54 one-to-three-bedroom terrace apartments, 144 village apartments (bachelor, 1 or 2 bedroom), and 20 assisted living stands. The care centre includes 34 sectional title stands for comprehensive care (Figure 7).

The development is situated outside all freshwater ecosystems and separated by a variable buffer of between 20 - 50 m. The ecosystems and surrounding buffer area fall within the area indicated as private open space in the development layout plan (Figure 7). Connectivity between natural wetlands and watercourses within and beyond the development footprint was included through the provision of open space corridors between erven indicated as red lines within the development layout plan (Figure 8).

The Stormwater Management Plan proposes to implement SUDS (Sustainable Urban Drainage System) principles to promote attenuation of stormwater runoff and maximise infiltration (LJR Civil 2021). In particular, the Stormwater Management Plan proposes the use of unlined vegetated buffer strips, unlined grass channels with rock/subsoil drains and energy dissipators to promote infiltration, enhance water quality amelioration and prevent erosion. Stormwater reticulation infrastructure includes a piped reticulation system designed for the 1 in 5 year storm events that will link with the retention infrastructure. Also, rain water harvesting is recommended such that stormwater events will be somewhat attenuated.

While situated at low points in the study area, sewer pump stations will make allowance for emergency capacity with standby pumps and generators (Mr L. Roets, LJR Civils, pers. comm., 2021). Also, the sewer reticulation system will be designed in such a way as to prevent blockages and possible overtopping of manholes. These measures will reduce the risk of sewage spills and thus minimize the probability of pollution events reaching any water courses.

5.2 No-development alternative

This will entail continuation of the status quo. Current levels of alien infestation are likely to increase and the extent of erosion within ephemeral watercourses will probably worsen. Although there are certain legal obligations regarding the clearing of aliens, there will be no incentive for any landowner to rehabilitate the land or the watercourses identified as conservation worthy.

