

CLOVER SA BOREHOLE AND UMHLATUZANA RIVER ABSTRACTION – WETLAND VERIFICATION

FINAL REPORT



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- The expertise required in conducting the specialist report relevant to this application, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity, are possessed by all involved;
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Steven Ellery is as a professionally registered natural scientist (Registration Number 132408) with the South African Council for Natural Scientific Professions (SACNASP), and as regulated by the National Scientific Professions Act (27 of 2003). SACNASP is the legislated regulatory body for natural science practitioners in South Africa, with key objectives being to:

- Ensure and administer the mandatory registration of natural scientists as required in terms of The Natural Scientific Professions Act of 2003.
- Exercise control over the standard of conduct of professional natural scientists.

As a professionally registered member of this body, he is also required to subscribe to their Code of Conduct (see: <https://www.sacnasp.org.za/code-of-conduct>)

Signed: *S. Ellery*
Steven Ellery

Date:14/01/2026.....

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List of Acronyms

Acronym	Explanation
DWS	Department of Water and Sanitation
DWAF	Department of Water Affairs and Forestry
EDTEA	KwaZulu-Natal Department of Economic Development, Tourism & Environmental Affairs
GIS	Geographic Information System
GPS	Global Positioning System
KZN	KwaZulu-Natal
MAP	Mean Annual Precipitation
NP	Not Protected
PET	Potential Evapotranspiration
SANBI	South African National Biodiversity Institute

1. INTRODUCTION

Local, regional, and national regulatory bodies, such as the Departments of Water and Sanitation (DWS) and Economic Development, Tourism and Environmental Affairs (EDTEA), have adopted legislation, policies and guidelines that regulate the use of wetland ecosystems to protect and maintain these systems' benefits and services to society and the natural environment. In order to be regulated, these systems must first be identified, delineated and assessed.

The objective of the delineation procedure is to identify the boundary between the wetland ecosystems and adjacent terrestrial areas. The process of delineation identifies the extent of these ecosystems based on the following legal definitions²³

- *“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.”*

Hydrology is considered to be the primary biophysical driver of wetland ecosystems, but due to its variability, it is not possible to efficiently and accurately delineate these systems based on water levels (Richardson and Vepraskas 2001). The delineation of wetland habitat, therefore, relies on indirect indicators, such as wetland vegetation, topography, and soils.

This study was undertaken to inform the potential risks posed by the construction of three proposed boreholes and one river abstraction site from the Umhlatuzana River to wetland habitat adjacent to one of Clover SA's facilities on Richmond Road, Queensburgh, KwaZulu-Natal. As such, a wetland verification process was conducted to delineate any wetland habitat possibly linked to the proposed abstraction sites (

² As per the National Water Act (Act No. 36 of 1998)

³ As per the National Environmental Management Act (Act No. 107 of 1998)

Figure 1-1). The wetland ecosystems within 500m of the study site that are hydrologically linked to the boreholes and abstraction sites were verified. The study found that there were no wetland systems linked to the abstraction sites, therefore a risk assessment is not required for this verification process. It should be noted that two riverine areas (i.e. river and riparian zone) were noted during this study – but their delineation and assessment was not within the scope of this study.

