Proposed Development of a Solar PV Array on Erf RE/2018, Riversdale, Western Cape.

Freshwater Compliance Statement

Prepared For: Sharples Environmental Services

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EXECUTIVE SUMMARY

Confluent Environmental Pty (Ltd), commissioned by Sharples Environmental Services, conducted a freshwater survey for a proposed PV Solar Plant on Erf 2018 in Riversdale, Western Cape. The area possesses 'Very high' aquatic biodiversity sensitivity, according to the DFFE Screening Tool. The proposed development sites are located north-west of the N2, near the Werner Frehse Nature Reserve, with the Goukou and Vet Rivers as the closest perennial rivers. Eight potential development sites were identified, with the preferred site in the southern corner of the property. These sites lie within the quaternary catchments of H90C & H90D, which necessitates consideration of erosion and stormwater management due to moderate rainfall intensity and soil erosion potential.

The mapped vegetation types are critically endangered, mainly Eastern Ruens Shale Renosterveld and Ruens Silcrete Renosterveld. The property falls within Critical Biodiversity Areas and Ecological Support Areas, emphasizing the need to avoid negative ecological impacts. Furthermore, the site is situated in the Langeberg Strategic Water Source Area for surface water, imposing strict regulations to protect water quantity and quality. However, no sub-quaternary reaches are classified under National Freshwater Ecosystem Priority Areas.

Mapped watercourses, including perennial and non-perennial rivers, were assessed. While some showed wetland characteristics, the majority were classified as non-perennial streams that flow only intermittently following periods of heavy rainfall. Historical assessment indicates minimal changes over 70 years, with recent activities primarily focused on livestock farming.

During the site visit, minimal indigenous vegetation was observed, as most of the property is used for grazing. Management recommendations include implementing erosion mitigation measures during construction to prevent soil deposition into nearby watercourses.

Based on desktop reviews and the site verification, development outside of 30 m from the edge of watercourse and outside of the regulated area as defined by the National Water Act (i.e. 100 m from a river/stream and 500 m from a wetland) would have low sensitivity to aquatic biodiversity and would not require any water use authorization. In this respect, the preferred alternative is considered ideal from an aquatic biodiversity and water use authorisation perspective.

DECLARATION OF SPECIALIST INDEPENDENCE

- I consider myself bound to the rules and ethics of the South African Council for Natural Scientific Professions (SACNASP);
- At the time of conducting the study and compiling this report I did not have any interest, hidden or otherwise, in the proposed development that this study has reference to, except for financial compensation for work done in a professional capacity;
- Work performed for this study was done in an objective manner. Even if this study results in views and findings that are not favourable to the client/applicant, I will not be affected in any manner by the outcome of any environmental process of which this report may form a part, other than being members of the general public;
- I declare that there are no circumstances that may compromise my objectivity in performing this specialist investigation. I do not necessarily object to or endorse any proposed developments, but aim to present facts, findings and recommendations based on relevant professional experience and scientific data;
- I do not have any influence over decisions made by the governing authorities;
- I undertake to disclose all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by a competent authority to such a relevant authority and the applicant;
- I have the necessary qualifications and guidance from professional experts in conducting specialist reports relevant to this application, including knowledge of the relevant Act, regulations and any guidelines that have relevance to the proposed activity;
- This document and all information contained herein is and will remain the intellectual property of Confluent Environmental. This document, in its entirety or any portion thereof, may not be altered in any manner or form, for any purpose without the specific and written consent of the specialist investigators.
- All the particulars furnished by me in this document are true and correct.

Dr. James Dabrowski (Pr. Sci. Nat. Water Resources)

