

CLIENT

WESTERN CAPE GOVERNMENT – DEPARTMENT OF TRANSPORT & PUBLIC WORKS

MAIN ENVIRONMENTAL CONSULTANT

CHAND CONSULTING

**PROPOSED HOUSING DEVELOPMENT ON ERF 6482,
GRASSY PARK, CAPE TOWN**



**SPECIALIST AQUATIC ECOLOGIST IMPACT ASSESSMENT
REPORT**

FINAL REPORT

JULY 2025

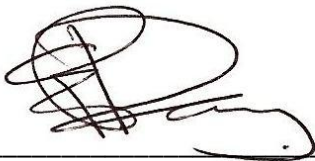
PREPARED BY

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6 May 2025

DECLARATION OF SPECIALIST INDEPENDENCE

I, Elizabeth (Liz) Day as a specialist river and wetland consultant, and Director of Liz Day Consulting (Pty) Ltd, 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, application or appeal in respect of which I was appointed by Chand Consultants to undertake an Aquatic Assessment of the proposed housing development on Erf 6482, Grassy Park, Cape Town , other than fair remuneration for work performed.



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Title / Position: Director

Qualification(s): BA, BSc, BSc Hons, PhD

Relevant work experience: Liz has worked as a freshwater ecologist / aquatic ecosystems specialist for the past +30 years, primarily in the Western Cape, and has produced over 900 technical and Environmental Impact Assessment reports, requiring the assessment of rivers and/or wetlands.

With regard to the current project, Liz has worked in the Cape Town area for the past 30 years and has extensive experience in the Zeekoe catchment (in which the study area is located), having been the aquatic ecologist on the (2022) False Bay Nature Reserve sewage spill rehabilitation and action plan (Day et al 2022a and b), which entailed extensive assessment of water courses throughout the catchment, as well as the aquatic specialist for the City of Cape Town's Green Infrastructure project for the Zeekoe and Diep/Sand catchments (Day 2024).

Registrations: Member of IAIASA; Registered Professional Natural Scientist by SACNASP (Reg No 004806) for fields of Aquatic Science, Biological Science, Ecological Science and Zoological Science.



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1 INTRODUCTION

1.1 Background

The Western Cape Government's Department of Infrastructure (DOI) ("the client") has proposed the development of Erf 6482 Grassy Park ("the site") for ¹Breaking New Ground (BNG) and potentially First Home Finance (FHF) housing. The proposed development would require various authorisations in order to proceed. These include Environmental Authorisation in terms of the National Environmental Management Act (NEMA) (Act 107 of 1998), through an Environmental Impact Assessment (EIA) process, and potentially also authorisation or registration of water uses in terms of the National Water Act (NWA) (Act 36 of 1998). As a result, Chand Consultants ("Chand") was appointed by the Western Cape Government's DOI to oversee *inter alia* the required environmental authorisation and water use licence application (WULA) processes.

The site abuts the Big Lotus River. The Aquatic Theme for the site is indicated as Very High Sensitivity in the (National) Department of Forestry, Fisheries and the Environment (DFFE)'s Screening Tool and the site includes at least some wetland areas. Thus inland aquatic ecosystems (specifically wetlands and rivers) were identified as systems that would require specific assessment and reporting in terms of the required NEMA and NWA authorisation applications. As a result, Liz Day Consulting (Pvt) Ltd (LDC) was appointed by Chand to carry out an independent aquatic ecosystems assessment and, if required, a Risk Assessment, using the Risk Assessment Matrix of DWS (2023).

LDC is an independent company that specializes in freshwater (i.e. inland) aquatic ecosystem assessment. The specialist's CV is attached as Appendix A.

1.2 Terms of reference

The terms of reference for this project required that the appointed specialist aquatic ecologist should include the following activities / inputs:

1. A site visit to identify the extent, quality and likely ecological importance of any wetlands or other watercourses on the site, including *in situ* water quality assessments and aquatic invertebrate sampling;
2. A description of watercourses on and associated with the site, including assessments of their:
 - a. Present Ecological State (PES) or condition;
 - b. Wetland ecosystem services;
 - c. Ecological Importance and Sensitivity;
3. Identification of measures to avoid, mitigate or manage impacts to watercourses associated with the proposed development;
4. Comment on the need, if any, for wetland offsets to offset residual wetland impacts after application of the mitigation hierarchy;
5. Formal assessment of the impacts of the proposed development on aquatic ecosystems, with and without mitigation measures;
6. A Risk Assessment, if appropriate, for Section 21c and i water uses.

¹ BNG housing refers to fully subsidized homes allocated by the National Government of South Africa through the Department of Human Settlements

1.3 Activities informing this input

This report was informed by the following activities / information sources:

- A wet season site visit on 14th June 2023, for preliminary wetland assessment and delineation - during this visit, aquatic macroinvertebrates were collected and assessed, using a 250 μ m mesh net – macroinvertebrates were identified to broad groupings indicative of seasonal wetland habitat;
- A follow-up site assessment on 26th August 2024, accompanied by the geohydrological specialists (GEOSS) and the project Environmental Assessment practitioners (Chand Consulting) – during this visit a single water sample was collected and analysed at the Aquatico laboratory in Somerset West;
- A dry season drive-past the site in December 2024;
- Liaison with the project town planners and design team (Ms Lisa van Aarde, Planning Partners).

1.4 Assumptions, limitations and uncertainties

The outputs of this study are subject to the following assumptions, limitations and uncertainties:

- The surrounding area is plagued by high levels of crime and gang activity, limiting the time that could be spent on site in safety;
- Much of the site has been infilled and although it previously probably included wetland habitat, these have been largely destroyed on the site, making accurate delineation on site difficult, even with the aid of aerial imagery;
- Wetland delineation relied on a combination of wet season field assessment (when wetlands were identified with high certainty. However, their extent was mapped off aerial imagery, guided by field ground-truthing and walking of the perimeter of key wetlands on site, using a hand held GPS> However, off-site wetlands were delineated primarily using aerial imagery;
- The assessment relied on the City's Inland Water Quality data to characterise water quality in the Big Lotus River;
- A single macroinvertebrate sample was collected for wetland characterisation – seasonal wetland invertebrate community composition does however change over the wet season (e.g. insect taxa become more abundant) and the sample was thus just a snap-shot of wetland conditions at the time of sampling;
- No other faunal survey informed this assessment – in terms of the Precautionary Principle, it is assumed that Western Leopard Toad might utilise parts of the site during non-breeding periods – it is unlikely that the site is a breeding site for this species, as the wetlands are shallow and dry out in early summer;
- A single water quality sample was collected in wetlands abutting the site, and used to characterise them.

1.5 Site location

Erf 6482 is located in Grassy Park on the Cape Flats of Cape Town, in the Western Cape of South Africa. The site is located on the south western corner of Edward Avenue and Hector Avenue. It is abutted to the west by open space, including a section of the Big Lotus River.



Figure 1.1

Location of Erf 6482 Grassy Park (green polygon). Figure adapted from Cape Farm Mapper (<https://gis.elsenburg.com/apps/cfm/>)

1.6 Assessment Methodologies

The assessment methodologies relevant to this assessment are outlined in Appendix B.

1.7 Definitions

All reference to wetlands and watercourses in this document were based on the following definitions of wetlands and watercourses, as stipulated in the National Water Act (NWA) (Act 36 of 1998):

"watercourse" means -

- (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 watercourse, and a reference to a watercourse includes, where relevant, its bed and banks;

"wetland" means -

land which is transitional between terrestrial and aquatic systems 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 to life in saturated soil.

"Extent of a watercourse" (as defined in Government Notice (GN) 4167 of 2023) means:

- (a) *The outer edge of the 1 in 100 year flood line or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, dam or lake; and*
- (b) *Wetlands and pans: the delineated boundary (extent) of any wetland or*

pan.

1.8 Content of the report in terms of addressing EIA regulations for specialist reporting

This report has been compiled so as to comply with the National Department of Forestry, Fisheries and the Environment (DFFE)'s 2020 *"Protocol for the specialist assessment and minimum report contents for environmental impacts on aquatic ecosystems"* (Government Notice 320 of 20 March 2020).

Table 1.1 summarises the reporting requirements listed in the above protocol, and indicates where they are addressed in this report.

Table 1.1

Required Specialist Report contents and locations of items covered in the present document (as per the DFFE's "Protocol for the specialist assessment and minimum report contents for environmental impacts on aquatic biodiversity" (Government Notice 320 of 20 March 2020)).

Reference in Protocol	Description	Section in this report where addressed
Section 2	Site Sensitivity Verification: Prior to commencing with a specialist assessment, the current use of the land and the environmental sensitivity of the site under consideration identified by the Screening Tool must be confirmed by undertaking a Site Sensitivity Verification. Confirmation or rejection of Site Screening Tool findings	Section 3.7
Table 1: Section 1.1	An applicant intending to undertake an activity identified in the scope of this protocol on a site identified on the screening tool as being of: 1.1.1. "very high sensitivity" for aquatic biodiversity, must submit an Aquatic Biodiversity Specialist Assessment; or 1.1.2. "low sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement.	This document N/A
Table 1: Sections 2.1-2.4	2. Aquatic Biodiversity Specialist Assessment: Requirements for Aquatic Biodiversity Specialist Assessment where there is a confirmed VERY HIGH SENSITIVITY RATING for aquatic biodiversity features: 2.1 The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP), with expertise in the field of aquatic sciences. 2.2. The assessment must be undertaken on the preferred site and within the proposed development footprint. 2.3. The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects: 2.3.1. a description of the aquatic biodiversity and ecosystems on the site, including: (a) aquatic ecosystem types; and (b) presence of aquatic species, and composition of aquatic species communities, their habitat, distribution and movement patterns; 2.3.2. the threat status of the ecosystem and species as identified by the screening; 2.3.3. an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status (i.e. if the site includes a wetland or a river freshwater ecosystem priority area or subcatchment, a strategic water source area, a priority estuary, whether or not they are free -flowing rivers, wetland clusters, a critical biodiversity or ecologically sensitivity area); and 2.3.4. a description of the ecological importance and sensitivity of the aquatic ecosystem including:(a) the description (spatially, if possible) of the ecosystem processes that operate in relation to the aquatic ecosystems on and immediately adjacent to the site (e.g. movement of surface and subsurface water, recharge, discharge, sediment transport, etc.); and (b) the historic ecological condition (reference) as well as present ecological state of rivers (in- stream, riparian and	Page i and Appendix A Sections 1.3 and 3 Section 3 Section 3.4 and Section 5 Section 3.5 Section 3.5 Section 3 and Section 3.4.6 in particular

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	floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel and flow regime (surface and groundwater). 2.4. The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate.	None – see comment in Section 7
Table 1: Sections 2.5-2.6	2.5 Related to impacts, a detailed assessment of the potential impacts of the proposed development on the following aspects must be undertaken to answer the following questions: 2.5.1 Is the proposed development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal? 2.5.2. is the proposed development consistent with maintaining the resource quality objectives for the aquatic ecosystems present? 2.5.3. how will the proposed development impact on fixed and dynamic ecological processes that operate within or across the site? This must include: (a) impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); (b) will the proposed development change the sediment regime of the aquatic ecosystem and its sub -catchment (e.g. sand movement, meandering river mouth or estuary, flooding or sedimentation patterns); (c) what will the extent of the modification in relation to the overall aquatic ecosystem be (e.g. at the source, upstream or downstream portion, in the temporary I seasonal I permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.); and (d) to what extent will the risks associated with water uses and related activities change; 2.5.4. how will the proposed development impact on the functioning of the aquatic feature? This must include: (a) base flows (e.g. too little or too much water in terms of characteristics and requirements of the system); (b) quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over -abstraction or instream or off stream impoundment of a wetland or river); (c) change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchanneled valley- bottom wetland to a channeled valley -bottom wetland); (d) quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication); (e) fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and longitudinal); and (f) the loss or degradation of all or part of any unique or important features associated with or within the aquatic ecosystem (e.g. waterfalls, springs, oxbow lakes, meandering or braided channels, peat soils, etc.); 2.5.5. how will the proposed development impact on key ecosystems regulating and supporting services especially: (a) flood attenuation; (b) streamflow regulation; (c) sediment trapping; (d) phosphate assimilation; (e) nitrate assimilation; (f) toxicant assimilation; (g) erosion control; and (h) carbon storage? 2.5.6. how will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator - prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site? 2.6. In addition to the above, where applicable, impacts to the frequency of estuary mouth, closure should be considered, in relation to: (a) size of the estuary; (b) availability of sediment; (c) wave action in the mouth; (d) protection of the mouth; (e) beach slope; (f) volume of mean annual runoff; and (g) extent of saline intrusion (especially relevant to permanently open systems).	Section 4 Section 5 Section 5 Table 5.1 Table 5.1 Table 5.1 Table 5.1 Table 5.1 N/A

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Table 1: Sections 2.7	The findings of the specialist assessment must be written up in an Aquatic Biodiversity Specialist Assessment Report that contains, as a minimum, the following information: 2.7.1. Contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae; 2.7.2. A signed statement of independence by the specialist; 2.7.3. A statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; 2.7.4. The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant; 2.7.5. A description of the assumptions made, any uncertainties or gaps in knowledge or data; 2.7.6. The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant; 2.7.7. Additional environmental impacts expected from the proposed development; 2.7.8. Any direct, indirect and cumulative impacts of the proposed development on site; 2.7.9. The degree to which impacts and risks can be mitigated; 2.7.10. The degree to which the impacts and risks can be reversed; 2.7.11. The degree to which the impacts and risks can cause loss of irreplaceable resources; 2.7.12. A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies; 2.7.13. Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr); 2.7.14. A motivation must be provided if there were development footprints [...] that were identified as having a "low" aquatic biodiversity sensitivity and that were not considered appropriate; 2.7.15. A substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not; and 2.7.16. Any conditions to which this statement is subjected.	Appendix A Page i Section 1.3 Section 1.6; Appendix B Section 1.4 Section 4 Section 4 Section 4 Section 4 and Table 4.1 Section 4 Section 4 and Table 4.1 N/A Section 7 Section 4 (mitigation measures) and Section 7 (uranium analysis)
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2 DESCRIPTION OF THE PROPOSED DEVELOPMENT

2.1 Overview

The development proposal is for the development of 318 BNG and/or FHF units on the erf, along with a community church, and public open space, as shown in **Figure 2.1**. Stormwater infrastructure would be located along the southern and western edges of the site.

The units would comprise double storey units along roughly the western half of the site (209 units), and 100 single storey units in the remaining area.

These housing typologies are of relevance to the identified impacts of the development on aquatic ecosystems.