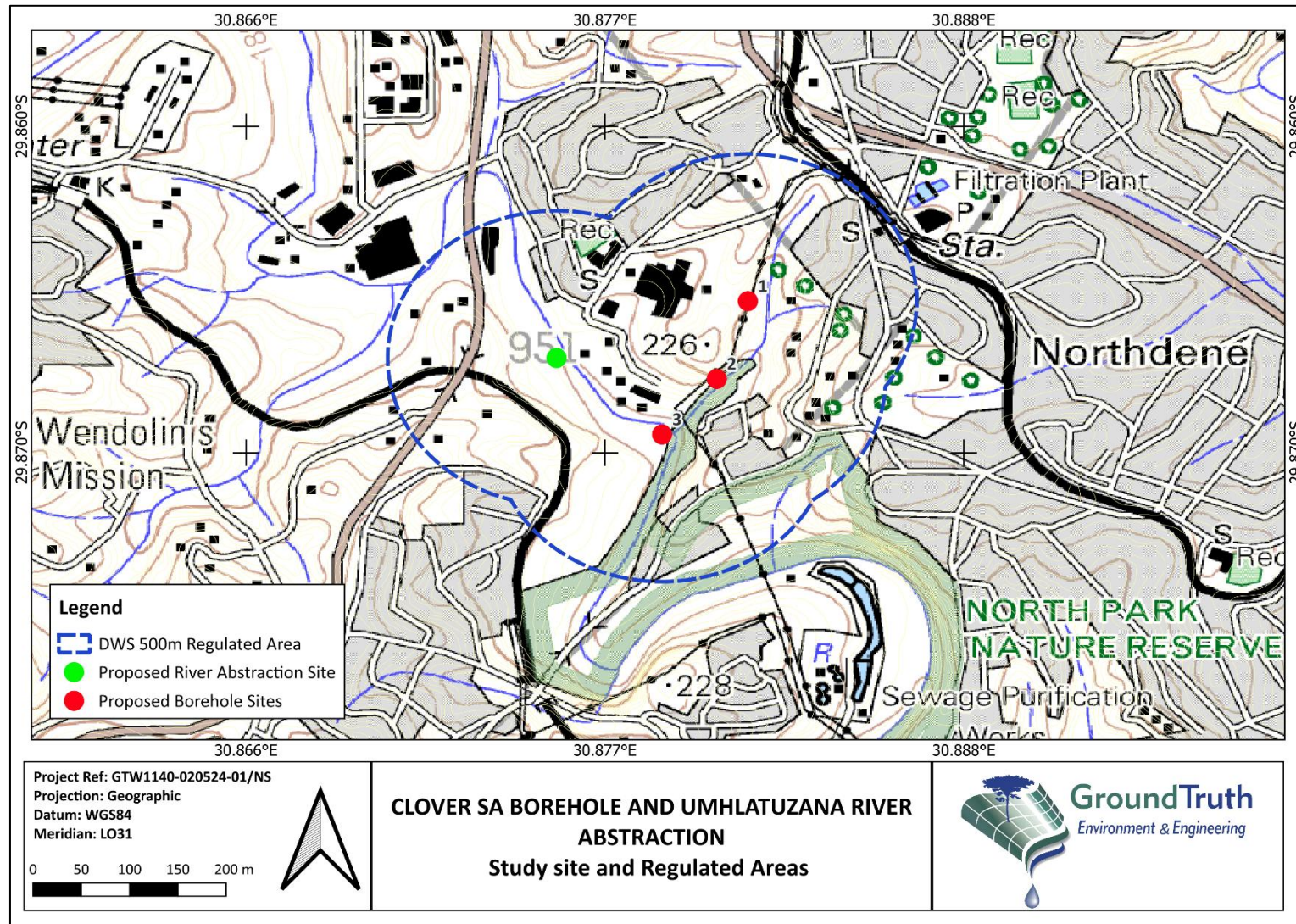


Figure 1-1 Study area location

2. TERMS OF REFERENCE

In order to determine the potential limitations of the proposed boreholes and Umhlatuzana River abstraction, it is essential to verify the presence of wetland systems within 500m of and/or hydrologically linked to the abstraction sites. For those identified systems, a risk assessment matrix (as per the GN 4197 of 2023) would need to be undertaken. The terms of reference of this study include the following:

- Identification and characterisation of wetland systems within 500m of the proposed abstraction sites;
- Mapping of identified freshwater systems within 500m of the study site at an appropriate scale.
- Conducting a risk assessment for all construction and operational risks associated with the proposed development.

3. KNOWLEDGE GAPS

The following sections highlight the assumptions, limitations and knowledge gaps associated with this study that may influence the type of information collected, and the accuracy of the data.

3.1 Assumptions

Studies relating to natural ecosystems and understanding historical conditions rely on various assumptions, with the following assumptions being made during the assessment of these particular systems:

- The reference benchmark vegetation within the study area is considered to be the KwaZulu-Natal Coastal Belt Grassland and the KwaZulu-Natal Coastal Belt Thornveld (SANBI 2018 and Mucina and Rutherford 2006).
- The bioregion is considered to be the Indian Ocean Coastal Belt (SANBI 2018), which has been classified as having a 'Endangered' conservation status, due to the lack of protection it receives.
- When undertaking a wetland delineation, three environmental indicators are generally considered namely, landscape position, soil properties and vegetation indicators. Wetlands seldom form on hill sides and scarp slopes and as such, assessing the landscape position can often preclude the need to assess the soil and vegetation indicators. As such, areas where there is a high chance that wetland conditions may exist were assessed in detail, whereas areas precluded by their position in the landscape were only briefly assessed for wetland conditions.