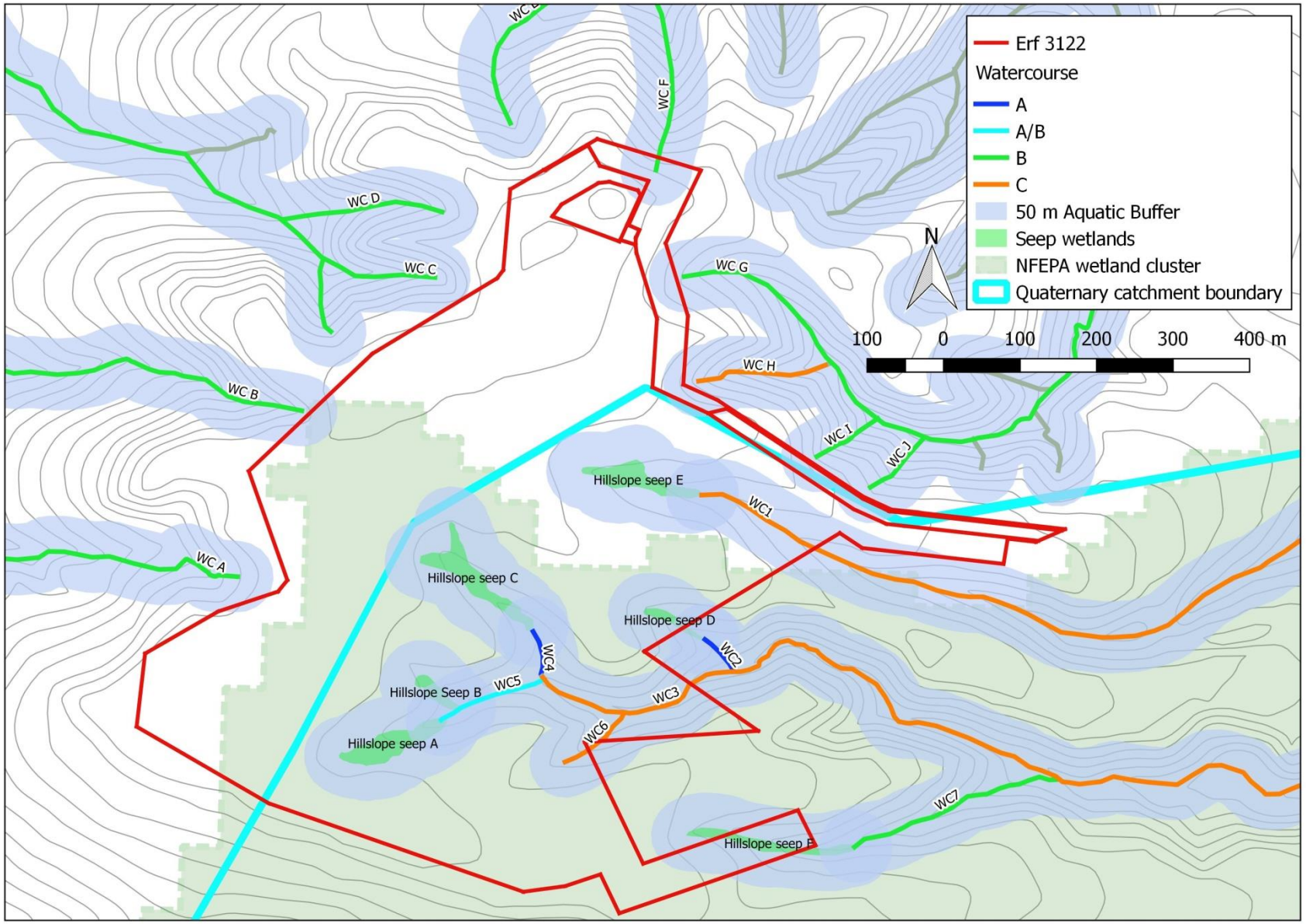

Figure 7 **Seeps and watercourse identified within and surrounding the study area showing the recommended buffer of 50m around these habitats.**