February 2024

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GLOSSARY

Aquatic Biodiversity	The variety of plant and animal life in water ecosystems, relevant to the study due to the site's proximity to potential water bodies.
Desktop Review	Preliminary assessment based on existing data and information, conducted prior to on-site investigations.
Erosion Control Methods	Techniques employed to prevent or minimize soil erosion, such as haybale check dams or silt fencing, crucial in areas with high inherent erosion potential.
Freshwater Ecosystem Priority Area (FEPA)	Designated areas of high importance for freshwater ecosystem conservation, identified as a sensitivity feature in the DFFE screening tool.
Site Assessment	Comprehensive evaluation of the proposed development site, including the identification of wetlands, watercourses, and soil characteristics.
Sensitivity	The degree to which a particular area or ecosystem is susceptible to disturbance or impact, crucial in determining potential environmental consequences.
Strategic Water Source Areas (SWSA)	Designated areas crucial for maintaining water quality and quantity, identified as a sensitivity feature in the DFFE screening tool.
Terrestrial Critical Biodiversity Area (CBA1)	A designation indicating the significance of the area's biodiversity on land.
Topography	The physical features of the land surface, considered for its potential influence on drainage and ecological features.
Water Protection Zones	Designated areas for protecting water sources and courses, highlighting the environmental importance of the property.
Wetland	An area where water covers the soil, or is present either at or near the surface, contributing to biodiversity and ecological significance.
Western Cape Biodiversity Spatial Plan (WCBSP)	A plan indicating categorized areas based on their ecological importance in the Western Cape region.

ABBREVIATIONS

CBA:	Critical Biodiversity Area
CD:NGI:	Chief Directorate: National Geo-spatial Information
CR:	Critical Endangered
DFFE:	Department of Environment, Forestry and Fisheries
DWAF:	Department of Water Affairs and Forestry
DWS:	Department of Water & Sanitation
EIS:	Ecological Importance and Sensitivity
ESA:	Ecological Support Area
FEPA:	Freshwater Ecosystem Priority Area
GA:	General Authorisation
GPS:	Global Positioning System
NEMA:	National Environmental Management Act
NFEPA:	National Freshwater Ecosystem Priority Areas
NWA:	National Water Act
NWM5:	National Wetland Map 5
PES:	Present Ecological State
SACNASP:	South African Council for Natural Scientific Professions
SWSA:	Strategic Water Source Areas
WCBSP:	Western Cape Biodiversity Spatial Plan
WUL:	Water Use License

1. INTRODUCTION

Confluent Environmental Pty (Ltd) was appointed by Sharples Environmental Services to undertake freshwater assessment for a proposed PV Solar Plant on the remainder of Erf 2018 Riversdale, Western Cape. The proposed development sites are approximately 1.4 km north-west of the N2 and between 3 and 4 km south-west of the town of Riversdale, adjacent to the Werner Frehse Nature Reserve on the east. The closest perennial rivers are the Goukou and Vet Rivers located between 3 and 4 km east of the proposed development sites (Figure 1).

Eight possible development sites have been proposed for the PV development, with the preferred site being the large polygon in the southern corner of the property. The remainder of the proposed sites are indicated by crosses throughout the property (Erf RE/2018) (Figure 1).

The scope of work for this report is guided by the legislative requirements of the National Environmental Management Act (NEMA) as well as the National Water Act (NWA).