2.2 Sewage treatment

Murray (2025) suggests that sewage would be linked to an existing sewer outfall west of the site (indicated in **Figure 2.1**).

2.3 Water mains

Murray (2025) also suggests that potable water would be supplied from existing mains in Edward Avenue and Hector Avenue.

2.4 Stormwater management

The site drains towards the Big Lotus River to the west. Murray (2025) presents the proposed stormwater management plan for the development. The plan allows for the treatment of both water quality and flood peaks / volume, and has been designed to meet the City of Cape Town's 2009 policy for the Management of Urban Stormwater Impacts (City of Cape Town 2009). It includes the following elements (from Murray 2025):

- An internal stormwater system comprising surface channels and a pipe network with inlet structures to drain hard surfaces towards the attenuation devices along the west and southern site edges;
- Overland escape routes in the form of roads, walkways and open spaces in major floods (> 1:5 year return period events) to drain water to the attenuation structures;
- A combination of bioretention swales and a wet extended detention pond, to achieve groundwater recharge, water quality improvement and flood attenuation. Of these, the wet extended detention pond would include a permanent pool settling zone and a sediment storage zone. The design report recommends that it is landscaped to provide suitable habitat for fauna and flora.

2.5 Changes in layout during project planning

During iterative project design, the development layout was adjusted so as to maximise road frontage along the development boundary where it abuts open space and/or wetland areas. This was recommended by the freshwater ecologist (this author) to reduce the creation of "dead", unsafe space along open space and riverine corridors.

Figure 2.2 shows the proposed landscape development plan

2.6 Project phasing

At the time of this report, implementation of the development was planned in three phases (see **Figure 2.3**).

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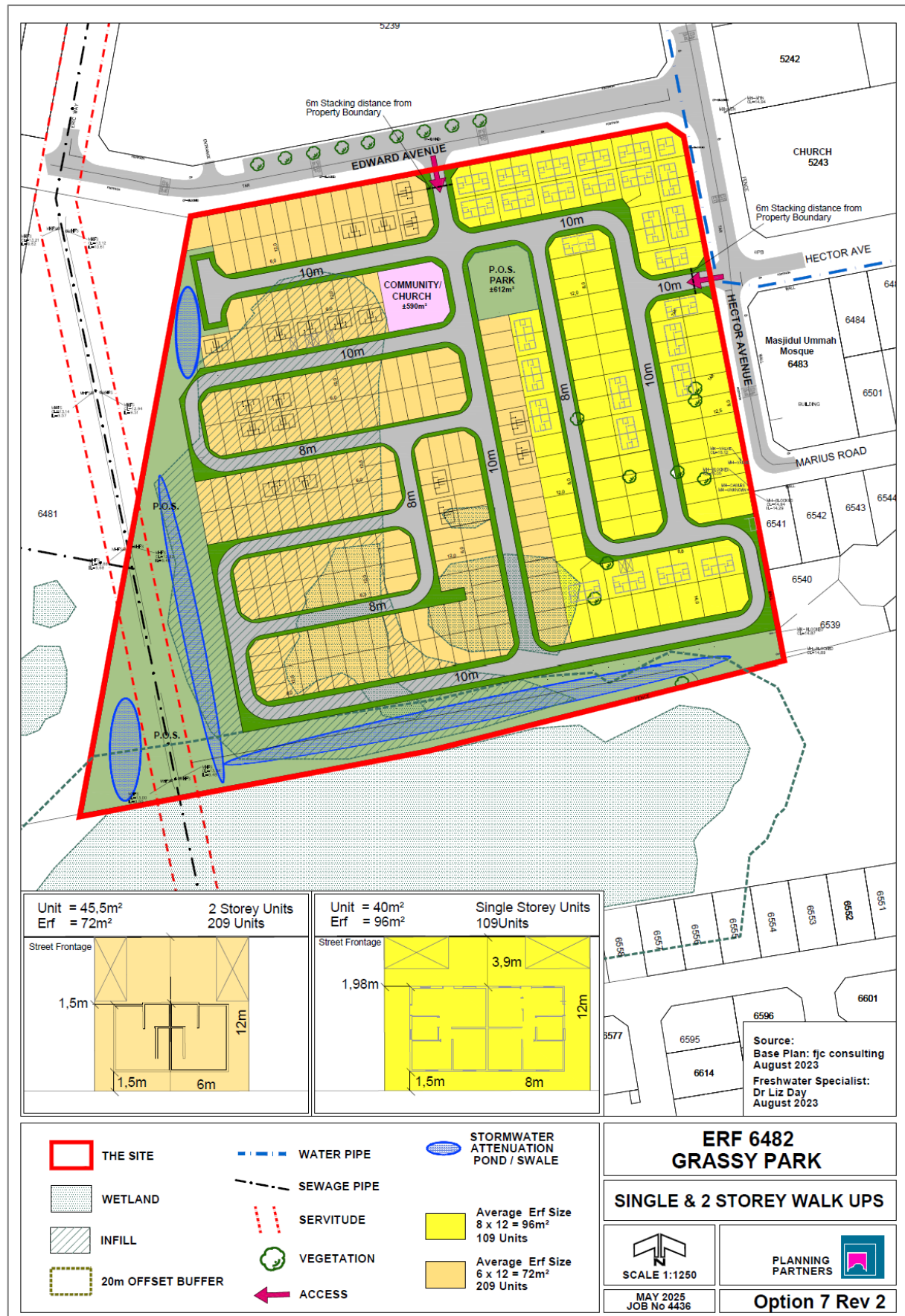


Figure2.1
Proposed development concept plan

Proposed housing development on Erf 6482, Grassy Park, Cape Town
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Figure 2.2
Proposed development – landscape concept plan

Proposed housing development on Erf 6482, Grassy Park, Cape Town
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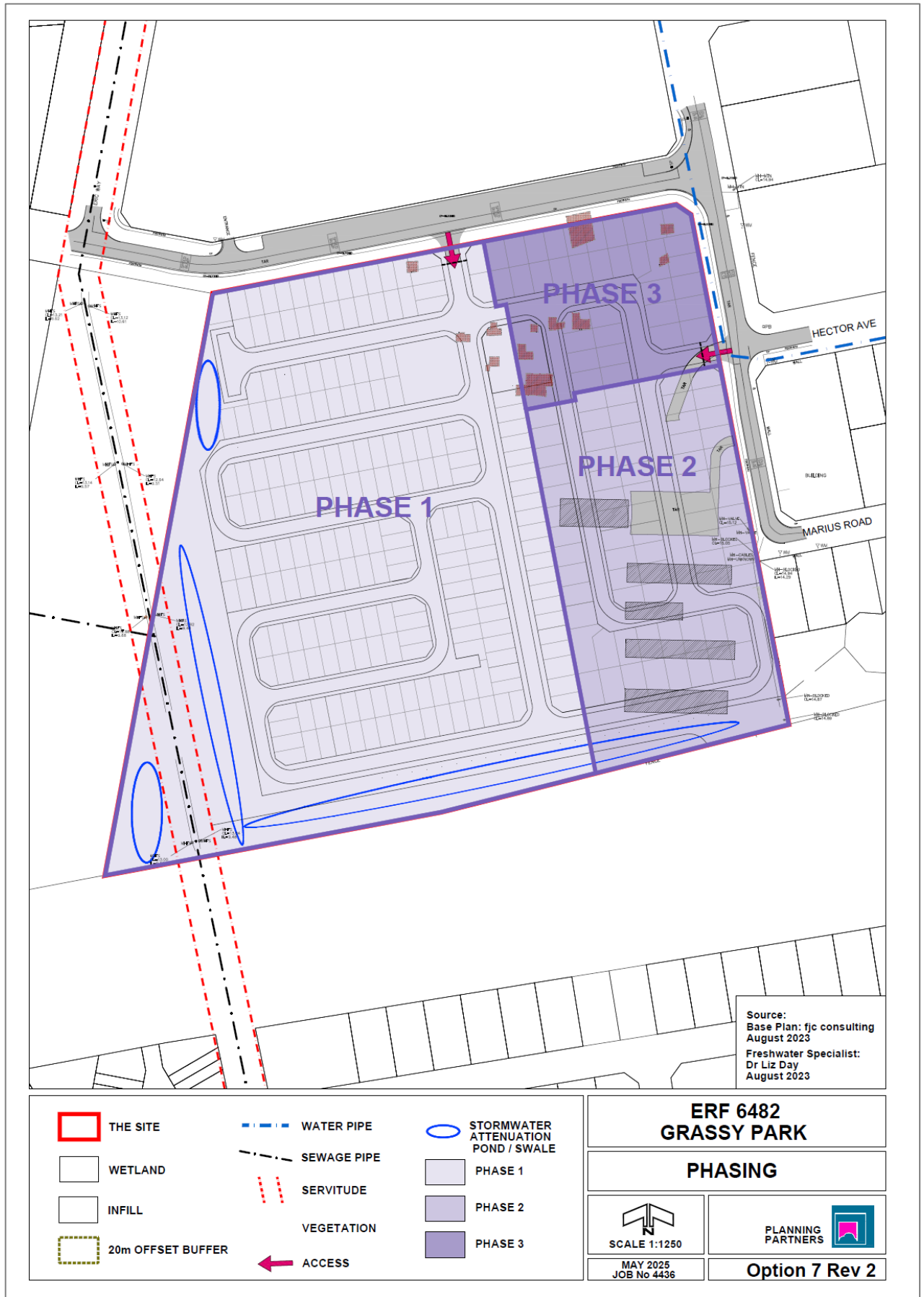


Figure 2.3
Proposed development phasing

3 BASELINE DESCRIPTION OF AQUATIC ECOSYSTEMS ON AND ASSOCIATED WITH THE SITE

3.1 Catchment context

The study area forms part of the Zeekoe Catchment and lies in the Department of Water and Sanitation (DWS)'s quaternary catchment G22D. This quaternary forms part of the DWS's Breede-Olifants Water Management Area, which includes the Berg River catchment.

Although not part of the actual catchment of the Berg River, the Zeekoe catchment (along with several other relatively small catchments in and around the City of Cape Town) is included in the Berg Catchment Resource Quality Objectives gazetted by the DWS in November 2020 (Government Notice GN 1179 of November 2020). The Big Lotus River is not included in the Gazette as a "Priority Resource Unit" (PRU). Its required ecological condition, in terms of the Gazette, would however be a Category D Present Ecological State (PES) river. This is because Category D is the lowest ecological state that is recognized as sustainable in terms of the NWA.

The Zeekoe catchment itself covers an area of some 7 813 ha and includes three of Cape Town's major recreational waterbodies, namely Zeekoevlei, Rondevlei and Princess Vlei. Of these, Zeekoevlei and Rondevlei form part of the False Bay Nature Reserve (FBNR), which has been accredited as a Ramsar wetland site. It is the only Ramsar wetland area in Cape Town, and part of the rationale for according Ramsar Wetland City status to the City of Cape Town ("the City") in 2022. Zeekoevlei is fed by the Little and Big Lotus Rivers, as well as with groundwater from the Cape Flats Aquifer. The Big Lotus River "rises" as an artificial earth channel, just north of the N2 near Cape Town International Airport and flows within a concrete canal throughout most of its reaches, passing initially through poorly serviced residential areas with high levels of informal and backyard dwellings (e.g. Barcelona informal settlement, Gugulethu and Hanover Park) and receives polluted runoff from extensive informal settlements in the Sweet Home and Brown's Farm areas.

Downstream of Govan Mbeki Road, the river flows as an earth channel through a portion of the Philippi horticultural area, before being crossed by Strandfontein Road, and flowing through the suburbs of Ottery, Ottery East and Edward (where the site is located). The western boundary of the site is located some 68 m from the river.

Zeekoevlei itself lies some 1 890 m downstream of the site and the Big Lotus River enters the vlei just downstream of Fisherman's Walk.

Highly polluted water quality and the accumulation of high levels of solid waste in the river have been identified as the most profound impacts afflicting the condition of the Big Lotus River and affecting the condition and management costs of Zeekoevlei itself (Day et al. 2022; Day et al. 2024).

3.2 On-site factors influencing the presence and quality of wetlands

3.2.1 Soils

GEOSS (2024) describes the soil profile on the site as generally dominated by brown to beige, medium-grained sands of aeolian origin, with layers and lenses of clayey horizons, and horizons characterised by a marked increase in their organic content.

3.2.2 Groundwater

GEOSS (2024) further suggest that, based on the soil types logged in their study and a noted decrease in moisture content of the soil unit beneath clay-rich units, it is inferred that perched aquifer conditions exist in places across the site, and particularly to the south of the property.

Water quality analyses conducted as part of the above study showed elevated iron, turbidity,

colour, lead and aluminium, when compared against SANS 2015 drinking water standards. Elevated turbidity and aluminium concentrations were attributed to the relatively high clay content of the soil, with the clays having been formed through weathering of aluminium silicate-bearing minerals in the bedrock. Elevated iron was assessed as likely to be a function of weathering of bedrock in the area. Trace metal concentrations (nickel, copper, cadmium, mercury, etc.) were generally low in the groundwater sample. Lead, however, was elevated in groundwater.

Possible sources of lead (suggested in the present report) could include runoff from roads and parking areas of stormwater exposed to lead, previously used in fuel.

GEOSS (2024) comments that groundwater is anticipated to follow topography and flow from the site roughly from a north to north easterly direction towards Zeekoevlei, in a south to south westerly direction. This means that groundwater flows would not be towards the Big Lotus River to the west of the site.

3.3 Surface groundwater linkages

Drawing on the findings of GEOSS (2024), it appears that although some wetlands in the vicinity of the site may be fed by groundwater, some comprise wetlands that are perched over clay horizons, particularly in the south of the site (e.g. W2). On the site itself, the present assessment found localised perching of small seasonal wetlands such as parts of W4 over brick and rubble infill.

3.4 Aquatic ecosystems on and associated with the site

3.4.1 Overview

The site as a whole is highly disturbed and degraded. Derelict buildings occur in the south eastern corner of the site, some of which housed a number of indigent families at the time of the 2024 site visit. Large areas of the site have been infilled at some stage in the past, with rubble and other waste, apparent during augering of the site for the identification of wetland indicators, and there is a clear infill “platform” visible along the southern boundary (Photo A in **Table 3.1**). Historical Google Earth imagery from 2002 (**Figure 3.1**) suggests that this infill was already in place then, with vegetation well established at that time, although more recent infilling / dumping of waste in parts of the site has also taken place. Such recent dumping was, at the time of the August 2024 site visit, largely confined to readily accessible parts of the site abutting the derelict buildings and Hector and Edward Avenues (see Photos A to J in **Table 3.1**).