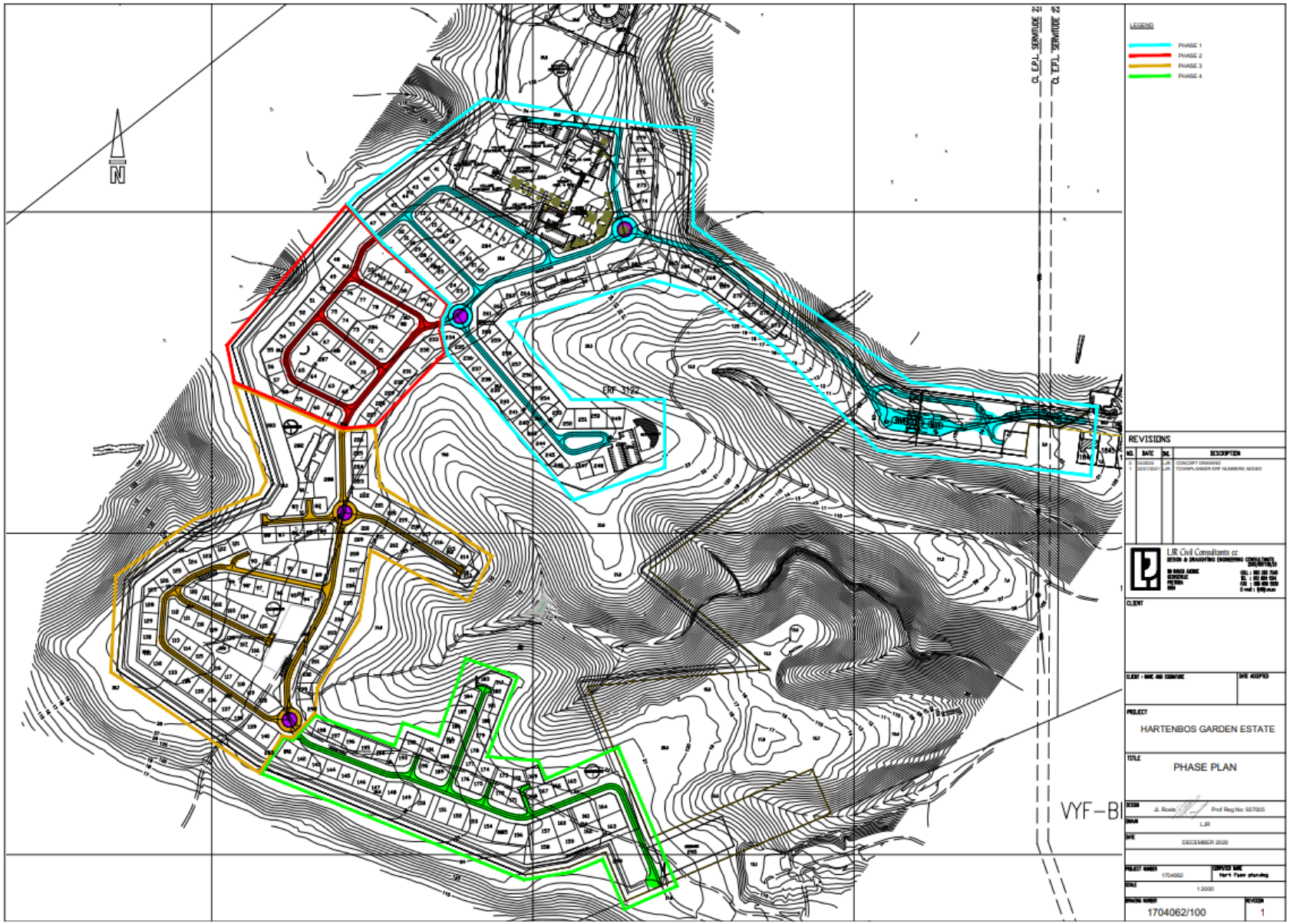

Figure 8 Proposed Development Layout Plan for Erf 3122.

6 IDENTIFICATION OF POTENTIAL IMPACTS AND PROPOSED MITIGATION

6.1.1 Layout/Design

Figure 8 indicates that all freshwater ecosystems identified during the Constraints Analysis have been accommodated within the open space areas of the proposed development layout. Thus, no wetland habitat will be lost due to the proposed footprint of development on Erf 3122. Furthermore, the recommended buffer of 50 m around seeps and watercourses is largely achieved, particularly around systems with steep topography that are most vulnerable to water quality and quantity impacts. A buffer of approximately 20 m surrounds Seep A.

Although all wetlands and watercourses are accommodated in the proposed new layout for the site, the layout does not provide corridors between these habitats for the movement and dispersal of biota across the water shed within the study area. It is therefore recommended that the layout address connectivity between these ecosystems through the provision of open space between erven that are appropriately vegetated and maintained and that road crossings promote the movement of biota across the road network.

6.1.2 Construction phase impacts and mitigation measures

Associated construction phase impacts would include:

- Dumping of waste material in wetlands or watercourses. Dumping of sand, soil bricks, gravel, cement etc within freshwater ecosystems will result in the loss and/or degradation of habitat. Changes in soil structure associated with dumping can compromise the ability to effectively rehabilitate these systems.
- Polluted runoff from stockpiles or work camps situated in close proximity to freshwater ecosystems. This includes runoff associated with vehicle washing, soil erosion from stockpiles and chemicals leached from stockpiles. Also, faecal contamination of freshwater ecosystems may occur through the use of open areas as toilets by construction staff. Considering the ephemeral nature of the streams and wetlands within the study area, it is likely that pollutants will accumulate and persist if not contained and removed from the site. The steep topography of the site increases the likelihood of contamination if clear measures are not implemented to ensure containment and effective removal.
- Uncontrolled access and movement of personnel, vehicles and machinery through wetlands and watercourses. This would lead to damage of the soils and vegetation and may result in increased erosion of these systems.
- Sedimentation due to landscaping and earth movement to level the areas for construction of infrastructure such as road and pipelines. Sediments may be particularly mobile during the wet months and the steep slopes surrounding wetlands and watercourses make them particularly vulnerable to sedimentation on Erf 3122.
- Disturbance of freshwater fauna and flora through the presence of construction staff and machinery will lead to noise and light pollution in an area that is currently unaffected by such impacts.

Mitigation:

The risk of dumping can be minimised by ensuring that the open space areas identified in the layout plan are fenced off from the development edge prior to the start of construction to reduce the likelihood that it will

be affected by construction activities. The fencing should be removed when construction in the vicinity of the open space areas has been completed.

Contamination of sensitive wetlands can be minimised by:

- Ensuring that all stockpiled materials are stored away (at least 50m) from wetlands and watercourses.
- Ensuring that stockpile areas do not exceed 1.5 m in height and are protected from wind to prevent spread of material.
- Ensuring that stockpile areas are adequately bunded such that there is no runoff from these areas into freshwater ecosystems.
- Ensuring that washing of vehicles and machinery take place well away (at least 50m) from wetlands and watercourses. All machinery should be regularly checked for leaks.
- Provision of adequate ablution facilities for construction workers to avoid contamination of wetland habitats through human waste.
- Ensuring that any disturbance created through construction related activities is remediated through rehabilitation of the habitat

A Construction Phase Environmental Management Programme (CEMP) must be compiled and its implementation enforced during the construction phase. The CEMP must include measures that adequately address the above construction-related issues, including specifications for:

- Adequate construction site setbacks from conservation areas – at least 50m and such that runoff does not enter watercourses or wetlands from these areas;
- Adequate bunding and other controls over refuelling areas;
- Litter controls;
- Construction phase stormwater management to prevent contaminated runoff entering the wetlands and watercourses;
- Rehabilitation of disturbed habitats, if necessary.