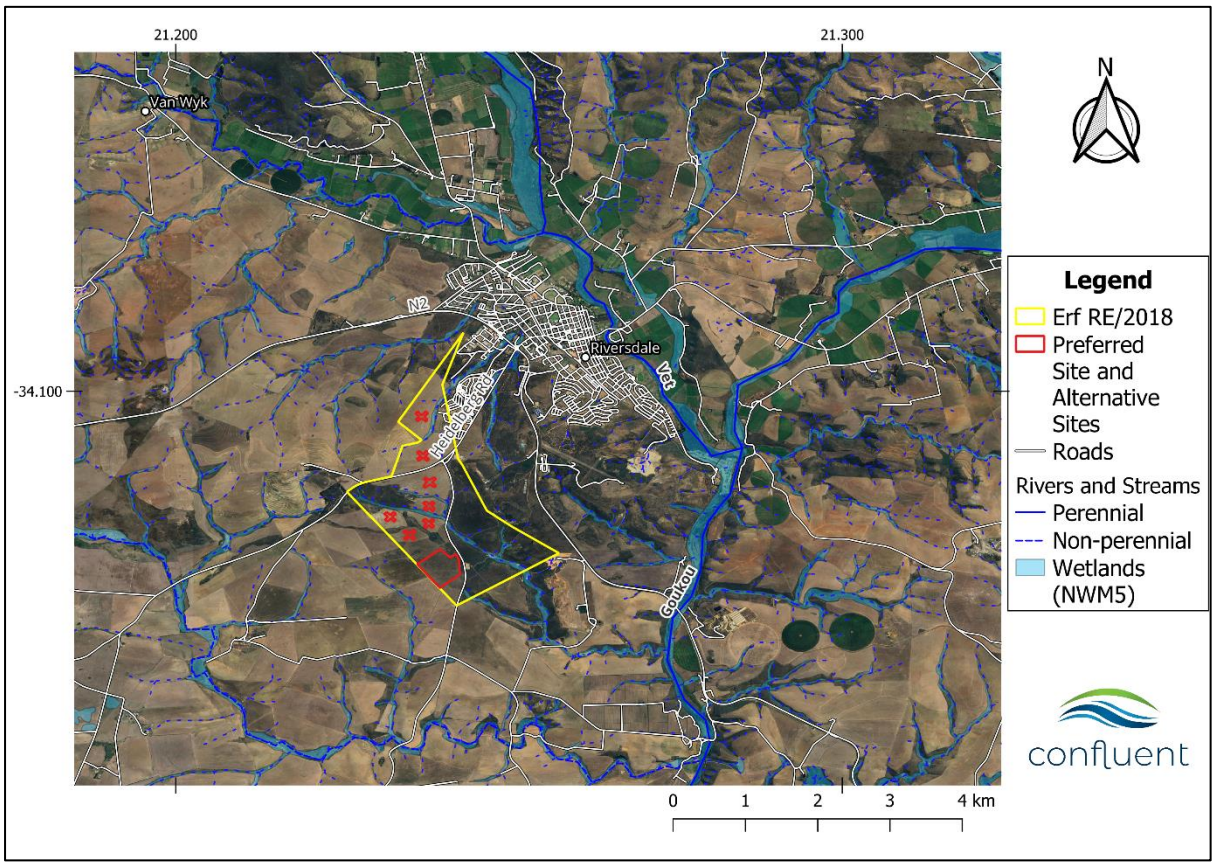

Figure 1. Location of Erf RE/2018, Riversdale, Western Cape.