Although much of the site has been infilled, it still includes large areas of seasonally inundated to saturated wetland (e.g. W6 and (the more infilled but saturated at 30-40cm below surface) W4 shown in **Figure 3.2**). Of these, some of the former appear to have been excavated, to form artificial depressions (W1 and W3) (see Photos A, E, F, and J in **Table 3.1**). Water quality in these was visibly impacted, with cloudy water with hydrocarbon films in places (Photo E).

Outside of the site, along the southern site boundary, extensive seasonal wetlands in good condition occur in a mosaic of seasonally saturated to inundated depressions (W2 in **Figure 3.2**). These are accessible only with effort and as a result, are less subject to dumping of waste. They were thus in relatively good condition during the 2023 and 2024 site visits and supported various indigenous wetland plants including Western Cape endemic aquatic *Aponogeton angustifolius* (IUCN near-threatened). Water quality appeared relatively unimpacted in these pools, with clear dark water, indicative of the presence of humic acids, characteristic of many wetlands in fynbos areas (but see Section 3.4.5). The deeper water sections of the wetlands supported Western Cape endemic Yellow Billed Duck as well as waders including Grey Heron

at the time of assessments.

The wetlands are shallowly inundated in the wet season, and appear to have dried out by October / November. This means that, although they occur in an area in which (Endangered) Western Leopard Toads are known to breed (e.g. Zeekoevlei, Rondevlei and Bamboesvlei wetlands in Ottery), these wetlands are unlikely to remain inundated for long enough periods to support tadpoles of this species through their full growth period. They do however provide habitat for aquatic invertebrates including zooplankton (invertebrates found in these wetlands in June 2023 included ostracods, calanoids, cladocerans and cyclopoids) and, later in the season, probably insect taxa such as Coenagrionid damselflies, culicid (mosquito) and chironomid (midge) larvae, not collected in 2023.

West of the site, the area between the site and the Big Lotus River is disturbed and was under construction during both site visits, with upgrading of / repairs to sewer infrastructure underway. Nevertheless, there remain patches of seasonally saturated wetland in this area (W5 and W7 in **Figure 3.2**). These were dominated by *Juncus kraussii* sedges.

The Big Lotus River itself flows past the western site boundary. It is concrete canalised in these reaches and the canal means that even big floods are contained in the canal. Murray (2025) presents data from the City's data portal that indicate that the 1:50 year return interval floods are contained within the canal.



Figure 3.1

Site as shown in 2002 Google Earth imagery, showing infill edge at that time (arrowed) and suggesting long-term infilling. Compare with Photo A in Table 3.1

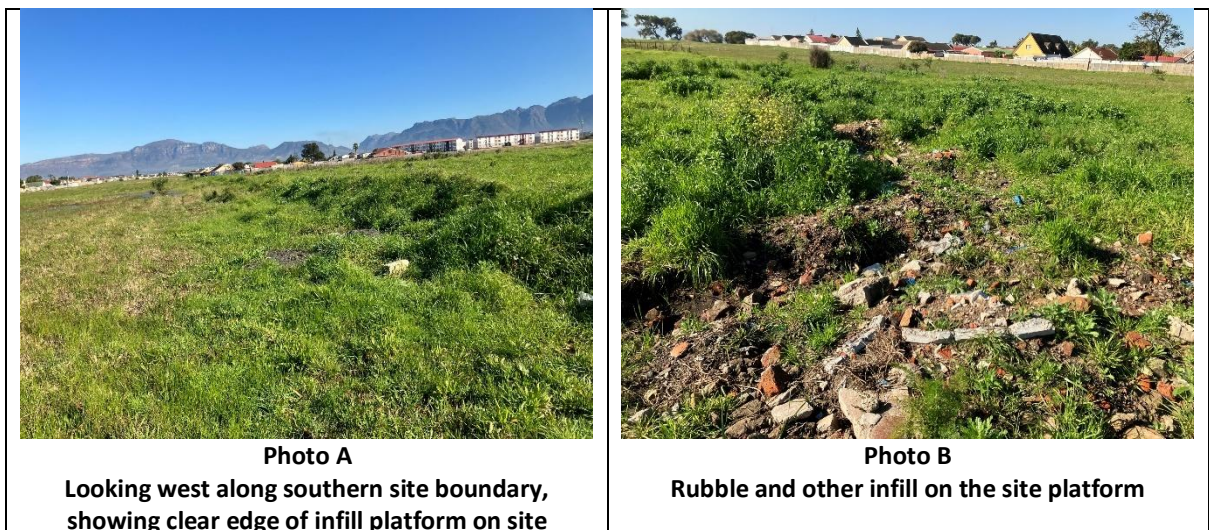


Figure 3.2

Wetlands as delineated in June 2023 on the basis of wet season ground-truthing, on-site augering and desk-top mapping (wetland delineation updated in May 2025).

Table 3.1

Photographic illustrations of Erf 6482 Grassy Park (photos from June 2023 and August 2024).
Wetland codes as per Figure 3.1



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Photo C Solid waste characterise the seasonal wetlands on the infilled site, in some cases perched on rubble	Photo D Most of the site comprises disturbed, infilled and degraded areas
	
Photo E Wetland W1 showing impacted water quality but still functional seasonal wetland habitat	Photo F Small patches of <i>Juncus kraussii</i> (wetland indicator species) on the site (e.g. W3)
	
Photo G Augered soil in W4, from 30 to 40 cm below the surface, showing gleying, surface saturation and organics in upper layer of soil horizon.	Photo H Extensive kikuyu grass over fill on much of the site – Photo G taken from augered soils in this area

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Photo I Weedy shrubs and kikuyu grass over fill on much of the site	Photo J Dumping of solid waste characterises W1, W3, W6 and parts of W4 (infilled wetland)
	
Photo K <i>Juncus kraussii</i> wetland west of site, and just east of the Big Lotus River (W7)	Photo L Larger patches of <i>Juncus kraussii</i> just east of the Big Lotus River and outside of the site boundary (W5)
	
Photo M Big Lotus River canal	Photo N Extensive seasonal wetlands in good condition south of the site



Photo O
Extensive seasonal wetlands (W2) south of site boundary

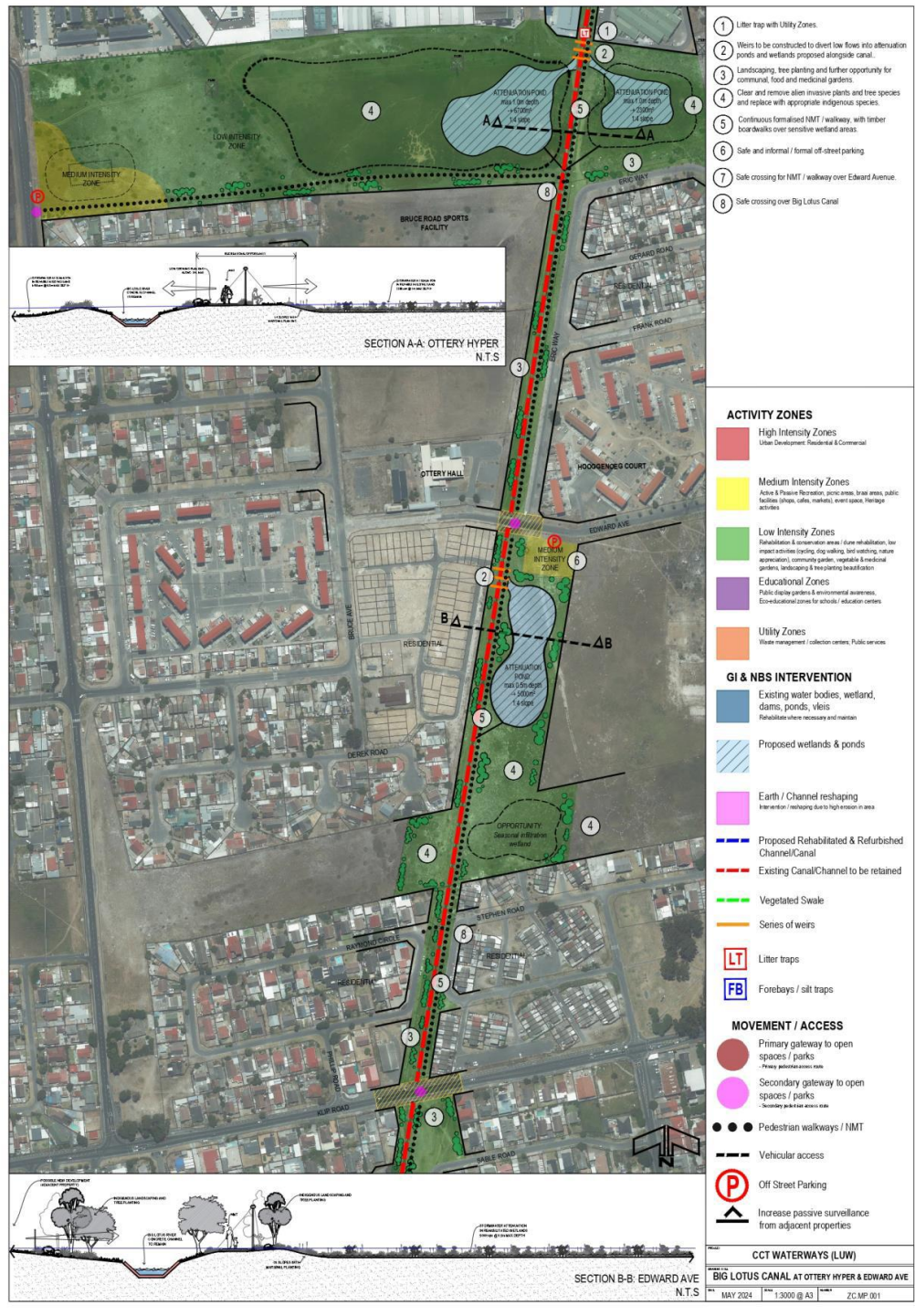


Photo P
Endemic and near-threatened *Aponogeton angustifolius* in wetland W2 south of site boundary

3.4.2 Site in the context of other initiatives

Turpie et al (2024) identified a number of sites along the Big Lotus River that have potential to contribute towards climate change resilience in urban areas, through the enhancement of green infrastructure. The area east of the Big Lotus River abutting Erf 6482 was identified in part of this study as potentially suitable for such initiatives. **Figure 3.3** shows the proposed interventions in this area, which would clearly also need to take cognisance of existing wetlands (W5 and W7). These should be considered in development planning for Erf 6482.

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3.4.3 Assumed river and wetland reference conditions

Prior to their development for agriculture, urban settlements and infrastructure such as roads, the Cape Flats in the Zeekoe Catchment included extensive, mainly seasonally inundated wetlands that developed between wind-blown sand dunes (referenced in Day 2024). Brown and Magoba (2009) cite early descriptions by Van Riebeeck in 1656, of the Cape Flats wetlands being interlinked, supporting abundant hippo and other wildlife and fed by water percolating through the dunes, rather than from formal rivers. The Big Lotus River itself is described in the above reference as comprising a string of seasonal wetlands, extending north of Zeekoevlei as far as Ottery. With the development of housing schemes in Nyanga and Gugulethu, as well as around the airport, the present Big Lotus River canal was constructed from the airport area, and the natural wetlands were channelised and then canalised.

The wetlands described above would have been fed mainly by groundwater from the Cape Flats aquifer. Development of Grassy Park meant hardening of parts of the catchment and this and the high winter water table led to flooding of houses close to Zeekoevlei and Rondevlei. The Big and Little Lotus River were therefore canalised, or channelised, with the Big Lotus River being extended all the way to the airport industrial area, north of the N2.

In the context of the above, it is clear that the Big Lotus River past the site is an artefact of stormwater management, while the seasonal wetlands on and abutting the site are probably more natural aquatic ecosystem remnants. Ironically, the concrete canal probably provides a level of protection to these wetlands, by separating them from polluted upstream flows (see Section 3.4.5) and preventing water table draw-down (because of the concrete lining).

3.4.4 Wetland classification

All of the wetlands identified in this study on and abutting the site, as shown in **Figure 3.2**, have been classified as depression wetlands, using the classification system of Ollis et al (2013).

3.4.5 Water quality

Water quality data were assessed only for the more natural wetlands associated with the site – that is, W2, with a single water sample being collected in August 2024, in the wet season in rainfall conditions. The laboratory certificate for these analyses is presented in Appendix C. While most variables included in the analyses were indicated as below limits of quantification, which in themselves were below levels of concern, the data did suggest:

- Relatively fresh water conditions as measured by electrical conductivity (50.9 mS/m) – conductivity would be likely to increase progressively as the wetland dried out in summer;
- pH that was neutral to mildly alkaline (7.71);
- Very low turbidity (3.05 NTUs);
- “Hard” water in terms of calcium carbonate (234 mg/CaCO₃/L) (DWAf 1996);
- Total ammonium (NH₄-N) concentrations at levels well below those where ammonia (NH₃) toxicity would be of concern, based on DWAf (1996) and DWAf (2008) guidelines;
- Orthophosphate (PO₄-P) (0.09 mg P/L) concentrations lay in the range suggestive of eutrophic conditions for standing water bodies and rivers (as per Day et al 2024 and DWAf 1996). This is supported by the fact that inundated areas, although characterized by clear water, included noticeable filamentous algae;
- Elevated copper concentration (0.002 mg/L) , just below the threshold for chronic

toxicity (DWAF 1996);

- Elevated dissolved uranium concentrations (0.016 mg/L): the ANZECC & ARMCANZ (2000) guideline notes that uranium toxicity in freshwater is inversely correlated with hardness – thus water hardness in these wetlands would tend to decrease potential uranium toxicity. The above guideline suggests a freshwater low reliability ²trigger value of 0.5 µg/L (0.0005 mg/L) for uranium – the value for the wetland lies well above this value and should thus be treated with concern. It is possible that elevated uranium in the wetland stemmed from contaminated rubble and brick infill on the site or in the vicinity – further assessment / confirmation of this issue is strongly recommended;
- Water quality in the Big Lotus River in these reaches is represented by the City's water quality monitoring point LR07, at Klip Road downstream of the site. Water quality data for this point (after Day et al 2024) suggest that water flowing through this site is routinely hypertrophic with regard to phosphate and nitrogen nutrients and often associated with elevated ammonia – the main source of these inflows is assumed to be from raw sewage from poorly serviced informal settlements in the upstream catchment (after Day et al 2024).

3.4.6 Wetland condition, wetland ecosystem services, wetland Ecological Importance and Sensitivity and wetland Conservation Importance

Table 3.2 presents the results of assessment of the ground-truthed aquatic ecosystems described above. These assessments were carried out using the methodologies outlined in Appendix B, noting however that wetland ecosystem services have been qualitatively described only.