Implementation of all of the above mitigation measures should effectively reduce the significance of impact to low or negligible.

6.1.3 Operational Phase impacts

The ephemeral seeps and watercourses within and surrounding the study area are particularly vulnerable to hydrological and water quality changes associated with catchment hardening (Ewart-Smith 2017). Thus, development of ERF 3122 is likely to result in the following operational phase impacts:

- increased risk of channel erosion within a network of watercourses that are highly sensitive to changes in the nature and volume of runoff. This may result in habitat loss and the development of unsightly dongas through the open space areas.
- An increase in the duration and frequency of saturation of wetlands and watercourses that are naturally dry for extended periods. This may result in a shift in community structure of the natural vegetation with associated impacts to biotic integrity.

- Long-term nutrient enrichment of wetlands and watercourses due to runoff of fertilisers / nutrients from adjacent gardens and landscaping. This may result in vegetation changes and associated loss of habitat integrity and biodiversity.
- Disturbance of remnant wetlands in open space areas, as a result of increased passage of pedestrians across them, and their use for riding, walking and as open space play areas; such impacts would result in trampling of wetland plants and potentially create erosion pathways through wetland patches.
- Increased likelihood of invasion by weeds and /or other alien plants, established in local gardens and including species such as highly invasive kikuyu grass.

Mitigation:

Mitigation measures to offset impacts associated with stormwater runoff include the following:

- Residential areas should be required to landscape their gardens with indigenous vegetation with low water and fertilizer requirements.
- Removal of alien vegetation and rehabilitation of eroded watercourses within the development footprint will somewhat offset the vulnerability of these systems to further erosion.
- No stormwater outlets should discharge directly into wetlands or watercourses, but should rather be passed into appropriately designed detention facilities that will attenuate runoff and provide some water quality amelioration, particularly the removal of phosphorus and sediments.
- Swales should be vegetated with appropriate wetland plants to maximize the efficacy of nutrient uptake and attenuation of runoff. These swales will need to be maintained with the possibility of sediment and vegetation removal and replanting if and when necessary.
- All surface flow must be directed towards these vegetated swales, where trapping of sediments and pollutants can occur and infiltration is promoted within the development area.
- Stormwater outlets with energy dissipaters should all be fitted with litter and sediment traps, with sediment assumed to be an efficient mechanism for the removal of at least some of the total phosphorous load.
- The effectiveness of any stormwater management plan should be monitored throughout the longevity of the development and adaptive management measures should be set in place to address any potential impacts should these measures not be effective at maintaining ecologically valuable wetland habitat. In this development, monitoring of potential erosion and increased saturation of wetlands is of particular importance.

Disturbance of remnant wetlands in open space areas can be mitigated through controlling the movement through these areas. In particular, access through open space areas should be limited to boardwalks – this will define the extent of disturbance and limit interruptions to surface and subsurface flows.

Mitigation measures against increased likelihood of invasion by weeds and /or other alien plants include:

- The development of a policy that stipulates the planting of indigenous vegetation only in its open space landscaping (e.g. along roadsides and in parking areas) – this should be encouraged among individual property owners / users as well.
- Adequate financial and human resources provision must be made for long-term alien clearing in the open space corridors and rehabilitation of eroded channels.

An Operational Phase Environmental Management Programme (OEMP) must be prepared for the entire site. The OEMP must provide sufficient detail on the management of buffer areas surrounding wetlands and watercourses to ensure protection of these systems. Specifications for rehabilitation of eroded channels and appropriate removal and long-term maintenance of invasive-alien-free private open space areas on the site must be included.

Also, it is recommended that a detailed monitoring plan be compiled which addresses the monitoring and management of stormwater such that adaptive measures can be implemented in the event that erosion, water quality and quantity changes to seeps and watercourses associated with stormwater runoff from the site are detected over the long term.

Depending on the extent to which these mitigation measures can be effectively implemented, including long term management of the site, negative operational phase impacts would likely be of low to moderate significance for freshwater ecosystems.

6.2 Cumulative impacts

Expansion of urban development within the Mosselbay Municipal Area continues to fragment threatened freshwater ecosystems of high conservation value. While development of Erf 3122 may contribute to fragmentation of habitats within the region, effective implementation of mitigation measures including long term monitoring of stormwater and management of the site and the provision of corridors to promote connectivity and maintain ecological integrity will most likely offset these impacts. Thus, development of the study area, with the provision of corridors, is unlikely to contribute significantly to the loss of wetlands associated with urban development with the region.