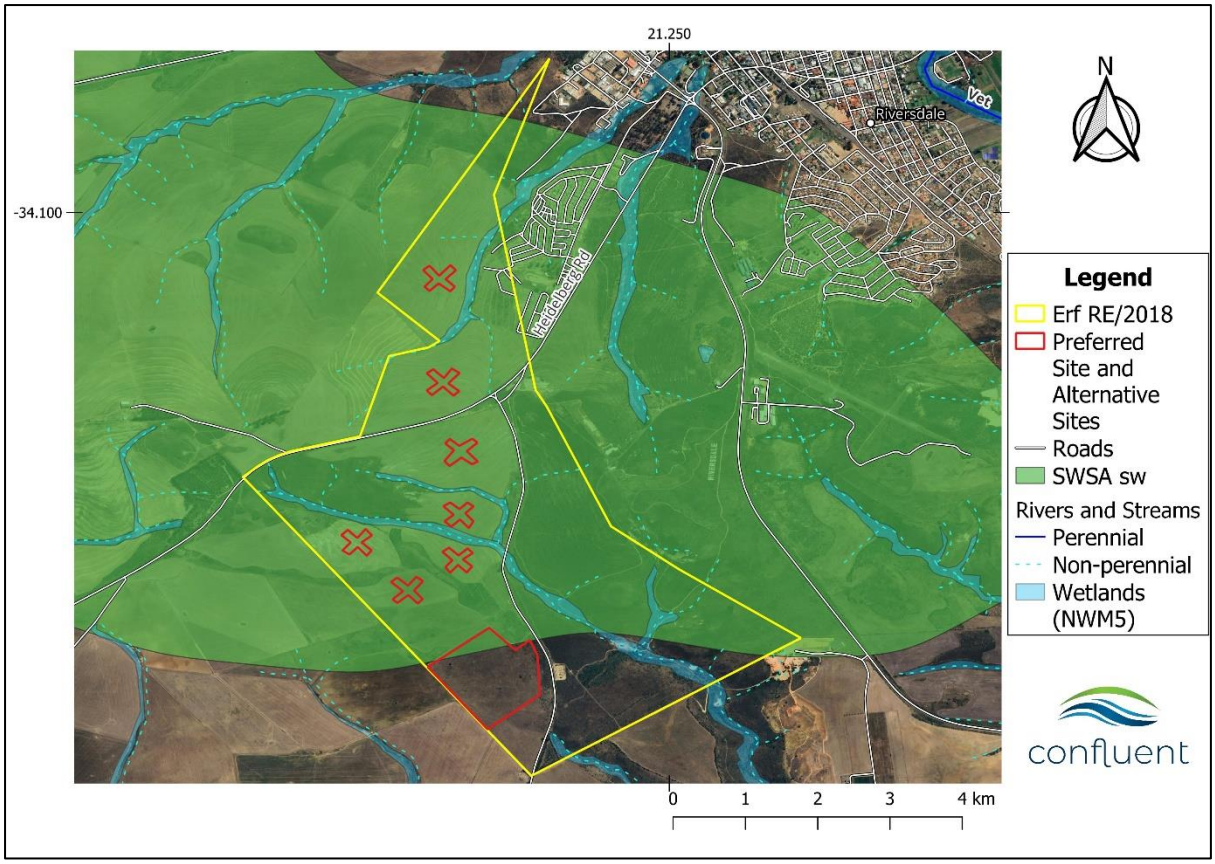

Figure 2: Detailed map indicating the preferred layout (red polygon) and possible alternatives (red crosses).

1.1 Key Legislative Requirements

1.1.1 National Environmental Management Act

According to the protocols specified in GN 1540 (Procedures for the Assessment and Minimum Criteria for Reporting on Identified Environmental Themes in Terms of Sections 24(5)(A) and (H) and 44 of the National Environmental Management Act, 1998, when Applying for Environmental Authorisation), assessment and reporting requirements for aquatic biodiversity are associated with a level of environmental sensitivity identified by the national web-based environmental screening tool (screening tool). An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of:

- **Very High** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Specialist Assessment; or
- **Low** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement.

The screening tool classified part of the preferred site as being of **Very High** aquatic biodiversity as it falls within the Langberg Strategic Water Source Area (SWSA) (Figure 3). According to the protocol, a site sensitivity verification must be undertaken to confirm the sensitivity of the site as indicated by the screening tool:

- Where the information gathered from the site sensitivity verification differs from the screening tool designation of **Low** aquatic biodiversity sensitivity, and it is found to be of a **Very High** sensitivity, an Aquatic Biodiversity Specialist Assessment must be submitted.