Table 3.2
Results of assessment of the ground-truthed aquatic ecosystems
Methodologies as per Appendix B

Wetland type	Ecosystem services	PES	EIS	Conservation importance (wetland)
Wetlands on the site (W1, W6 and W3)	Perched wetlands on fill with some areas possibly connected to groundwater: flood attenuation; limited potential for sediment trapping given flat gradient; some potential for water quality amelioration; limited carbon storage; No amenity or recreational value at present – but could be important in a development context. Low biodiversity value	Category E	Moderate	Low –highly degraded
Partially infilled wetland W4	Infilled wetland saturated at depths of 30-40 cm and deeper below the surface	Category F	Negligible	Very Low

² "Trigger value" represents a concentration or load of a specific indicator that, if exceeded, suggests a potential risk of adverse effects on the ecosystem

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	and supporting mainly weedy plants and kikuyu grass: flood attenuation; limited potential for sediment trapping given flat gradient; no real potential for water quality amelioration; some carbon storage; no amenity or recreational value at present – but could be important in a development context; very low to negligible biodiversity value; some role as a buffer area to the more sensitive wetlands to the south and west (W2, and W5 and W7 respectively).			
Seasonal wetlands south of the site (W2)	Perched wetlands on fill with some areas possibly connected to groundwater: flood attenuation; limited potential for sediment trapping given flat gradient; some potential for water quality amelioration; some carbon storage; No amenity or recreational value at present – but could be important in a development context; Medium to high biodiversity value – support regionally endemic flora and fauna	Category C (moderately modified from natural)	High	High – important remnant wetlands that, although somewhat degraded and assumed to be species impoverished, nevertheless are important and rapidly disappearing habitat types, particularly in urban areas
Big Lotus River	The canal provides flood conveyance services as well as very low levels of water quality attenuation through exposure to the air.	Category F (critically modified through canalization with high levels of water quality impact)	Low	All watercourses have some conservation importance in the Bionet (see Snaddon and Day 2009).

3.5 Wetland Bioregion context

Watercourses within the study area lie in the **South West Fynbos Bioregion**, as identified in the 2018 National Biodiversity Assessment (NBA) of aquatic ecosystems (see Van Deventer et al 2018). All of the natural wetlands within the present study area are **depression** wetlands. South West Fynbos Depression Wetlands are rated in the NBA as Endangered and Poorly Protected.

3.6 Local and Regional Context in the Western Cape Biodiversity Spatial Plan and the City's Bionet

The Western Cape Biodiversity Spatial Plan (WCBSBP) is the product of a systematic biodiversity planning assessment that delineates Critical Biodiversity Areas (CBAs) and Ecological Support Areas (ESAs) which require safeguarding to ensure the continued existence and functioning of species and ecosystems, including the delivery of ecosystem services, across terrestrial and freshwater realms (Pool-Stanvliet et al 2017).

The City's ⁽³⁾2017) Bionet data for aquatic ecosystems is based on the same dataset as the WCBSBP. This dataset (see **Figure 3.4**) shows that the current site does not lie within any nodes or corridors that are included in the Bionet. However, two wetlands have been mapped in the City's 2017 dataset, roughly coinciding with those that were ground-truthed in the present assessment. The (2017) mapped wetlands and the Big Lotus River are all accorded conservation status in the City's wetland prioritisation layer (Snaddon and Day 2009). By implication, the wetlands identified on the site as part of this assessment and also shown in **Figure 3.4** would also have conservation status.

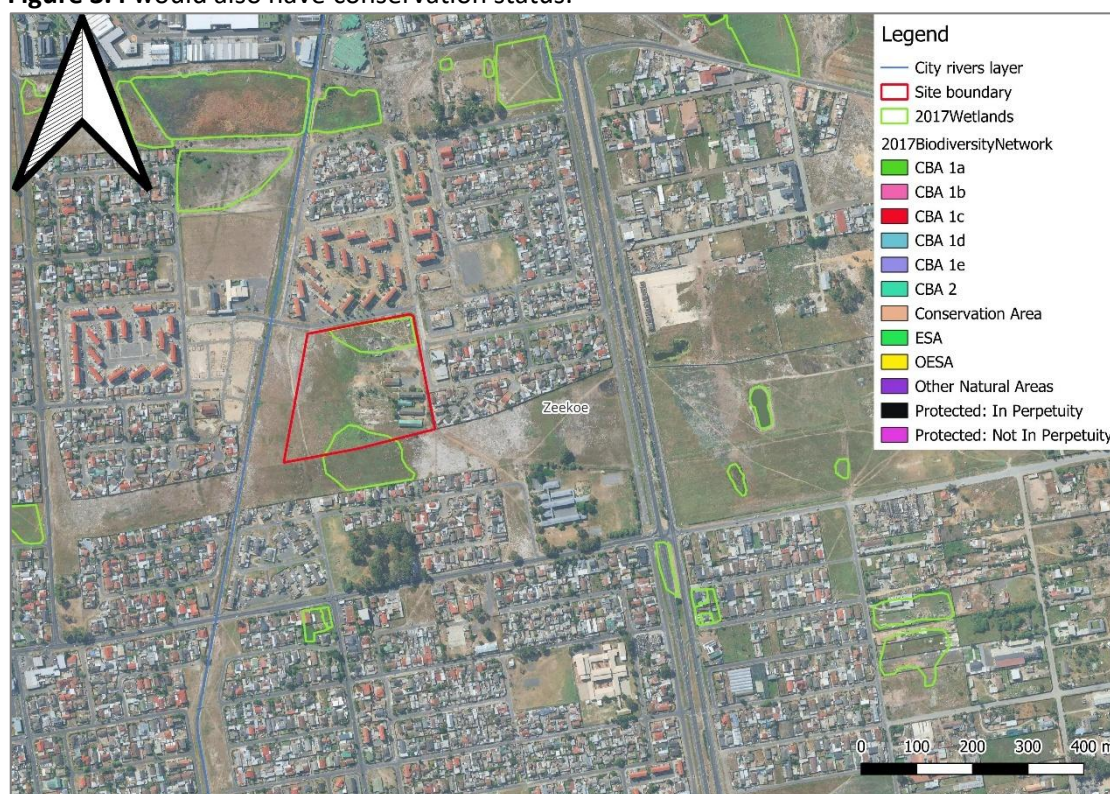


Figure 3.4

Site context in terms of the City's Bionet and wetlands layer, showing the presence of wetlands of at least some conservation importance from the City's 2017 wetland layer

³ At the time of this assessment, the City's updated aquatic Bionet had not yet been finalised

4 IMPACTS OF THE PROPOSED DEVELOPMENT ON AQUATIC ECOSYSTEMS

4.1 Development overview from an aquatic ecosystems perspective

The development as proposed in **Figure 2.1** and described in Section 2 would result in development over all of the wetlands identified within Erf 6482, barring the outer fringes of the partially infilled W4. The layout would include a minimum 20m setback from W2, between the wetland and any hardened development, as requested by the aquatic specialist during early project planning. This buffer would be used in part for the establishment of the proposed swales, included in the stormwater management plan. Along the western side of the site, a wide area of Public Open Space (POS) has been included west of the edge of the built portion. Within this space, two more swales would be located, as well as a wet extended detention (ED) pond, located west of the sewer servitude shown in **Figure 2.1**. The wet ED pond would have an area of 600 m² (R. Murray, pers. comm. to Liz Day, 12 May 2025).

4.2 Approach

The following sections identify and assess the implications of the development as proposed, noting that the iterative approach taken in this project has meant that more impactful proposals have been modified.

Table 4.1 provides a formal assessment of the identified impacts, using the methodology outlined in Appendix D.

4.3 Impacts associated with layout and design

4.3.1 Impact 1

Impact description: Wetland loss

The development would result in the definite loss of wetlands W1 (± 0.17 ha), W3 (± 0.0146 ha) and W6 (± 0.29 ha). These have been described as degraded remnants of what were likely to have been extensive seasonally inundated wetlands across large areas of this part of Grassy Park. Although the wetlands have been highly impacted by alien vegetation, dumping of solid waste, infilling and fragmentation (PES Category E), they still provide some ecosystem services (**Table 3.2**). They are depression wetlands in the South West Fynbos Bioregion, rated as Endangered and Poorly Protected in the NBA (see Section 3.5). The combined wetland loss would be ± 0.474 ha.

The development plan includes the loss of the more degraded (Category F) wetland W4, in which W1, W3 and W6 are nested (total area of W4 including W1, W3 and W6 = ± 1.55 ha). Although impacted with infill, this wetland area could be rehabilitable with effort, and seasonal wetlands of far better condition and with improved ecosystem function could be created, through the removal of infill and reshaping and establishment of indigenous wetland plants in this area. Such an outcome is however considered exceptionally unlikely, given the site's location, ownership and development pressures.

Taking into account the above reasoning, the combined loss of seasonal wetlands on the site is considered of Medium to High negative significance.

Recommended mitigation measures

There is no mitigation for the loss of wetlands. However, the following compensatory measures are recommended as essential, if the proposed development is authorised:

- i. The swale to the south of the development area abutting W2 should be spaced so as to allow for 10 m width between the southern edge of the swale and W2;
- ii. The swales to the west of the housing area, within Erf 6482, should be brought closer

to the edge of the development area (± 5 m), so as to act as a defined edge to the development and a protective buffer for the wetlands beyond;

- iii. The swales themselves should be planted with locally indigenous, hardy vegetation compatible with their locations abutting important seasonally inundated and (western side) rehabilitated wetland (see measure iv below) – input from a botanical specialist and a wetland ecologist should be obtained in this regard, and should be informed by detailed engineering design that considers the depth of the water table in the affected areas, in establishing swale depth;
- iv. The remaining part of the POS in the western area, excluding the areas designated for the stormwater ED pond, should be landscaped so as to create seasonally inundated wetland. This would be achievable by excavation of fill (on the remnant portion of W4) and creation of wetland in the area west of this area, so as to create wetlands that are:
 - a. Set at roughly the same level as those of W2;
 - b. Landscaped so as to create an area that “reads” as a mosaic of natural, shallowly inundated depressions (maximum 1:1 year wet season inundation of around 300 mm depth), interspersed by slightly higher lying mounds;
 - c. Planted with locally indigenous wetland vegetation, sourced from plant stock in the Zeekoe catchment, and dominated by *Juncus kraussii* plants, to achieve a density of 80% by area before site hand-over;
 - d. Reasonable compensation for the loss of wetland in the rest of the site (impacted wetlands with PES variously Category E and F – rehabilitated wetlands to be REC Category C/D);

The above would reduce the likelihood of informal settlement within these open spaces. The wetland area would probably need to grade up into slightly higher lying mosaic areas across the sewer servitude and towards the ED pond;

- v. The proposed ED pond should:
 - a. Include an accessible forebay for removal of sediment and solid waste (although it is assumed in fact that most of this material would be collected in the swale systems);
 - b. Be landscaped so as to include seasonally shallowly inundated wetland margins on the outer edges of the pond, in which similar habitat to that in W2 could be created – allowance must be made for sourcing of locally indigenous wetland plants for these areas, which would lie outside of the hard-working functional parts of the ED pond, but would contribute towards improved biodiversity and provide additional shallow (<300 mm deep) seasonally inundated wetland habitat, suitable for the use by wading birds in the wet season – these margins should average at least 10 m in width;
- vi. It is assumed that the site would be fenced. In this regard, it is recommended that:
 - a. Fencing or boundary controls should use palisade fencing rather than walls;
 - b. Fencing should be located along the outside edge of the site boundary on the western edge, to prevent external dumping into the stormwater ponds and rehabilitated wetlands;
 - c. Fencing along the western boundary could include access to the ED pond for maintenance purposes, without having to cross through the rehabilitated

wetland recommended in this section;

- d. Fencing along the southern site boundary should allow for at least 5m between the fence and the edge of W2. The rationale for this is that this part of the site is less accessible for external dumping but may well become a desire line for pedestrians who formerly crossed through the current site. In that event, an unintended consequence of closing off the development with a fence along the edge of W2 could be the creation of informal paths and crossing areas through W2, thus degrading it. This measure thus seeks to provide potential space for such pedestrian movement outside of W2;
- vii. Given concerns raised in Section 3.4.5 regarding the presence of uranium in wetland surface water, the quality of fill on the site should be assessed for potential sources of this and other contaminants of concern, and their appropriate disposal would need to be informed by the outcomes of this investigation, which would need to be carried out during detailed site planning. Such investigations should be further informed by the results of repeat wet season sampling of W2 for water quality assessments.

The above measures must be in place before handover of the first phase of development for occupation, and all swales and detention ponds must be completed, even if not yet connected to upstream stormwater channels and pipes.

4.4 Construction phase impacts

4.4.1 Impact 2

Impact description: Wetland degradation

The greatest threat to the seasonal wetland mosaic W2 and (to a lesser degree) wetlands W5 and W7, would occur during the development construction phase. Given the proximity of construction to wetlands in the adjacent areas, it is likely that, without application of serious mitigation measures, that these wetlands would be negatively impacted by:

- Changes in water quality (inflows of cement or otherwise contaminated water);
- Physical damage during construction as a result of the passage of vehicles / construction machinery over these areas;
- The accumulation of construction material such as cement bags, as well as waste from construction workers (e.g. cool drink bottles and other waste).

The potentially affected wetlands provide habitat *inter alia* (in the case of W2) to locally indigenous wetland plants including the Western Cape endemic *Aponogeton angustifolius* as well as to aquatic invertebrate communities, the natural habitats of which are severely threatened (rated Endangered and Poorly threatened in the NBA 2018 assessment).

The above impacts would be associated (as a worst case scenario) with impacts of High negative significance, given the high ecological importance and sensitivity and conservation importance of these wetlands.

Recommended mitigation measures

The following measures are recommended as essential:

- i. The edge of wetland W2, buffered by an additional area of 10 m (see impact mitigation for Impact 1), should be fenced off from the development, using temporary fencing that prevents machine and human access to this area during construction and prevents the runoff of sediment-rich water from the site – the area south of the 10m zone should be regarded as a “no go” area during construction;

- ii. The western site boundary should also be fenced off with temporary fencing;
- iii. “Temporary fencing” should comprise robust fencing that prevents access by humans; is highly visible to machine operators; and also prevents water borne sediment access and wind-blown litter access – entrenched shade-cloth / wind-break netting is thus recommended, although alternatives that meet the same objectives would be supported;
- iv. A Construction Phase Environmental Management Programme (CEMP) should be compiled and implemented such that construction-associated sediment and runoff of contaminated material (e.g. sediment, oils, fuel, cementitious water) is contained within the buffered erf (i.e. within the erf and allowing for a 10 m wide setback from W2);
- v. Compliance with the above “no go” areas south of the swale construction zones (W2 area) and the western site boundary should be strictly enforced by the site Environmental Control Officer (or similar designation);
- vi. Construction of the ED pond and swales should take place outside of the wet season – thus between October and end of May only in any year, as once these areas are saturated or inundated, impacts to remnant wetlands outside of the site would increase – the mitigation measures for the swales and pond outlined for Impact 1 should be considered in planning construction of these systems.