3.2 Limitations

The following limitations apply to the studies undertaken for this report:

- Due to time constraints, soil descriptions are based on moist conditions, rather than the dry conditions stipulated in the DWS guidelines (DWAF 2005). Generally, the recorded Munsell colour values would increase as soil is dried. This was taken into consideration during the infield studies.
- Any hydrologically isolated freshwater ecosystems have not been delineated in detail and were based predominantly on desktop mapping and review with limited infield verification.
- Some soils within the study area have been disturbed by past activities, making the interpretation of soil profiles difficult at times.
- Even though the freshwater ecosystems within 500m of the study site were briefly visually assessed, detailed delineation within these areas was prohibited due to some of the abstraction points being inaccessible. Nonetheless, the verification of the wetland habitat within the 500m radius should be seen as adequate for feasibility purposes and would require detailed delineation should the client/any persons want to develop an area that falls beyond the development site.

The project deliverables, including the reported results, comments, recommendations, and conclusions, are based on the authors' professional knowledge as well as available information. This study is based on assessment techniques and investigations that are limited by time and budgetary constraints applicable to the type and level of survey undertaken. Should the client be required to apply for environmental authorisation and/or a water use licence at a later stage, this report would need to be suitably updated to include the assessment of the identified freshwater ecosystems.

4. STUDY AREA

The following section provides an overview of the study area, focusing on the regional context, climate, and wetland types.

4.1 Regional context

South Africa is a semi-arid country, and thus wetlands are important features within the landscape as they provide ecosystem services directly related to water quantity and quality. Approximately 300'000ha of wetlands or 2.4% of South Africa's surface area remain. It is estimated that there has been a loss of between 35% and 60% of wetlands across the major catchments in South Africa and of the remaining systems, 48% are classified as critically endangered making these systems the most threatened ecosystems (Nel and Driver 2012).

Within the KwaZulu-Natal region, wetlands have been subjected to high levels of modification and destruction (Kotze et al. 1995; Macfarlane et al. 2012). The factors contributing towards the degradation of the systems vary greatly, but the predominant impacts include urbanisation, abstraction, dams, cultivation, drainage, and over-grazing (Macfarlane et al. 2012). The loss of wetland habitat within KwaZulu-Natal is considered to be of concern due to the value of wetlands in terms of contributions to water quantity and quality, supporting unique biological diversity and other ecosystem services (Kotze et al. 2020). Taking into consideration the above-mentioned degradation of wetland ecosystems, it is important any development attempts to maintain the current levels of ecosystem service delivery, and where possible, enhance the systems' ability to supply these benefits and services.

4.2 Climate

The study area falls within the U60F quaternary catchment, as defined by Midgley et al. (1994). The Mean Annual Precipitation (MAP) is 967 mm and the Potential Evapotranspiration (PET) for U60F is 1200 mm (Schulze 2007). This would suggest that the wetlands within the U60F catchment have a **Moderately Low** sensitivity to hydrological impacts (Macfarlane et al. 2020).

4.3 Vegetation type

Under natural conditions the surrounding landscape and study site would have been characterised by particular vegetation types. The historical dominant vegetation type present would have been the KwaZulu-Natal Coastal Belt Grassland and the KwaZulu-Natal Coastal Belt Thornveld which both fall under the Indian Ocean Coastal Belt Bioregion.

The KwaZulu-Natal Coastal Belt Grassland and the KwaZulu-Natal Coastal Thornveld vegetation types have been classified as 'Endangered' and not protected. Both these vegetation types expand along the KwaZulu-Natal coastal strip, from Mthunzini in the north, through Durban, towards Margate and Port Edward in the south. Additionally, these vegetation types occur about 20-450m above sea level. Only a small percentage is statutorily protected in reserves including Ngoye, Mbumbazi and Vernon Cookes. The greatest threat to these vegetation types include alien invasive species such as *Chromolaena odorata*, *Lantana*

camara, *Melia azedarach* and *Solanum mauritianum*, with erosion being moderate and low (Mucina and Rutherford, 2006). An estimated 50% these vegetation types have been cleared for cultivation, urban sprawl and built infrastructure development (e.g. roads).