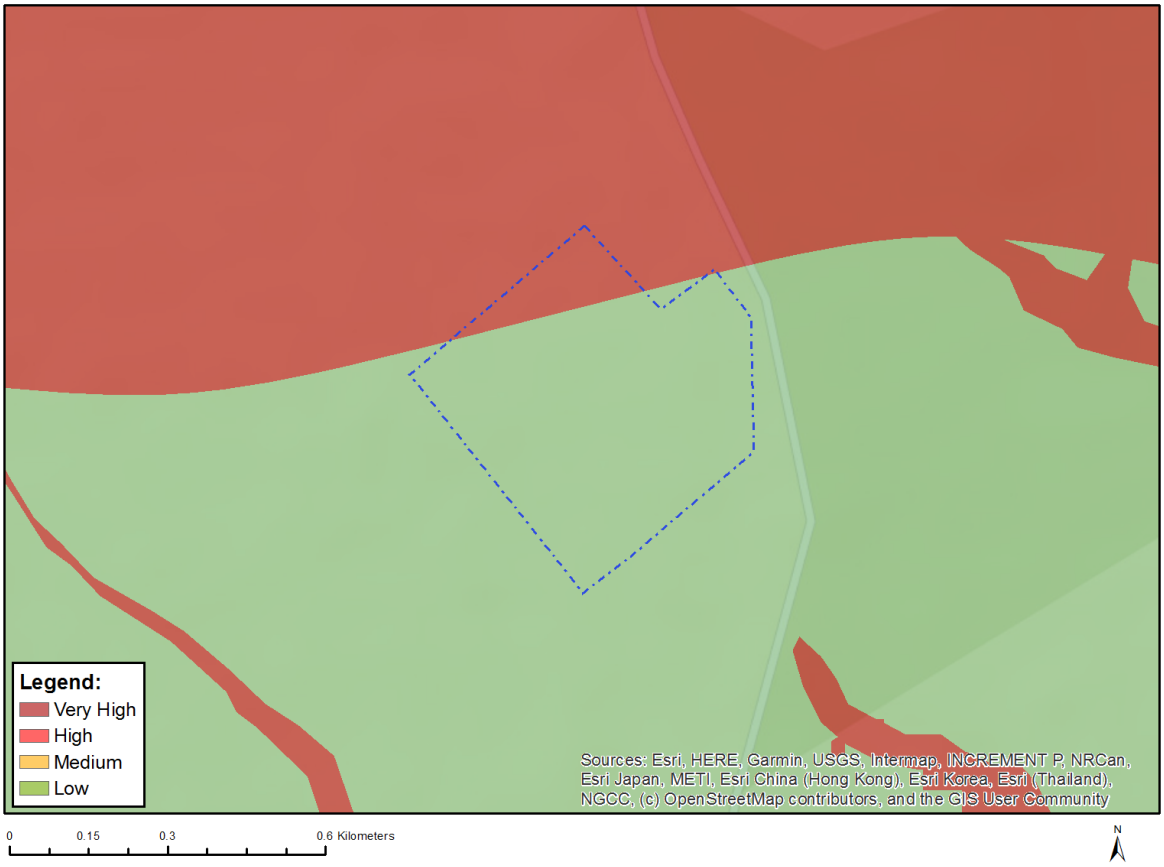

Figure 3. Results of the DFFE Screening Tool which indicate Very High Sensitivity of the Aquatic Biodiversity theme for the preferred development site on Erf RE/2018.

1.1.2 National Water Act

The Department of Water & Sanitation (DWS) is the custodian of South Africa's water resources and therefore assumes public trusteeship of water resources, which includes watercourses, surface water, estuaries, or aquifers.

A watercourse means:

- A river or spring;
- A natural channel in which water flows regularly or intermittently;
- A wetland, lake or dam into which, or from which, water flows; and
- 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.

For the purposes of this assessment, a wetland area is defined according to the NWA (Act No. 36 of 1998):

"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".

Wetlands must therefore have one or more of the following attributes to meet the NWA wetland definition (DWAF, 2005):

- A high water table that results in the saturation at or near the surface, leading to anaerobic conditions developing in the top 50 cm of the soil;
- Wetland or hydromorphic soils that display characteristics resulting from prolonged saturation, i.e. mottling or grey soils; and
- The presence of, at least occasionally, hydrophilic plants, i.e. hydrophytes (water loving plants).

No activity may take place within a watercourse unless it is authorised by the Department of Water and Sanitation (DWS). According to Section 21 (c) and (i) of the National Water Act, an authorization (Water Use License or General Authorisation) is required for any activities that impede or divert the flow of water in a watercourse or alter the bed, banks, course or characteristics of a watercourse. The regulated area of a watercourse for section 21(c) or (i) of the Act water uses means:

a) The outer edge of the 1 in 100-year flood line and/or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;

b) In the absence of a determined 1 in 100-year flood line or riparian area the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench (subject to compliance to section 144 of the Act); or

c) A 500 m radius from the delineated boundary (extent) of any wetland or pan.

According to Section 21 (c) and (i) of the NWA, any water use activities that do occur within the regulated area of a watercourse must be assessed using the DWS Risk Assessment Matrix (GN 4167 of 2023) to determine the impact of construction and operational activities on the flow, water quality, habitat and biotic characteristics of the watercourse. Low-Risk activities require a General Authorisation (GA), while Medium or High-Risk activities require a Water Use License (WUL).

According to Appendix D1 in the amended Section 21 (c) and (i) (GN 4167 of 2023) a GA without a DWS Risk Matrix Assessment is required if the PV array falls within the regulated area and does not directly impact any watercourses and the sewerage associated with the PV array is 100 m away from any watercourses. Otherwise, a DWS Risk Assessment Matrix must be compiled to determine the level of water use authorisation required.