4.5 Operational phase impacts

4.5.1 Impact 3

Impact description: Ongoing wetland degradation and loss

The proposed development would result in housing development in close proximity to wetlands of high ecological importance (W2 in particular, but also W5 and W7). These wetlands have hitherto been buffered from impacts by the undeveloped portion of Erf 6482, which has hitherto borne the brunt of issues such as illegal dumping. The proposed development of Erf 6482 for housing would potentially simply bring all of these impacts closer to these areas, resulting in increased opportunities for dumping of solid waste into adjacent open space areas. If the development included backyard development, such impacts would be compounded by likely impacts on water quality runoff and solid waste accumulation, largely as a result of the actual population in the proposed development being significantly (up to four times) increased from design levels.

These impacts are considered likely and have been rated as of Medium to High negative significance.

Recommended mitigation measures

- i. The development typology shown in **Figure 2.1** should be implemented – specifically with regards to the location of two-storey units along the western edge of the development and parts of the southern edge of the development – two-storey units are (often) less likely to be associated with additional backyard development than single storey development;
- ii. Two-storey units should also be extended along the full length of southern boundary of the site – again, this is to decrease the threat of backyard settlements – if necessary, this development change could be offset by a reduction in two-storey units along the northern site boundary, provided that the western boundary was always edged by two-storey units;
- iii. Servicing (sewage, solid waste collection and stormwater management) should be

sized so as to assume the presence of backyard settlements in all plots other than, potentially, two-storey units – this means, allowing for up to four additional backyard residential units on each plot, potentially resulting in a four-fold increase in solid waste, sewage reticulation and waste water treatment requirements;

- iv. The capacity for all of the above additional servicing requirements should be confirmed by the relevant sewage reticulation, WWTW and urban waste departments of the City, prior to any development authorisation;
- v. Weekly removal of solid waste from the POS area shown in **Figure 2.1** west of the development and along the southern buffer area and its swales would be required and should be committed to as a condition of the proposed development authorisation;
- vi. Capacity for ongoing maintenance of the stormwater system presented in Murray (2025) should also be confirmed by the Client, and this should be an auditable measure going forward;
- vii. All road edges abutting the southern and western edges of the development should be edged with bollards, spaced at sufficient distances apart so as to limit access for dumping from vehicles.

Table 4.1 shows the significance of this impact with mitigation as Low to Medium, given low confidence in actual mitigation implementation with regard to service delivery requirements. This significance rating could be improved to Low if a service level agreement was entered into between the client and the City of Cape Town, or an alternative service provider, guaranteeing levels of service delivery in line with actual populations and service demand.

4.5.2 Impact 4

Impact description: Incremental degradation of the Big Lotus River

The Big Lotus River is currently in a state of critical degradation with regard to water quality, and is the main source of water quality impacts into Zeekoevlei. Zeekoevlei is itself in a critical condition, with inflows from the Big Lotus River being the most significant threat to the sustainability of this important water body (Day et al 2024).

The proposed development would potentially increase (already high) levels of solid waste dumping into the river and, if the development included high levels of informal / backyard settlement, would also potentially increase pollution sources into the river system, from dumping of night soils and/or domestic waste water into the river and/or stormwater system. Increased unmanaged solid waste in the development would further increase the likelihood of sewage blockages and overflows into the stormwater system, exacerbating current levels of pollution in the system.

These impacts are again considered likely and have been rated as of Medium significance.

Recommended mitigation measures

- i. The client should commit to funding of the design, construction and ongoing maintenance of a solid waste interceptor fence in the Big Lotus River immediately downstream of the site or in a nearby suitable location. This measure would need to:
 - a. Take cognisance of learnings from existing solid waste interceptors in the Big Lotus River, through liaison with the Friends of Zeekoevlei and Rondevlei (FOZR)'s implementing team and the City's CSRM team;
 - b. Allow for ongoing clearing of the litter fence on at least a twice weekly basis;
 - c. Arrange for the removal of cleared solid waste on at least a weekly basis by

Urban Waste Management.

This mitigation measure takes note of the fact that the Big Lotus River lies outside of the property cadastral. However, the measure can be readily implemented in liaison with the City of Cape Town, as has already been shown in other parts of the catchment, where external agents (e.g. The Litter Boom Project) have provided similar interventions. Partnering with the City and/or agencies such as The Litter Boom Project should be considered in implementing this measure, which should be fully operational by the time Phase 1 is completed.

4.6 Cumulative Impact Assessment

The proposed development would, if approved, take place in the context of increasing levels of visible degradation in the surrounding area as a result of crime, gangsterism, poverty and increasing water quality issues stemming from upstream sources of raw sewage into the Big Lotus River (e.g. Day et al 2024). The association of relatively low cost housing in these and other similar parts of Cape Town is often with increased levels of dumping of solid waste in the surrounding areas, including rivers and wetlands. In many cases, this is at least in part the result of significantly increased numbers of residents in the area, well beyond the original design intention, as a result of backyard rentals. Unless a concomitant effort is made to increase the frequency and volume of solid waste collection at source (i.e. from households), the proposed development would contribute to this excessive loading of solid waste, with its knock-on impacts on the quality of important remnant seasonal wetlands (e.g. W2).

The development could also contribute to this area becoming an additional pollution hot-spot along the Big Lotus River, if the above threats transpire. This would be unfortunate, as despite upstream pollutants within the river, there is relatively little solid waste dumping along the channel in the vicinity of the site.

Deterioration of the condition of the Big Lotus River corridor in this area would furthermore impact negatively on the viability of the site for implementation of green infrastructure projects already proposed for this area (e.g. Turpie et al 2024).

The above said, if the mitigation measures proposed in this report are implemented, particularly with regards to a firm commitment to increased frequency and volumes of solid waste collection from the development, along with rehabilitation of portions of the infilled W4, the cumulative impact of the development would be more positive, and address to some degree the ease of dumping into a derelict site.

4.7 Assessment of the No Development Alternative

In terms of the no-development alternative, it is assumed that the site would remain derelict and subject to high levels of ongoing criminality and dumping along the accessible (by road) northern and eastern margins of the site. Rehabilitation of any of the infilled wetlands on site is moreover highly unlikely, and in fact it is assumed that infilling and further pollution of the degraded wetlands W1, W3 and W5 would continue over time. In addition, if the source of contaminants noted in Section 3.4.5 is associated with existing infill on the site, then this would continue to leach into shallow surface groundwater.

On the other hand, the most important seasonal wetland areas (W2) near the site are in fact buffered from dumping and disturbance by the presence of the derelict site, making them less likely to be impacted on directly by dumping.

The anticipated increase in solid waste accumulation in open space areas on and near to the site as a result of inadequately serviced households would also not take place.

Consideration of the implications of the no-development alternative is thus complex. However, in the event that the full suite of impact mitigation, avoidance, management,

maintenance and on-site compensatory rehabilitation measures outlined in this report were implemented, on an ongoing basis, then the development alternative would be mildly preferred to the no-development alternative. There is however low confidence in effective implementation of the long-term operation phase mitigation measures being implemented. Thus strict auditing and effective policing would be required.

4.8 Impact summary

Table 4.1 provides the outcomes of the formal assessment of impact significance, based on the methodology outlined in Appendix D.

Table 4.1
Outcomes of formal assessment of impact significance – see Appendix C for assessment methodology

SUMMARY OF IMPACTS		
IMPACTS ASSOCIATED WITH DESIGN AND LAYOUT		
Potential impact and risk:	Impact 1: Wetland loss	
	No mitigation	With mitigation
Nature of impact:	Negative	Negative
Extent and duration of impact:	Local and Permanent	Permanent
Intensity of impact or risk:	Medium	Medium
Probability of occurrence:	Definite	Definite
Degree to which the impact may cause irreplaceable loss of resources:	Local	Immediate
Degree to which the impact can be reversed:	Irreversible once development constructed	Irreversible once development constructed
Indirect impacts:	Possible knock-on impacts on adjacent sensitive wetlands	Possible knock-on impacts on adjacent sensitive wetlands
Significance rating of impact prior to mitigation (e.g. Very Low, Low, Low-Medium, Medium, Medium-High, or High)	Medium to High	
Degree to which the impact can be avoided:	None (if development proceeds)	
Degree to which the impact can be managed:	None	
Degree to which the impact can be mitigated:	Only through on-site compensation	
Proposed mitigation:	See Section 4.3.1 (mitigation sections)	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High or High)		Low (negative)
CONSTRUCTION PHASE IMPACTS		
Potential impact and risk:	Impact 2: Wetland degradation	
	No mitigation	With mitigation
Nature of impact:	Negative	Negative
Extent and duration of impact:	Local and Medium-term	Immediate and Short-term
Intensity of impact or risk:	High	Low

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Probability of occurrence:	Highly probable	Low probability
Degree to which the impact may cause irreplaceable loss of resources:	High	Low
Degree to which the impact can be reversed:	Reversible with effort	Reversible
Indirect impacts:	Possible knock-on impacts on the Big Lotus River as a result of uncontained runoff	Unlikely
Significance rating of impact prior to mitigation (e.g. Very Low, Low, Low-Medium, Medium, Medium-High, or High)	High (negative)	
Degree to which the impact can be avoided:	High	
Degree to which the impact can be managed:	High	
Degree to which the impact can be mitigated:	High	
Proposed mitigation:	See Section 4.4.1 (mitigation sections)	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High or High)		Low (negative)
OPERATIONAL PHASE IMPACTS		
Potential impact and risk:	Impact 3: Ongoing wetland degradation and loss (W2, W5 and W7) No mitigation	With mitigation
Nature of impact:	Negative	Negative
Extent and duration of impact:	Local and Long-term	Immediate and Short-term
Intensity of impact or risk:	Medium	Low
Probability of occurrence:	Highly probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	High	Immediate
Degree to which the impact can be reversed:	Essentially irreversible	Reversible with effort
Indirect impacts:	Possible knock-on impacts on the Big Lotus River as a result of uncontained runoff	Unlikely
Significance rating of impact prior to mitigation (e.g. Very Low, Low, Low-Medium, Medium, Medium-High, or High)	Medium to high (negative)	
Degree to which the impact can be avoided:	Medium	
Degree to which the impact can be managed:	Medium with effort	

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Degree to which the impact can be mitigated:	High	
Proposed mitigation:	See Section 4.5.1 (mitigation sections)	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High or High)		Low to medium (negative) - because of low confidence in actual adequate implementation
Potential impact and risk:	Impact 4: Incremental degradation of the Big Lotus River No mitigation	With mitigation
Nature of impact:	Negative	Negative
Extent and duration of impact:	Local and Long-term	Local and Long -term
Intensity of impact or risk:	Medium	Low
Probability of occurrence:	Highly probable	Probable
Degree to which the impact may cause irreplaceable loss of resources:	Low	Low
Degree to which the impact can be reversed:	Reversible with major costs (remediation in downstream Zeekoevlei system)	Reversible with major costs (remediation in downstream Zeekoevlei system)
Indirect impacts:	<u>Contribution</u> to nutrient enrichment and accumulation of solid waste in Zeekoevlei, adding to management burden and increasing frequency of dredging and other interventions	None -other than increased at-source management effort and costs in line with impact source
Significance rating of impact prior to mitigation (e.g. Very Low, Low, Low-Medium, Medium, Medium-High, or High)	Medium (negative)	
Degree to which the impact can be avoided:	Low	
Degree to which the impact can be managed:	Medium	
Degree to which the impact can be mitigated:	Medium	
Proposed mitigation:	See Section 4.5.1 (mitigation sections)	
Significance rating of impact after mitigation (e.g. Low, Medium, Medium-High or High)		Low (negative)
"NO DEVELOPMENT" ALTERNATIVE		
Potential impact and risk:	Wetland degradation in a no development scenario (compared to present)	
Nature of impact:	Negative	
Extent and duration of impact:	Local and Permanent	
Intensity of impact or risk:	Low to Medium	

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Probability of occurrence:	Highly probable
Degree to which the impact may cause irreplaceable loss of resources:	Moderate – may affect W2 although the wetland is moderately buffered by infilled W4
Degree to which the impact can be reversed:	Essentially irreversible
Indirect impacts:	Long term increasing likelihood of overflow and seepage of solid waste from the site
Significance rating of impact prior to mitigation (e.g. Very Low, Low, Low-Medium, Medium, Medium-High, or High)	Medium (negative)

5 RESPONSE TO SPECIFIC REQUIREMENTS OF THE NEMA IMPACT ASSESSMENT PROTOCOLS

The National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998) assessment protocols, as amended, were promulgated in Gazette No. 42451, Government Notice No. 648 of 10 May 2019. These comprised procedures for the Assessment and Minimum Criteria for Reporting of Identified Environmental Themes in terms of Section 24(5)(a) and (h) of the NEMA, when applying for Environmental Authorisation.

Although these issues have been considered indirectly in the Sections 3 and 4, this section has been included to address each point raised in the amended assessment protocol specifically. Where relevant, the reader is referred to the section of the overall report where the issue has been addressed already.