4.4 National Wetland Mapping (National Wetland Map 5)

Mapping of all wetlands within South Africa has been an ongoing exercise for many years, as data has been collated and improved upon over time. SANBI has recently released the latest National Wetland Map 5 (NWM5_AEA) in an attempt to improve the wetland inventory available to users at a national level (Van Deventer et al., 2018). This layer includes inland wetlands and estuaries; and has been determined through extensive consultation with many other datasets within the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) 2018.

For the sake of this report, the development sites within the broader landscape of the study site has been illustrated in **Figure 4-1**. As per the figure, it should be noted that all wetlands have been classified as channelled valley bottom, seep and unchanneled valley bottom wetlands, which are all considered to be endangered (not protected), which is directly linked to the threat status of the vegetation type within the broader landscape.

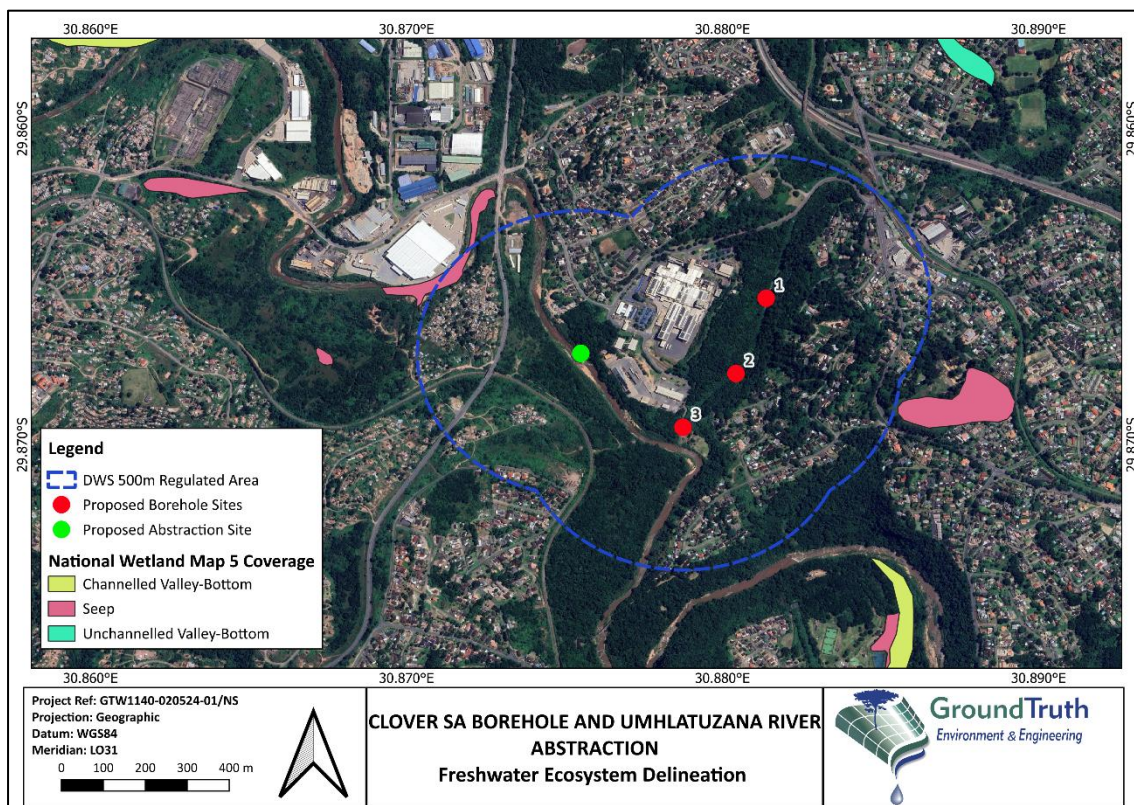


Figure 4-1 Overview of the National Wetland Map 5 coverage with the study site

5. EXPERTISE OF THE SPECIALISTS

Due to the nature of the study, the project team included experienced personnel with experience specifically in freshwater delineation projects in largely modified landscapes within KwaZulu-Natal (**Table 5-1**).