6.3 Assessment of the no-development alternative

Under the no-development option, wetlands and watercourses within and surrounding the study area would persist as a network of ephemeral ecosystems that are well connected and promote the movement of biota between catchments. Without long term management intervention, however, invasion by alien species along watercourses and within seep habitats is likely to spread and the extent of erosion along watercourses will likely increase. In the long term therefore, habitats in relatively good condition and of high ecological importance may degrade, resulting in a loss of habitat integrity and biodiversity.

7 INFORMATION REQUIREMENTS TO BE ADDRESSED IN THE DETAILED ENVIRONMENTAL IMPACT ASSESSMENT PHASE

7.1 Mitigation specifications

The following issues require specific consideration in the EIA phase of the project, in order to gauge the extent to which they can provide effective mitigation, namely:

- Full details of structures considered to attenuate and promote infiltration of stormwater runoff from hardened surfaces. This includes the design and siting of detention/retention facilities as well as the vegetated swales between residential erven.

- The extent to which proposed mitigation is feasible and/or achievable.

8 COMMENTS ON NEED AND DESIRABILITY FROM AN ECOLOGICAL PERSPECTIVE

EIA legislation requires *inter alia* that the Scoping Report includes some level of comment on the need for and desirability of the proposed development.

From a freshwater ecosystem perspective, there is neither direct need nor desirability for development. Assuming long term management of the open space within the layout plan, however, removal of alien vegetation and rehabilitation of the eroded watercourses may promote the ecological functioning of these systems.

9 LEGISLATION

In addition to the requirements for authorisation of the proposed development layout in terms of NEMA regulations, implementation would trigger the need for authorisation of the activity as it pertains to water use in terms of Section 21c[1] and i[2] of the NWA. Assuming that mitigation measures proposed herein are effectively implemented, risks to freshwater ecosystems are likely to be low, thus requiring General Authorisation of identified water uses with the Department of Water and Sanitation (DWS). Nevertheless, the feasibility of such mitigation will need to be addressed during the EIA phase of the project before the level of risk can be assessed.

10 CONCLUDING REMARKS

Through an iterative process of compiling the preferred development layout for Erf 3122, all seeps and watercourses identified in the sensitivity analysis were accommodated in the open space areas of the design. Thus, the development of this site, according to the preferred alternative, does not result in the any direct loss of wetland habitat. Also, a variable setback (mostly 20-50 m) between the development edge and seeps / watercourses was achieved. Relative to the no-development alternative however, connectivity between freshwater ecosystems across the watershed is significantly compromised. While some construction phase impacts are identified, these are readily mitigated and are unlikely to result in any significant negative impacts.

Despite the provision of a setback, the ephemeral seeps and watercourses within and surrounding the study area are particularly vulnerable to water quality and quantity changes associated with catchment hardening. Without effective mitigation, these impacts may result in the permanent loss or degradation of freshwater ecosystems of high ecological importance. Effective mitigation measures to offset these impacts have however been identified. The extent to which mitigation is feasible and effective will need to be addressed during the EIA phase. In particular, provision of specifications of attenuation facilities and swales is essential information for evaluating the efficacy of mitigation during the EIA phase.

[1] "impeding or diverting the flow of water in a watercourse"
[2] "altering the bed, banks. course or characteristics of a watercourse"

11 REFERENCES

Ewart-Smith, J. (2017). Baseline (Sensitivity) assessment of freshwater ecosystems. Erf 3122, Hartenbos Heuwels Residential Development. Submitted to Cape EAPrac (Pty) Ltd for ATKV Sake (Pty) Ltd as part of Phase 1 of the EIA process for development.

Helme, N. (2012). Botanical assessment for Erf 3122 and remainder of portion 4 of Hartenbos 217, Hartenbos, Western Cape.

LJR Civil Consultants (2021). Services Report for Hartenbos Garden Estate Residential Development. Erf 3122 Hartenbos. Project No 1704062.

Nel J.L., Driver A., Strydom W., Maherry A., Petersen C., Roux D.J., Nienaber S., van Deventer H, Smith-Adao LB and Hill L. (2011). Atlas of Freshwater Ecosystem Priority Areas in South Africa: Maps to support sustainable development of water resources. WRC Report No. TT 500/11, Water Research Commission, Pretoria.

Pool-Stanvliet , R., Duffell-Canham, A., Pence, G. and Smart, R. (2017). The Western Cape Biodiversity Spatial Plan Handbook. Stellenbosch: Cape Nature.