Table 5.1

Response to specific questions relating to the environmental impact of the proposed development on aquatic ecosystems

ISSUE	RESPONSE – note that all responses assume that Mitigation measures have been applied
Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Potentially so, assuming that full mitigation measures are implemented, that will protect adjacent seasonal wetlands and improve the quality of portions of (currently infilled) wetland on the site.
Is the development consistent with maintaining the Resource Quality Objectives (RQOs) for the aquatic ecosystems present?	No RQOs have been developed specifically for wetlands. The development would not <u>detract</u> from the potential for the Big Lotus to reach its required minimum REC of Category D – although the river is unlikely to achieve this without major interventions upstream. With full mitigation implementation, W2 and other adjacent seasonal wetlands should be maintained in their required condition – however commitment from the City of Cape Town to provide the required level of servicing would be required.
How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including: Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood	These ecosystem services (flood attenuation, sediment regime, water quality amelioration

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regimes (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); and • Change in the sediment regime (e.g. sand movement, meandering river mouth/estuary, changing flooding or sedimentation patterns) of the aquatic ecosystem and its sub-catchment; • The extent of the modification in relation to the overall aquatic ecosystem (i.e. at the source, upstream or downstream portion, in the temporary / seasonal / permanent zone of a wetland, in the riparian zone or within the channel of a watercourse, etc.). • Assessment of the risks associated with water use/s and related activities.	should be provided by the stormwater management system. The Big Lotus River's flooding regime and floodplain processes have already been permanently impacted by past canalization and would not be impacted further by the development. The development would destroy some degraded and infilled seasonal wetland habitat. It should however reinstate other areas of infilled wetland and landscape and plant these so as to create extensive seasonal wetland areas in the western POS area. The development would include Section 21 c and 21 l water use activities. The Risk associated with the proposed development would not be Low, because the development includes the passage of sewers across (infilled) wetland; the infilling of extant (but degraded) wetlands; and potential threats to important wetland systems.
How will the development impact on the functionality of the aquatic feature, including: • Base flows (e.g. too little/too much water in terms of characteristics and requirements of system); • Quantity of water including change in the hydrological regime or hydroperiod of the aquatic ecosystem (e.g. seasonal to temporary or permanent; impact of over abstraction or instream or off-stream impoundment of a wetland or river) • Change in the hydrogeomorphic typing of the aquatic ecosystem (e.g. change from an unchanneled valley-bottom wetland to a channeled valley-bottom wetland). • Quality of water (e.g. due to increased sediment load, contamination by chemical and/or organic effluent, and/or eutrophication) • Fragmentation (e.g. road or pipeline crossing a wetland) and loss of ecological connectivity (lateral and Longitudinal) . • The loss or degradation of all or part of any unique or important features (e.g. waterfalls, springs, oxbow lakes,	Remnant seasonal wetlands: no change (because stormwater system would manage changes in flow) Compensatory (presently infilled wetlands): Improvement in hydrology because of rehabilitation activities; Wetlands on development platform – loss of hydrology (but function replicated in stormwater system) No change Should be no change if stormwater management systems and solid waste clearance effected as required; rehabilitation of compensatory (presently infilled wetlands) might improve water quality if potentially contaminated infill was removed; None

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meandering or braided channels, peat soils, etc.) associated with or within the aquatic ecosystem.	
How will the development impact on key ecosystem regulating and supporting services especially: • Flood attenuation; • Streamflow regulation; • Sediment trapping; • Phosphate assimilation; • Nitrate assimilation • Toxicant assimilation; • Erosion control; and • Carbon storage.	Managed through stormwater management system N/A Managed through stormwater management system Managed through stormwater management system N/A Compensatory wetland mitigation and implementation of other mitigation measures re swale and ED pond would address this issue.
How will the development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	With mitigation should not impact on ecosystem function and plant and animal community structure in existing wetlands of high conservation value (e.g. W2) and might increase the extent of these (i.e. rehabilitation of sections of W4 along the western property edge
In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered in relation to: • Size of the estuary; Availability of sediment; • Wave action in the mouth; • Protection of the mouth; • Beach slope; • Volume of mean annual runoff (MAR); • Extent of saline intrusion (especially relevant to permanently open systems).	Not applicable
A motivation must be provided if there were development footprints identified as having a "low" biodiversity sensitivity and were not considered appropriate.	The assessed development footprint would have a lesser impact than previous iterations.

6 APPLICABILITY OF THE NATIONAL WATER ACT TO THE PROPOSED DEVELOPMENT

6.1 Identification of water uses

The proposed development of Erf 6482 would, in addition to triggering aspects of the NEMA already assessed in Sections 4 and 5, also potentially require authorisation and/or registration in terms of the National Water Act (NWA) (Act 36 of 1998), if they included any water uses. Section 21 of the NWA defines a range of water uses. Of these, the following are potentially applicable to the proposed development:

- c. impeding or diverting the flow of water in a watercourse (possible periodic diversion for sewer repairs or replacement);*
- i. altering the bed, banks, course or characteristics of a watercourse (excavation to access existing pipes for maintenance or replacement, and associated impacts to water quality and watercourse condition).*

6.2 Applicability of GN 4167 (December 2023) to the proposed Section 21c and i water uses

GN 4167 presents revised conditions for General Authorisation (GA) of Section 21c and i water uses in terms of the National Water Act. If the GA applies to a development, then there should be no need for licensing of Section 21c and i water uses, although their registration would be required before they could be implemented (Section 7(7) of GN 4167) and they would be subject to various conditions, as outlined in Section 7 of the GA.

Exclusions to GN 4167 include however the following, relevant to the proposed development:

- 3. This Notice does not apply -A person who –*

[...]

(e) to any section 21 (c) or (i) water use associated with construction / installation or maintenance of main or bulk sewerage pipelines, French drains, pipelines carrying hazardous materials.

Activities that are NOT excluded from the above include “minor sewerage connections to main sewers” provided that the maximum flow in the pipelines are below the 120 l/s threshold.

If the mitigation measures outlined in this report that require allowance to be made for up to four times the households allowed for in the formal development proposal in development areas. The required accommodation of such a population in sewerage and solid waste collection services would potentially result in total pipeline capacity exceeding the above threshold where GN 4167 is applicable. This requires confirmation from the Engineering consultants on this project.

In addition, the proposed development would impact on multiple wetlands, at varying degrees of magnitude. Section 4 of this report makes it clear that, while generally mitigable to levels below High negative (i.e. a no development recommendation), the impacts potentially associated with the proposed development would be complex and none of these have been rated as Low in the impact assessment tables of Section 4.

A Risk Assessment Matrix for the Section 21c and 21i activities would similarly not result in a Low Risk outcome, and thus GN 4167 is considered inapplicable to this project.. A full water use licence would thus be required, This is not entirely problematic, as a WULA would allow relevant rather than generic conditions of authorisation to be included in the licensing conditions, thus making a licence more project-specific and auditable.

7 CONCLUSIONS

This report has assessed the likely implications of the proposed development of Erf 6482 Grassy Park for aquatic ecosystems on, and in particular in the vicinity of, the site.

The site is highly degraded and has a long history of infilling. Large areas do however remain functional wetlands (seasonally saturated within the top 500 mm of the surface), albeit no longer seasonally inundated, or inundated only as a result of probable excavation into infill. Of more importance from an aquatic ecosystems' perspective are extensive seasonal wetlands in good condition outside of the site, and in particular running parallel with its southern boundary.

All of the natural wetlands within and in the vicinity of the study area including the above are South West Fynbos **depression** wetlands. South West Fynbos Depression Wetlands are rated in the NBA as Endangered and Poorly Protected in the NWM (v5) of Van Deventer et al (2019).

The proposed development would result in development over all of the seasonally inundated (but highly degraded and manipulated) wetlands identified within Erf 6482 itself, barring the outer fringes of the infilled wetland area, which extends across much of the site.

Proposed stormwater swales and an ED pond would be included in the development layout to address potential stormwater runoff impacts. Some of the swale area would be located in the recommended 20 m setback from the important seasonal wetlands outside of the site.

The impact assessment found that on-site wetland loss would be definite and that off-site wetland degradation would be highly likely in a development context without mitigation, notwithstanding that the development layout has already responded to concerns raised from a freshwater perspective during early planning stages. Layout and Operation phase impacts would be associated with impacts of Medium to High negative significance, while Construction phase impacts could have impacts of High negative significance, largely because of concerns around knock-on impacts to the important seasonal wetlands to the south and west of the site. Operational phase impacts centred on an assessed high probability of single-storey residential stands, inadvertently allowing for backyard settlements, and the low likelihood of adequate servicing of these additional populations in terms of solid waste and sewage management. Concerns around the accumulation of solid waste in sensitive wetlands adjacent to the site were thus also raised.

Despite the Medium to High and High significance ratings of the development without mitigation, there are numerous potential measures that could reduce these impacts to more acceptable levels. Design and layout phase measures could not directly address loss of already degraded wetland. However, the report recommends compensatory rehabilitation of infilled areas outside of the building footprint, as well as other measures, such as slight adjustments of the footprints of the swales and the design of the ED pond.

Construction phase impacts could generally be avoided, managed and mitigated, and again could be reduced to Low, provided that sufficient effort and urgency is applied to the implementation and enforcement of these measures. Operational phase measures are considered most problematic, as although not complex, they require buy-in from the City of Cape Town to provide adequate servicing of solid waste and sewage to allow for the assumed increase in population size, over and above that allowed for by the formal development. Although the measures recommended should readily reduce impact significance to Low significance, low confidence in their actual implementation means that the assessment with mitigation yields a Low to Medium significance rating. This significance rating could however be improved to Low, if confidence in implementation could be improved (e.g. through an appropriate service level agreement).

Alternative development layouts that allowed for the retention of existing wetlands W1, W3 and W6 were not considered feasible or desirable development alternatives, given the extent of degradation of the existing wetlands (infill, dumping) and the likelihood that these would simply become further contaminated and disturbed wetland fragments if retained within the proposed development. Such alternatives were not therefore further developed as part of this project.

In terms of the no-development alternative, it is assumed that the site would remain derelict and subject to high levels of ongoing criminality and dumping along the accessible (by road) northern and eastern margins of the site. Rehabilitation of any of the infilled wetlands on site is moreover highly unlikely, and in fact it is assumed that infilling and further pollution of the degraded wetlands W1, W3 and W5 would continue over time.

On the other hand, the most important seasonal wetland areas south of the site are currently buffered from dumping and disturbance by the presence of the derelict site, making them less likely to be impacted on directly by dumping without formal site development and the anticipated increase in solid waste accumulation in open space areas on and near to the site as a result of inadequately serviced households would also not take place.

Consideration of the implications of the no-development alternative is thus complex. However, in the event that the full suite of impact mitigation, avoidance, management, maintenance and on-site compensatory rehabilitation measures outlined in this report were implemented, on an ongoing basis, then the development alternative would be mildly preferred to the no-development alternative.

With full implementation of the avoidance, mitigation, management and compensation measures outlined in this report, the proposed development would be considered acceptable from a freshwater ecosystems perspective.

A water use licence application for Section 21c and 21i water uses would however be required.

Given the finding of elevated uranium in the seasonal wetland abutting the site, it is recommended that additional water samples should be collected and analysed from the assessed wetland as well as others in the vicinity, to confirm these findings, and inform the need for specific interventions. Replicate samples should be analysed at at least two different accredited laboratories and the results used to inform further interventions if any, and the relevant party /parties for its implementation.

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APPENDIX A
SPECIALIST CV

LIZ DAY'S CURRICULUM VITAE

SUMMARY DOCUMENT (2025)

Name	Dr Elizabeth (Liz) Day (née Reynolds)
Address	6 Flamingo Crescent, Zeekoevlei, 7941, Cape Town, South Africa
Cell number	083 454 2309
Email	liz@lizdayconsulting.co.za
Date of birth	3 May 1968
Place of birth	Zimbabwe
Nationality	South African
Current Position	Director: Liz Day Consulting (Pty) Ltd

Liz Day is a **Freshwater Ecologist** who provides specialist input into river and wetland ecosystems management and rehabilitation, water quality, baseline assessments, impact assessments, wetland offset determinations, strategic planning and review and other aspects of aquatic ecosystem consulting. She has particular experience in working in rehabilitation and management of urban and agricultural areas, across a wide range of socio economic conditions.

KEY WORK EXPERIENCE

2019 -	Specialist consultant on freshwater ecosystems (rivers and wetlands) – Liz Day Consulting (Pty) Ltd
1999- 2019	Specialist consultant on freshwater ecosystems; co-founder of Freshwater Consulting (FCG)
1997 - 1999	Senior Consultant for Southern Waters Ecological Research and Consulting cc
1994 - 1996	Scientific Officer on Water Research Commission Project, Freshwater Research Unit, UCT.

SUMMARY OF RELEVANT EXPERIENCE

> 30 years' experience in aspects of aquatic ecology, specialising in:

- Water quality - river, vlei and wetland water quality monitoring, data analysis and interpretation as well as urban stormwater quality, pollution tracking and pollution abatement assessments;
- Lake, wetland and river rehabilitation, (ecological) design and management;
- Urban river and wetland management and rehabilitation;
- Stormwater design with respect to freshwater ecosystems and water quality amelioration;
- Specialist input into environmental impact assessments; baseline and situation assessments;
- DWS Risk Assessments;
- Wetland Offset calculations and agreements;
- Catchment and River Management Plans;
- River corridor plans;
- River and wetland Maintenance and Management Plans;
- River and wetland mapping and biodiversity planning;
- Wetland and riparian area delineation;
- SASS5 bioassessments.

Liz has compiled over 1000 specialist riverine ecology technical reports, 12 scientific papers (6 in international literature); 20 popular biological articles published in local environmental magazines, scripts for several environmental documentaries; *ad hoc* lecturer in freshwater ecology at UCT; co-author on 5 Water Research Commission reports; lead author on chapter in UNESCO Sustainable Management of Urban Aquatic Ecosystems handbook; lead author on chapter in Fynbos Ecosystem Management book; project leader and author of WRC Technical Manual for River Rehabilitation in South Africa (2016). She has also sat on the Reference Groups / Steering Committees of numerous Water Research projects, including those relating to wetland ecological infrastructure, wetland rehabilitation monitoring protocols, Sustainable Urban Drainage Systems (SUDS) and Water Sensitive Urban Design (WSUD) in the City of Cape Town and eThekweni Municipalities.

KEY QUALIFICATIONS

- Bachelor of Arts (English), University of Cape Town, 1989
- Bachelor of Science (Zoology and Environmental and Geographical Science); University of Cape Town; 1992
- Bachelor of Science (honours- Zoology, first class); University of Cape Town, 1993
- PhD (Zoology / Marine Biology); University of Cape Town, 1998

PROFESSIONAL AFFILIATIONS AND MEMBERSHIPS

- Registered Professional Natural Scientist by SACNASP (Reg No 004806)
- Member of WISA, IAIA-SA and Society for Ecological Restoration (SER) (African Chapter)
- Member of False Bay Nature Reserve Protected Area Advisory Committee
- Member – Section 80 Mayoral Advisory Committee on Water Quality in Wetlands and Waterways
- Chair: Zeekoe Catchment Management Forum

APPENDIX B

Assessment protocols

B1 Wetland condition

Wetland condition was assessed using the desk-top Present Ecological State (PES) methodology, adapted from DWAF (1999). The methodology is based on a comparison of current attributes of the wetland, which are scored against those of a desired baseline or reference condition, resulting in the assignment of a wetland to one of six PES categories, as defined in DWAF (1999) and described in Table B1. The methodology is applicable to natural wetlands only.