Table 5-1 Team members, roles, experience levels and qualifications

Wetland Practitioner	Role in the Study	Experience Levels	Qualifications
Steven Ellery	- Infield wetland verification - Review of the project report.	5 years' experience, with input into various wetland studies, including: - Delineation; - Assessments; - Rehabilitation planning; and - Rehabilitation monitoring and evaluation	M.Sc. (Geography) Pr.Sci.Nat - Ecology
Nkosingithandile Sithole	- Infield wetland verification - Compilation of the project report.	1-2 years' experience in environmental education and training	M.Sc. Environmental Education

6. STUDY METHODOLOGY

6.1 Site visit

A site visit was conducted on the 9th of April 2024 to verify the extent of wetland systems within the study area.

6.2 Delineation of freshwater ecosystems

The freshwater ecosystems within the property were delineated infield in accordance with the DWS guideline documents (DWAF 2005; 2008). This included the delineation of wetland systems (**Figure 6-1**). The freshwater ecosystems within 500m of the site boundary were verified infield where possible. The derived boundaries were determined at appropriate intervals within the study area and recorded using an appropriate Global Positioning System (GPS)⁴. The subsequent information was used to inform the production of a Geographic Information System (GIS) spatial coverage of the boundaries of the freshwater habitat. In accordance with the preferences of the regional DWS, the study also attempted to identify and/or describe the zones of wetness within the study site.

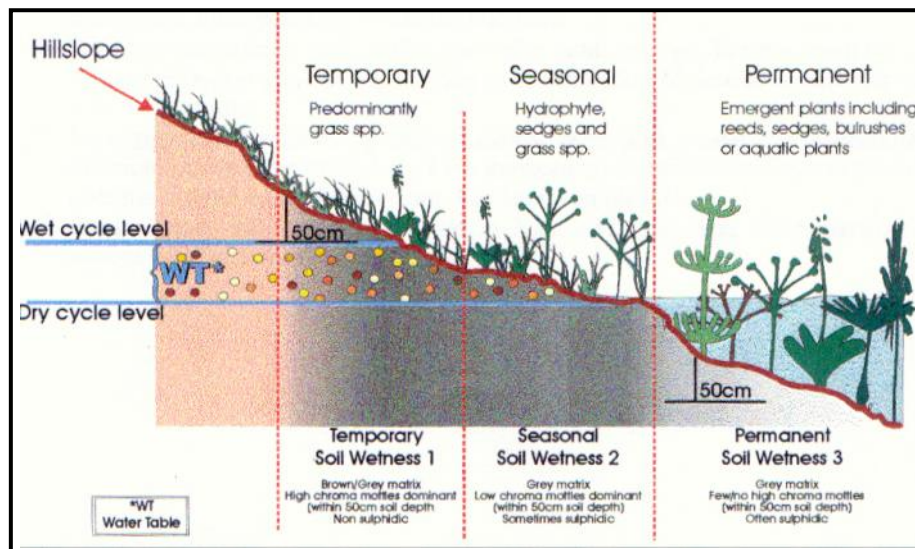


Figure 6-1 Wetness zones within wetland ecosystems
(DWAF 2005, p.6)

⁴ Trimble Catalyst DA1 handheld unit, a professional sub-meter accurate receiver

7. STUDY RESULTS

The results of the wetland verification study area are outlined in the following sections.

7.1 Freshwater ecosystem delineation

A wetland verification study was undertaken at the proposed borehole and river abstraction site, and no wetland systems hydrologically linked within 500 m of the proposed development sites were found. Thus, a risk assessment matrix was not required. Two riparian channels and a number of topographic features that accumulate flow were also observed and verified onsite. Furthermore, there are a number of hydrologically isolated features within the 500m DWS radius that were briefly verified while infield.

7.1.1 Freshwater ecosystems

Two riparian channels were observed onsite – the first (Riparian Channel 1) being the river and fringe habitat associated with the Umhlatuzana River flowing to the south of the Clover facility and the second (Riparian Channel 2) being a tributary riparian area to the east of the Clover facility. The confluence of these two riparian channels occurs to the south of borehole 3 and to the southeast of the Clover facility. Furthermore, three topographic features that accumulate flow⁵ (hereafter referred to as topographic features) that are hydrologically linked to the proposed development were observed onsite (

⁵ Topographic features that accumulate flow are features in the landscape which naturally hold flows during floods or wet seasons, but they lack any specific characteristics that characterise them as watercourses as defined by the National Water Act (no. 36 of 1998). As such, no legislation protects these topographic features and therefore no assessments can be undertaken on them.