Table B1

Relationship between Present Ecological State (PES) and showing deviation from natural conditions, as defined in DWAF (2008) (Note: subcategories of DWAF 2008 have been excluded)

PES RATING/ VALUE	DEVIATION FROM REFERENCE CONDITIONS	SCORE (% SIMILARITY TO REFERENCE OR NATURAL CONDITION)	PES CATEGORY
0	No Change	≥92	A
1	Small Change	>82 to 92	B
2	Moderate Change	>62 to 82	C
3	Large Change	>42 to 62	D
4	Serious Change	> 22 to 42	E
5	Extreme Change	0 to 42	F

B2 Habitat integrity assessments of rivers

Habitat integrity is a measure of the degree of intactness of a system, and refers to the maintenance of the natural physico-chemical and habitat characteristics of a river, both spatially and temporally. Habitat integrity is considered greatest where these characteristics are most comparable to the natural riverine habitats of the region (Southern Waters 2001).

Habitat Integrity assessments involve the following procedures:

- **River classification:** rivers, or reaches of a river are classified into broad categories, based primarily on their gradients, as outlined in section 2.3. The categories (or geomorphological zones) are as follows:
 - source zone
 - mountain headwater stream
 - mountain stream
 - foothills (cobble bed)
 - foothills (gravel bed)
 - valley bottom wetlands (channeled and unchanneled)
 - lowland floodplain.

Habitat integrity assessment: the assessment itself is based on a qualitative assessment of a number of pre-weighted criteria, with each criterion being scored between 1 and 25 and the final Habitat Integrity score being calculated as a percentage, as outlined in Southern Waters (2001). The criteria are listed below.

- water abstraction
- flow modification
- bed modification
- channel modification

- water quality
- inundation
- exotic macrophytes
- exotic fauna
- solid waste disposal
- indigenous vegetation removal
- encroachment of exotic vegetation
- bank erosion
- channel modification.

The assessment of the severity of impact of each modification is based on six descriptive categories with ratings ranging from 0 (no impact), 1 to 5 (small impact), 6 to 10 (moderate impact), 11 to 15 (large impact), 16 to 20 (serious impact) and 21 to 25 (critical impact).

The calculated overall habitat integrity scores for each geomorphological zone are grouped, to allow classification of subregions into Habitat Integrity categories. These are defined in **Table B2**, after Kleynhans (1996).

Table B2
Descriptions of Habitat Integrity categories (after Kleynhans 1996)

CATEGORY	DESCRIPTION	SCORE
A	Unmodified, natural	90-100
B	Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged.	80-90
C	Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged.	60-79
D	Largely modified. A large loss of natural habitat, biota and basic ecosystem functions has occurred.	40-59
E	The loss of natural habitat, biota and basic ecosystem functions is extensive.	20-39
F	Modifications have reached a critical level and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In the worst instances the basic ecosystem functions have been destroyed and the changes are irreversible.	0

B3 Ecological Importance and Sensitivity (EIS) of wetlands

The method used to assess the EIS of wetlands is a refinement of the Resource Directed Measures for Water Resources: Wetland Ecosystems method (DWAF 1999). It includes an assessment of ecological (e.g. presence of rare and endangered fauna / flora), functional (e.g. groundwater storage / recharge) and socio-economic criteria (e.g. human use of the wetland).

Scoring of these criteria places a wetland in a Wetland Importance Class (A-D) (see **Table B3**).

Table B3
Wetland Importance Class integrating Ecological Importance and Sensitivity, and functional and socio-cultural importance modifiers

Importance class (one or more attributes may apply)	Range of Median	Wetland Importance Class
Very high	>3 <=4	A

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Representative of wetlands that: • support key populations of rare or endangered species; • have a high level of habitat and species richness; • have a high degree of taxonomic uniqueness and/or intolerant taxa; • provide unique habitat (e.g. salt marsh or ephemeral pan; physiognomic features, spawning or nursery environments); • is a crucial avifaunal migratory node (e.g. RAMSAR wetlands); • may provide hydraulic buffering and sediment retention for large to major rivers that originate largely outside of urban conurbations; • have groundwater recharge/discharge comprising a major component of the hydrological regime of the wetland; • are highly sensitive to changes in hydrology, patterns of inundation, discharge rates, water quality and/or disturbance; and • are of extreme importance for conservation, research or education.		
High Representative of wetlands that: • support populations of rare or endangered species, or fragments of such populations that are present in other similar and geographically-adjacent wetlands; • contain areas of habitat and species richness; • contain elements of taxonomic uniqueness and/or intolerant taxa; • contain habitat suitable for specific species (e.g. physiognomic features); • provide unique habitat (e.g. salt marsh or ephemeral pan; spawning or nursery environments, heronries); • may provide hydraulic buffering and sediment retention for rivers that originate largely outside of urban conurbations, or within residential fringes of urban areas; • have groundwater recharge/discharge comprising a component of the hydrological regime of the wetland; • may be sensitive to changes in hydrology, patterns of inundation, discharge rates, water quality and/or human disturbance; and • are important for conservation, research, education or eco-tourism.	> 2 <= 3	B
Moderate Representative of wetlands that: • contain small areas of habitat and species richness; • provide limited elements of habitat that has become fragmented by development (e.g. salt marsh, ephemeral pan; roosting sites and heronries); • provide hydraulic buffering for rivers that originate in urban areas; • are moderately sensitive to changes in hydrology, patterns of inundation, discharge rates and/or human disturbance; • perform a moderate degree of water quality	>1 <= 2	C

Proposed housing development on Erf 6482, Grassy Park, Cape Town
Specialist Aquatic Biodiversity Assessment and Risk Assessment

enhancement, but are insensitive to sustained eutrophication and/or pollution; and			
are of importance for active and passive recreational activities.			
Low/marginal Representative of wetlands that: - contain large areas of coarse (reeds) wetland vegetation with minimal floral and faunal diversity; - have a high urban watershed:wetland area ratio; - are important for active and passive recreation; - provide moderate to high levels of hydraulic buffering; - may be eutrophic and generally insensitive to further nutrient loading; - are generally insensitive to changes in hydrology, patterns of inundation, discharge rates and/or human disturbance; - have regulated water; and - contain large quantities of accumulated organic and inorganic sediments.		>0 <= 1	D
Rating		Explanation	
None, Rating = 0		Rarely sensitive to changes in water quality/hydrological regime	
Low, Rating =1		One or a few elements sensitive to changes in water quality/hydrological regime	
Moderate, Rating =2		Some elements sensitive to changes in water quality/hydrological regime	
High, Rating =3		Many elements sensitive to changes in water quality/ hydrological regime	
Very high, Rating =4		Very many elements sensitive to changes in water quality/ hydrological regime	

B4 Regional Wetland biodiversity importance

The Western Cape Biodiversity Spatial Plan (WCBSPP) of Pool-Stanvliet et al (2017) includes the City's aquatic biodiversity data and was considered in this assessment. This has the following categories (after Snaddon and Day 2009):

- *Critical Biodiversity Areas (CBAs)*: High ranking "natural or semi-natural" wetlands within each type (top quarter of total scores = CBA1 (rank 1); second quarter = CBA2 (rank 2)); all estuaries (top quarter of total scores = CBA1; remaining estuaries = CBA2);
- *Critical Ecological Support Areas (CESAs)*: High ranking artificial wetlands (top quarter of artificial wetlands) (rank 1); middle ranking natural or semi-natural wetlands (third quarter of total scores) (rank 3), and
- *Other Ecological Support Areas (OESAs)*: Lower ranking artificial wetlands (ranks 2, 3 and 4); lowest ranking natural or semi-natural wetlands (rank 4).

B5 Approach to the identification and delineation of wetlands

The presence of wetlands, and their extent (if any) was determined on the basis of the principles outlined in DWAF (2005) and DWAF (2008) – only wetlands within the pipeline corridor (a 20m wide area) were delineated, on the basis of visual evidence of surface water and saturation in early summer; plants; limited augering; and aerial photography.

B6 River and wetland classification

The South African National Aquatic Ecosystem Classification system of Ollis et al (2013) was utilised in this study. This is a hierarchical system, which recognises three distinct wetland types – Inland, Estuarine and Coastal systems. The classification system is shown in **Table B4**.

Table B4

Structure of the National Wetland Classification Systems for Inland systems (rivers and wetlands excluding estuaries) showing main Hydrogeomorphic (HGM) Units at Level 4a and Subcategories at Levels 4b to 4c. Table after Ollis et al (2013)

LEVEL 4: HYDROGEOMORPHIC (HGM) UNIT		
<i>HGM type</i>	<i>Longitudinal zonation/Landform/ Outflow drainage</i>	<i>Landform/Inflow drainage</i>
A	B	C
River	Mountain headwater stream	Active channel Riparian zone
	Mountain stream	Active channel Riparian zone
	Transitional	Active channel Riparian zone
	Upper foothills	Active channel Riparian zone
	Lower foothills	Active channel Riparian zone
	Lowland river	Active channel Riparian zone
	Rejuvenated bedrock fall	Active channel Riparian zone
	Rejuvenated foothills	Active channel Riparian zone
	Upland floodplain	Active channel Riparian zone
Channelled valley-bottom wetland	[not applicable]	[not applicable]
	[not applicable]	[not applicable]
Unchannelled valley-bottom wetland	[not applicable]	[not applicable]
	[not applicable]	[not applicable]
Floodplain wetland	Floodplain depression	[not applicable]
	Floodplain flat	[not applicable]
Depression	Exorheic	With channelled inflow Without channelled inflow
	Endorheic	With channelled inflow Without channelled inflow
	Dammed	With channelled inflow Without channelled inflow
Seep	With channelled outflow	[not applicable]
	Without channelled outflow	[not applicable]
Wetland flat	[not applicable]	[not applicable]

B7 River ecosystem threat status

Threat Status data were accessed from the NBA (2019) dataset for rivers and wetlands.

APPENDIX C

LABORATORY CERTIFICATE OF ANALYSIS – WETLAND WATER SAMPLE

Proposed housing development on Erf 6482, Grassy Park, Cape Town
Specialist Aquatic Biodiversity Assessment and Risk Assessment



T1067

Test Report

Page 1 of 2

Client: Liz Day Consulting

Address: 6 Flamingo Crescent, Zeekoevlei, Cape Town, 7941

Report no: 194948

Project: Grassy Park WL

Date of report: 04 September 2024

Date accepted: 28 August 2024

Date completed: 03 September 2024

Date received: 28 August 2024

Lab no:					Uncertainty of measure- ment %	SANS 241- 1:2015	125413
Date sampled:							27-Aug-24
Aquatico sampled:							No
Sample type:							Water
Locality description:							Grassy Park W/L
Analyses				Unit	Method		
A	AQCL	pH @ 25°C	pH	ALM 20	2.33	5 - 9.7	7.71
A	AQCL	Electrical conductivity (EC) @ 25°C	mS/m	ALM 20	4.92	< 170	50.9
A	AQCL	Total Dissolved solids @ 180°C	mg/l	ALM 24	9.42	< 1200	326
A	AQCL	Total Alkalinity	mg CaCO ₃ /l	ALM 01	6.06		234
A	AQCL	Chloride (Cl)	mg/l	ALM 02	7.57	< 300	51.9
A	AQCL	Sulphate (SO ₄)	mg/l	ALM 03	8.45	< 500	<0.141
A	AQCL	Nitrate (NO ₃) as N	mg/l	ALM 06	9.46	< 11	<0.194
A	AQCL	Total oxidised nitrogen as N	mg/l	ALM 06	9.46		<0.194
A	AQCL	Nitrite (NO ₂) as N	mg/l	ALM 07	7.73	< 0.9	<0.065
A	AQCL	Ammonium (NH ₄) as N	mg/l	ALM 05	8.46	< 1.5	0.080
A	AQCL	Orthophosphate (PO ₄) as P	mg/l	ALM 12	5.05		0.090
A	AQCL	Fluoride (F)	mg/l	ALM 08	9.76	< 1.5	0.484
A	AQCL	Calcium (Ca)	mg/l	ALM 30	7.65		71.1
A	AQCL	Magnesium (Mg)	mg/l	ALM 30	7.65		6.88
A	AQCL	Sodium (Na)	mg/l	ALM 30	6.94	< 200	33.9
A	AQCL	Potassium (K)	mg/l	ALM 30	10.47		8.05
A	AQCL	Aluminium (Al)	mg/l	ALM 31	7.08	< 0.3	0.238
A	AQCL	Iron (Fe)	mg/l	ALM 31	7.16	< 0.3	1.02
A	AQCL	Manganese (Mn)	mg/l	ALM 31	6.34	< 0.1	0.027
A	AQCL	Chromium (Cr)	mg/l	ALM 31	6.88	< 0.05	<0.003
A	AQCL	Copper (Cu)	mg/l	ALM 31	5.15	< 2	0.002
A	AQCL	Nickel (Ni)	mg/l	ALM 31	6.45	< 0.07	0.012
A	AQCL	Zinc (Zn)	mg/l	ALM 31	6.65	< 5	0.010
A	AQCL	Cadmium (Cd)	mg/l	ALM 31	7.19	< 0.003	<0.002
A	AQCL	Lead (Pb)	mg/l	ALM 31	7.09	< 0.01	<0.004

A = Accredited N = Non accredited Sub = Sub-contracted NR = Not requested RTF = Results to follow NATD = Not able to determine ATR = Alternative test report ; Results relate only to the items received and tested ; Results reported against the limit of detection; Results marked 'Non SANAS Accredited' in this report are not included in the SANAS Schedule of Accreditation for this laboratory; Uncertainty of measurement available on request for all methods included in the SANAS Schedule of Accreditation; The report shall not be reproduced except in full without approval of the laboratory

AQL = Aquatico Laboratories ; AQCL = Aquatico Cape Laboratories

Ian Belford
Technical Signatory

AQL 89 Regency Drive, R21 Corporate Park, Centurion, South Africa
AQCL Olive Grove Business Estate, Block H, Ou Paardevlei Rd, Somerset West, 7130

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Tel: +27 12 450 4500 www.aquatico.co.za

Proposed housing development on Erf 6482, Grassy Park, Cape Town
Specialist Aquatic Biodiversity Assessment and Risk Assessment



Test Report

Page 2 of 2

Client: Liz Day Consulting	Date of report: 04 September 2024
Address: 6 Flamingo Crescent, Zeekoevlei, Cape Town, 7941	Date accepted: 28 August 2024
Report no: 194948	Date completed: 03 September 2024
Project: Grassy Park WL	Date received: 28 August 2024