Figure 7-1).

Riparian Channel 1 is a large riverine system and has a sizeable riparian habitat associated with it. Given that this feature is associated with the Umhlatuzana River, it is expected that there will be a significant riparian fringe. The instream portion of the river is characterised by extensive alluvial deposits and some riffle pools between disparately spaced rapids. The water is characterised by a strong chemical and sewage smell and a white alga was observed growing on most of the visible surfaces in the river channel (**Figure 7-2**). The riparian fringe was characterised by some riparian vegetation and a number of invasive alien plant species and disturbance tolerant species such as *Arundo donax*, *Melia azedrach*, *Tacoma stans*, *Robinia pseudoacacia*, *Commelina sp* and *Ipomea purpurea*.

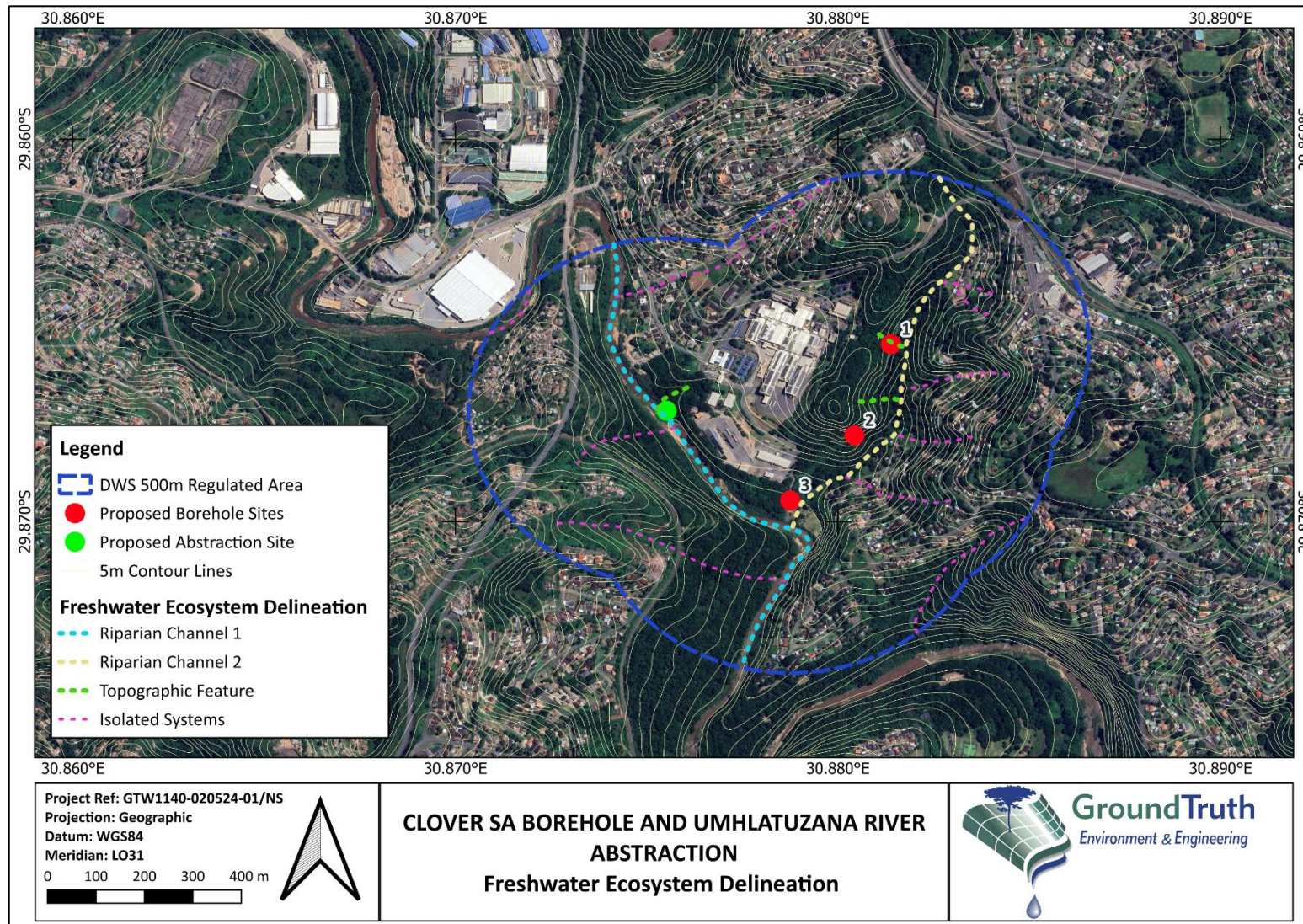


Figure 7-1 Freshwater ecosystems and topographical features that accumulate flow within the Clover SA development site and associated 500 m radius.

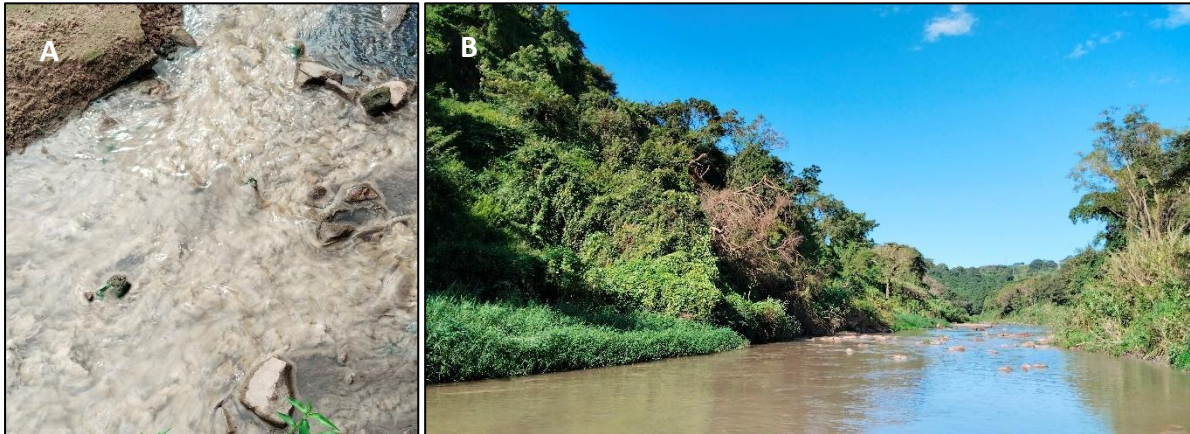


Figure 7-2 A) White alga growing on the rocks within the reach of the Umhlatuzana River adjacent to the study site and B) Extensive riparian habitat adjacent to the Riparian Channel.

Riparian Channel 2 is a tributary of the Umhlatuzana River and joins the river from the north. This riparian channel is a narrow and relatively steep riparian channel that is characterised by an incised channel with steep, eroding banks. The base level of this