Lab no:					Uncertainty of measurement %	SANS 241-1:2015	125413	
Date sampled:							27-Aug-24	
Aquatico sampled:							No	
Sample type:							Water	
Locality description:							Grassy Park W/L	
Analyses				Unit	Method			
A	AQCL	Turbidity		NTU	ALM 21	5.9	< 1	3.05
A	AQCL	Free chlorine (Cl ₂)		mg/l	ALM 23	5.94	< 5	<0.02
A	AQL	Total Cyanide (CN)		mg/l	ALM 16	10.36	< 0.2	<0.005
A	AQCL	Arsenic (As)		mg/l	ALM 34	10.93	< 0.01	<0.006
A	AQCL	Selenium (Se)		mg/l	ALM 34	11.42	< 0.04	<0.002
A	AQCL	Mercury (Hg)		mg/l	ALM 34	18.43	< 0.006	<0.005
A	AQCL	Boron (B)		mg/l	ALM 33	8.93	< 2.4	0.035
A	AQCL	Barium (Ba)		mg/l	ALM 33	6.13	< 0.7	0.016
A	AQCL	Dissolved Uranium (U)		mg/l	ALM 37	10.98	< 0.03	0.016
A	AQCL	Antimony (Sb)		mg/l	ALM 36	6.19	< 0.02	0.001

A = Accredited N = Non accredited Sub = Sub-contracted NR = Not requested RTF = Results to follow NATD = Not able to determine ATR = Alternative test report ; Results relate only to the items received and tested ; Results reported against the limit of detection; Results marked 'Non SANAS Accredited' in this report are not included in the SANAS Schedule of Accreditation for this laboratory; Uncertainty of measurement available on request for all methods included in the SANAS Schedule of Accreditation; The report shall not be reproduced except in full without approval of the laboratory

AQL = Aquatigo Laboratories ; AQCL = Aquatigo Cape Laboratories

Authenticated signature on first page

AQL	89 Regency Drive, R21 Corporate Park, Centurion, South Africa	Tel: +27 12 450 3800	www.aquatigo.co.za
AQCL	Olive Grove Business Estate, Block H, Ou Paardevlei Rd, Somerset West, 7130	Tel: +27 12 450 4500	www.aquatigo.co.za

APPENDIX D

METHODOLOGY FOR DETERMINING IMPACT SIGNIFICANCE

Adapted by Liz Day Consulting

METHODOLOGY FOR ASSESSING IDENTIFIED IMPACTS	
Extent of impact being either	Immediate (the site and immediate surrounds)
	Local (a significant portion of the waterbody (wetland) or river reach)
	Regional (Affecting watercourses at a catchment scale)
	National (Affecting watercourses with national importance in terms of water supply or large systems with irreplaceable biodiversity)
	International (Affecting watercourses that traverse international boundaries; with international importance in terms of water supply or large systems with irreplaceable biodiversity)
Duration of impact being either:	Short term (0-5 years)
	Medium term (5-15 years)
	Long term (operational life of the development)
	Permanent (beyond the operational life of the development)
Intensity of impact being either:	Low (where natural, cultural and social functions and processes are not affected – affecting small watercourses of relatively low importance; or barely impacting on more important systems)
	Medium (where the affected environment is altered but natural, cultural and social functions and processes can continue – moderate impacts on important watercourses (e.g. Ramsar wetlands, IBAs); major impacts on insignificant watercourses)
	High (where the affected environment is altered but natural, cultural and social functions and processes are altered to the extent that it will temporarily or permanently cease – major impacts on important watercourses)
Probability of impact being either:	Low probability (possibility of impact occurring is low)
	Probable (where there is a distinct possibility that it will occur)
	Highly probable (where the impact is most likely to occur)
	Definite (where the impact will occur)
Significance of impact:	Very Low (where natural, cultural and social functions and processes are essentially unaffected or insignificantly affected)
	Low (where natural, cultural and social functions and processes are slightly affected)
	Low to Medium (where natural, cultural and social functions and processes are slightly affected causing a minor change in functions and processes but are still able to continue)
	Medium (where the affected environment is altered but natural, cultural and social functions and processes can continue)
	Medium to High (where natural, cultural and social functions and processes are altered and most likely the impact will not allow functions and processes to continue, but in some cases, the function or process may continue)

	High (where the affected environment is altered but natural, cultural and social functions and processes are altered to the extent that it will temporarily or permanently cease)
Reversibility Rating:	Irreversible (the activity will lead to an impact that is permanent)
	Partially reversible (The impact is reversible to a degree e.g. acceptable re-vegetation measures can be implemented but the pre-impact species composition and/or diversity may never be attained. Impacts may be partially reversible within a short (during construction), medium (during operation) or long term (following decommissioning) timeframe)
	Fully reversible (The impact is fully reversible, within a short, medium or long-term timeframe)

20 October 2025

Attention: Ms Lisa van Aarde
Planning Partners
97 Durham Avenue
Salt River
Cape Town

Dear Ms van Aarde

15 on Hector (Erf 6482 Grassy Park):

Results of follow-up water quality sampling and analysis to determine the degree to which the presence of dissolved uranium in wetlands on and associated with the proposed development are likely to pose human health or other concerns

The findings of the Specialist Aquatic Biodiversity Assessment and Risk Assessment for the above proposed development refer. Day (2025) reported an elevated dissolved **copper** concentration (0.002 mg/L), just below the threshold for chronic toxicity of 2.8 µg/L (DWAf 1996) as well as an elevated dissolved **uranium** concentration (0.016 mg/L), which lies well above the ANZECC & ARMCANZ (2000) freshwater low reliability ¹trigger value of > 0.5 µg/L (0.0005 mg/L) for uranium.

As a result of these concerning findings, further water quality assessments were carried out in late winter 2025 (towards the end of the wet season). Water samples were collected from inundated wetlands on and abutting the site on 5 September 2025. At this time, the extent of inundation in wetlands in this area was shrinking, and although it was originally planned to collect samples from multiple wetland depressions, in fact only wetland W2 (see Day 2025) was inundated at this time, and only marginally so.

Three 1-litre samples were collected from this wetland within a one-meter radius (samples labelled GP_A, GP_B and GP_C). Sub-samples were subsequently split from each of these (annotated GP_B1, GP_B2 etc.), and variously sent to each of three accredited laboratories. The results of analyses are indicated below (**Table 1**), along with interpretation in terms of the DWAf (1996) and ANZECC & ARMCANZ (2000) guidelines. The analytical certificates for these analyses are provided as Appendix A. Water hardness data (used in the determination of dissolved copper toxicity) showed that water in wetland W2 was classified as "Very Hard" (> 180 mg/L CaCO₃) (see data in Appendix A).

Results

The results of the above sampling effort are illustrated in Table 1. The results show high variability between laboratories and low variability within laboratories, complicated to a degree by different levels of detection and/or quantification. The September 2025 samples were collected during the late wet season, when standing water samples were assumed to be concentrated, as a result of evapo-concentration.

¹ "Trigger value" represents a concentration or load of a specific indicator that, if exceeded, suggests a potential risk of adverse effects on the ecosystem



The data do suggest that:

- Although dissolved copper was present in at least wetland W2, it was not present at concentrations likely to be linked to negative aquatic ecosystem impacts, based on the DWAF (1996) guidelines for chronic toxicity thresholds.
- Dissolved uranium was present at concentrations above the ANZECC & ARMCANZ (2000) thresholds of concern for aquatic organisms but below the SANS 241-1:2015 (drinking water) thresholds for chronic impacts on human health (≤ 30 ug/l).

Table 1

Results of water quality assessments, carried out in September 2025 on water sampled from wetland W2 (described and mapped in Day 2025). See Appendix A for actual laboratory certificates. Data colour-coded (red) as to whether they fall on or above the (above) cited chronic toxicity or “trigger” thresholds. Data coded blue indicate samples where the Limits of Detection fell above those of chronic toxicity or “trigger” thresholds. Groundwater data for these two variables have also been presented, as per GEOSS (2024). These have not been coded for aquatic ecosystem toxicity, but are included for reference purposes.

Sample	Dissolved copper (ug/L)				Uranium (ug/L)			
	DWAF (1996): Chronic toxicity	Laboratory 1 (Aquatico)	Laboratory 2 (CSIR)	Laboratory 3 (Element)	ANZECC & ARMCANZ (2000) guidelines	Laboratory 1 (Aquatico)	Laboratory 2 (CSIR)	Laboratory 3 (Element)
Sample: August 2024								
W2	≥ 2.8	2	-	-	≥ 0.5	16	-	-
Groundwater (GEOSS 2024)		< 28				4		
Samples: September 2025								
GPA	≥ 2.8				≥ 0.5			
GPA_1		< 2		< 5		< 15		< 5
GPB		< 2	<20			15	0.9	
GPB_1			<20				0.8	
GPC		< 2	<20			15	0.9	

Recommendations

Additional sampling reported on in this letter suggests that **neither of the two assessed heavy metals were present in any samples at concentrations above the SANS 241-1:2015 (drinking water) thresholds.** They should thus not be of concern from the perspective of exposure of residents to these contaminants.

Dissolved uranium concentrations were however above chronic ecosystem toxicity concentrations. It is recommended that monitoring of this variable be included in any water use license issued for development authorisation.

It is further recommended that the City of Cape Town’s Health Department should be made aware of these data, and should pursue this matter further if desired.

Thank you for providing for the additional analyses that informed this input. I trust that this has removed some of the uncertainty alluded to in the report of Day (2025).

Yours sincerely



Dr Liz Day
PhD; Pr Nat Sci



Liz Day PhD; Pr Nat Sci
Cape Town, South Africa
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Reg No 2019/067960/07

References cited:

- ANZECC & ARMCANZ 2000. Australian and New Zealand Guidelines for Fresh and Marine Water Quality, Australian and New Zealand Environment and Conservation Council and Agriculture and Resource Management Council of Australia and New Zealand, Canberra.
- Day, E. (Liz). 2025. Proposed housing development on Erf 6482, Grassy Park, Cape Town. Specialist aquatic ecologist impact assessment report. Report to Chand Consulting for the Western Cape Government – Department of Transport and Public Works
- Department of Water Affairs and Forestry (DWAF), 1996. South African Water Quality Guidelines. Volume 7: Aquatic Ecosystems. Pretoria: DWAF
- GEOSS. 2024. Groundwater Impact Assessment for a Proposed Housing Development on Erf 6482, Grassy Park, Cape Town. GEOSS Report Number: 2024/11-17. GEOSS -South Africa (Pty) Ltd. Stellenbosch, South Africa



APPENDIX A

LABORATORY CERTIFICATES OF ANALYSIS: SEPTEMBER 2025 SAMPLES

Note:

Full laboratory certificates, including laboratory specifications and assumptions, are available from Liz Day Consulting



Test Report

Page 1 of 1

Client: Liz Day Consulting
Address: 6 Flamingo Crescent, Zeekoevlei, Cape Town, 7941
Report no: 235737
Project: Grassy Park WL

Date of report: 29 September 2025
Date accepted: 19 September 2025
Date completed: 29 September 2025
Date received: 19 September 2025

Lab no:	350791	350792	350793
Date sampled:	19-Sept-25	19-Sept-25	19-Sept-25
Aquatico sampled:	No	No	No
Sample type:	Water	Water	Water
Locality description:	GP_A1	GP_B	GP_C
Analyses	Unit	Method	
A AQCL pH @ 25°C	pH	ALM 20	7.40 7.36 7.43
A AQCL Total Alkalinity	mg CaCO ₃ /l	ALM 01	507 565 549
A AQCL Copper (Cu)	mg/l	ALM 31	<0.002 <0.002 <0.002
A AQCL Dissolved organic carbon (DOC)	mg/l	ALM 63	87.7 82.0 72.2
A AQCL Dissolved Uranium (U)	mg/l	ALM 37	<0.015 <0.015 <0.015
A AQCL Bicarbonate alkalinity	mg CaCO ₃ /l	ALM 26	506 564 547

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Ian Belford
 Technical Signatory

AQL = Aquatico Laboratories ; AQCL = Aquatico Cape Laboratories

Tel: (+27) 21 888 2400/2433
Fax: (+27) 21 888 2030

Certificate of Analysis

Report NO: SAL-2025-21863	Sample Description: Water samples in 100ml containers with white lids
Customer: Liz Day Consulting	No of Samples: 3
Address: Cape Town	Sample Condition: Fresh
Contact: Liz Day	Date Received: 01-Oct-2025
Phone: 083 454 2309	Date Analysis Started: 01-Oct-2025
Fax:	Date Completed: 6-Oct-25
Email: liz@lizdayconsulting.co.za	Order No: Cash payment to follow

Sample Disposal	a) Liquid Sample One Month - After issuing of final Certificate of Analysis	b) Solid Sample Three Months - After issuing of final Certificate of Analysis
-----------------	--	--

Lab No	2521863-152748FW	2521863-152749FW	2521863-152750FW
Sample Date	Not supplied	Not supplied	Not supplied
Sample ID	GP-B Sept 25	GP-B1 Sept 25	GP-C Sept 25

Analysis	Unit			
Alkalinity as CaCO ₃	mg/l	425	347	478
Dissolved Organic Carbon	mg/l	85	80	99
Copper as Cu Dissolved	mg/l	<0.02	<0.02	<0.02
Uranium as U Dissolved *	µg/L	0.9	0.8	0.9

This report contains results for items submitted to the CSIR and sampled by the customer. This report relates only to the samples actually supplied to and tested at CSIR, STELLENBOSCH LABORATORY. The operation unit does not accept responsibility for any matters arising from the further use of these results. This certificate shall not be reproduced, except in full, without the written approval of the Laboratory Manager. No reference may be made to the CSIR or any of its operation units or officers in advertisements or for sale or publicity purposes without the CSIR's prior approval. All work is undertaken according to the CSIR general conditions of contract. Samples are discarded after 30 days from issue date of certificate.

Remarks: Methods marked with * in this report are Results Not SANAS Accredited and are not covered by the Scope of Accreditation for this laboratory.

Methods marked with # in this report are Results from Subcontracted Test and are not covered by the Scope of Accreditation for this laboratory.

Opinions and interpretations expressed herein are outside the scope of SANAS accreditation.

		Date Printed 07-Oct-2025
Eithen Ireland - Technical Signatory	Sebastian Brown - Technical Signatory	Page 1 of 1

A copy of the original of this certificate is available from the CSIR on request. This certificate is issued without any alteration or emasure.

End of Report

Client Name: INFINITY ENVIRONMENTAL (PTY) LTD
Reference: Misc-Metals Investigation
Location: Simons Town
Contact: Tom Smyth
EMT Job No: 25/15903

Report: Liquid

Liquids/products: V=40ml vial, G=glass bottle, P=plastic bottle
H=H₂SO₄, Z=ZnAc, N=NaOH, HN=HN0₃