riparian channel is being set by the Umhlatuzana River. With the flooding that has occurred in KwaZulu-Natal in the last 3-4 years, a lot of sediment has been mobilised in down rivers and has caused a number of them to erode. Clear evidence of this erosion was observed in Riparian Channel 2 near its confluence with Riparian Channel 1 (**Figure 7-3**). The upper reaches of Riparian Channel 2 were characterised by a steep valley and a similarly incised channel, however, the channel was far narrower given the smaller hydraulic load it receives higher up in the catchment. It was characterised by a variety of forest and riparian tree species as well as a number of invasive alien plant species such as *Halleria lucida*, *Brachylaena sp*, *Eucalyptus sp* and *Tacoma stans*.





Figure 7-3 A) Evidence of attempts to stabilise bank erosion along Riparian Channel 2. B) Extensive channel incision at the toe of Riparian Channel 2.

Three topographic features that accumulate flow that are hydrologically linked to the proposed developments were observed. However, given that these features are not considered to be watercourses, they were simply verified onsite and were not delineated or described in detail. None of the topographic features had natural channels in their extents and were not characterised by obligate wetland or riparian vegetation (**Figure 7-4**).



Figure 7-4 A) Topographical feature adjacent to borehole site 1 B) Topographical feature adjacent to the proposed abstraction site.

8. CONCLUSIONS

The wetland verification study found that there were no wetland systems that are hydrologically linked to any of the proposed development sites. Two riparian channels were observed and characterised briefly onsite, and a number of topographic features that accumulate flow were identified and mapped onsite. Through the infield verification process, it was evident that the water quality of the two freshwater ecosystems have been heavily impacted through the urbanisation of the catchment area. Similarly, the urbanised catchment has resulted in the incision and erosion of Riparian Channel 2. However, no wetlands were observed onsite and therefore no wetland related legislation will be triggered should the proposed development go ahead.

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10. APPENDIX

Appendix 1

Sample plot descriptions and photographs collected during the field component of the study using a data collection sheet adapted from Job (2009).

Project/Site: Clover SA

Sample Plot No.: 1

Date: 9 April 2024

Lat: -29.86904

Long: 30.87934

Do normal circumstances exist on the site? Yes ~~No~~Is the site significantly disturbed (difficult site)? ~~Yes~~ NoIs the area a Specific Case per Appendix A of the delineation manual? ~~Yes~~=No

TERRAIN UNIT INDICATOR

Position in the landscape:

- ☐ crest ☒ footslope
☐ scarp ☐ valley-bottom
☐ midslope

Local relief:

- ☐ flat
☒ concave
☐ convex

VEGETATION INDICATOR

Dominant or indicator species within sample plot	Indicator Category	% Cover
<i>Furina complanata</i>	Facultative positive	10
<i>Cyperus sp</i>	Facultative	5
<i>Kylinga melanospermum</i>	Facultative	15
<i>Commalina sp</i>	Facultative negative	20
<i>Plectranthus sp</i>	Terrestrial	10
<i>Leersia hexandra</i>	Facultative positive	10
<i>Centella asiatica</i>	Facultative	10
<i>Paspalum urvillei</i>	Facultative	20

Are more than 50% of dominant species (> 50% cover) obligate, facultative positive or facultative?

Yes

SOIL WETNESS INDICATORS

Soil Profile Description:

Depth (cm)	Matrix Colour (Munsell)	Mottle Colours (Munsell)	Texture, Concretions, Rhizospheres, etc.
0-50	7.5YR 4/3	N/A	N/A
60-80	10YR 4/3	N/A	N/A

Zone of Wetness:

- ☐ Permanent Wetness Zone
☐ Seasonal Wetness Zone
☐ Temporary Wetness Zone
☒ Non-Wetland or Dryland

Features present within 50cm of the soil surface:

- ☐ Organic soil ☐ High organic content in surface layer
☐ Grey/gleyed matrix ☐ Mottle / concretions
☐ Organic streaking ☐ Sulfidic odour
☐ Other

Munsell colour one of the following? ~~Yes~~ No

Gley 1:

☐

Gley 2:

☐

Hue 5YR:

- ☐ value 5 or more/chroma 2 or less OR
☐ value 6 or more/chroma 4 or less

Hue 7.5YR:

- ☐ value 5 or more/chroma 2 or less OR
☐ value 6 or more/chroma 4 or less.

Hue 10YR:

- ☐ value 4 or more/chroma 2 or less OR
☐ value 5 or more/chroma 3 or less OR
☐ value 6 or more/chroma 4 or less

Hue 2.5Y:

- ☐ value 5 or more/chroma 2 or less OR
☐ value 6 or more/chroma 4 or less

Hue 5Y:

- ☐ value 5 or more/chroma 2 or less

HYDROLOGY INDICATORS (Generally applicable to Permanent/Seasonal Zones of Wetness)

☐ Inundated

Depth of Surface Water: 60cm

☐ Evidence of bedrock or other impermeable layer within 30-50 cm of the soil surface.☐ Saturated within 50 cm of surface

Depth to Saturated Soil: N/A

☐ Sediment Deposits☐ Aquatic invertebrates☐ Salt Crust☐ Oxidized Root Channels☐ Water-Stained Leaves☐ Water Marks

WETLAND DETERMINATION

Terrain unit indicators present?	Yes	No
Vegetation indicators present?	Yes	No
Soil wetness indicators present?	Yes	No
Hydrology indicators present?	Yes	No
Is this sampling plot within wetland?	Yes	No

Sample Plot Photographs

Overview of the Soil Profile



Location of Soil Profile



Appendix 2 Fieldwork Points