1.2 The Proposed Development

At the time of writing this report, no proposed development plan was available. Lyners Engineers propose the development of a PV Solar Plant and Battery Energy Storage System (BESS) on the preferred development site on the remainder of Erf 2018.s

1.3 Scope of work

According to the protocols specified in GN 320 (Protocol for the specialist assessment and minimum report content requirements for environmental impacts on aquatic biodiversity) of the National Environmental Management Act (NEMA; Act No. 107 of 1998), assessment and reporting requirements for aquatic biodiversity are associated with a level of environmental sensitivity identified by the national web-based environmental screening tool (screening tool). An applicant intending to undertake an activity identified in the scope of this protocol on a site identified by the screening tool as being of:

- **Very High** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Specialist Assessment; or
- **Low** sensitivity for aquatic biodiversity, must submit an Aquatic Biodiversity Compliance Statement.

The objectives of this assessment included the following:

- To undertake a desktop analysis and site inspection to verify the sensitivity of aquatic biodiversity as **Very High** or **Low**; and
- Compile an Aquatic Biodiversity Compliance Statement or Aquatic Biodiversity Specialist Assessment based on the site verification of the sensitivity of the site. This includes an assessment of the following:

  Interrogation of available desktop resources including:

  - DWS spatial layers (1:50 000 rivers)
  - National Freshwater Ecosystem Priority Areas (NFEPA) spatial layers (Nel *et al.,* 2011)
  - National Wetland Map 5 and Confidence Map (CSIR, 2018)
  - Western Cape Biodiversity Spatial Plan (WCBSP, 2017).
- Conduct a site visit to determine the site sensitivity:
  - Identification and classification of watercourses within and adjacent to the site according to methods detailed by Ollis *et al*. (2013);
  - Determine the watercourse Present Ecological State (PES) and Ecological Importance and Sensitivity (EIS) using an appropriate method (if watercourses are present).
  - Delineate wetland / riparian areas following methods prescribed by DWAF (2015).
  - Determine an appropriate buffer for wetland areas using the site-specific buffer tool developed by Macfarlane and Bredin (2016).
  - Determine water use authorisation requirements for the proposed development.

2. ASSUMPTIONS AND EXCLUSIONS

- A site visit was conducted in January 2024 which fall during the summer period. It is possible that sensitive features such as rare or unique biota (e.g. amphibians), plants or habitat were not observed during the site visit, but are influenced by season, time of day, flow level or vegetation cover. However, recent good rainfall would have meant that any wetland features would have been quite evident and easy to identify.
- The assessment of PES&EIS is limited to the watercourse areas assessed for this report and does not extend across the entire system.
- Watercourse delineations and buffer determinations are site and land use specific and cannot be extrapolated beyond the area assessed in this report.
- The watercourse within the Werner Frehse Nature Reserve was not assessed during the site visit.

3. CATCHMENT CONTEXT

3.1 Catchment Features

The development sites on Erf RE/2018 are situated on the watershed of the quaternary catchments H90C & H90D in the catchments of the Vet and Goukou Rivers, situated towards the east of the property. Two of the proposed sites are located in the quaternary catchment H90C, with the remaining six sites, including the preferred site, are located in quaternary catchment H90D. As the rainfall intensity in the area is classified as Moderate and the inherent erosion potential of soils also as Moderate, erosion of soils and stormwater management are factors which must be considered when signs of erosion appear in this area (Table 1 and Figure 4)

Table 1. Summary of relevant catchment features for the proposed development area.

Feature	Description
Quaternary catchment	H90C & H90D
Mean Annual Runoff	29.22 mm
Mean Annual Precipitation	456.00 mm
Inherent erosion potential of soils (K-factor)	0.46, Moderate
Rainfall intensity	Moderate
Ecoregion Level II	22 02, Southern coastal belt
Geomorphological Zone	Not applicable
NFEPA area	Sub-quaternary reaches 9220, 9282 & 9287 No NFEPA's
Mapped Vegetation Type	FRs13: Eastern Ruens Shale Renosterveld (CR) & FRc2: Ruens Silcrete Renosterveld (CR)
Conservation	Ecological Support Area 2, Critical Biodiversity Area 1 (Aquatic and Terrestrial), Critical Biodiversity Area 2 (Terrestrial) WCBSP (2017)

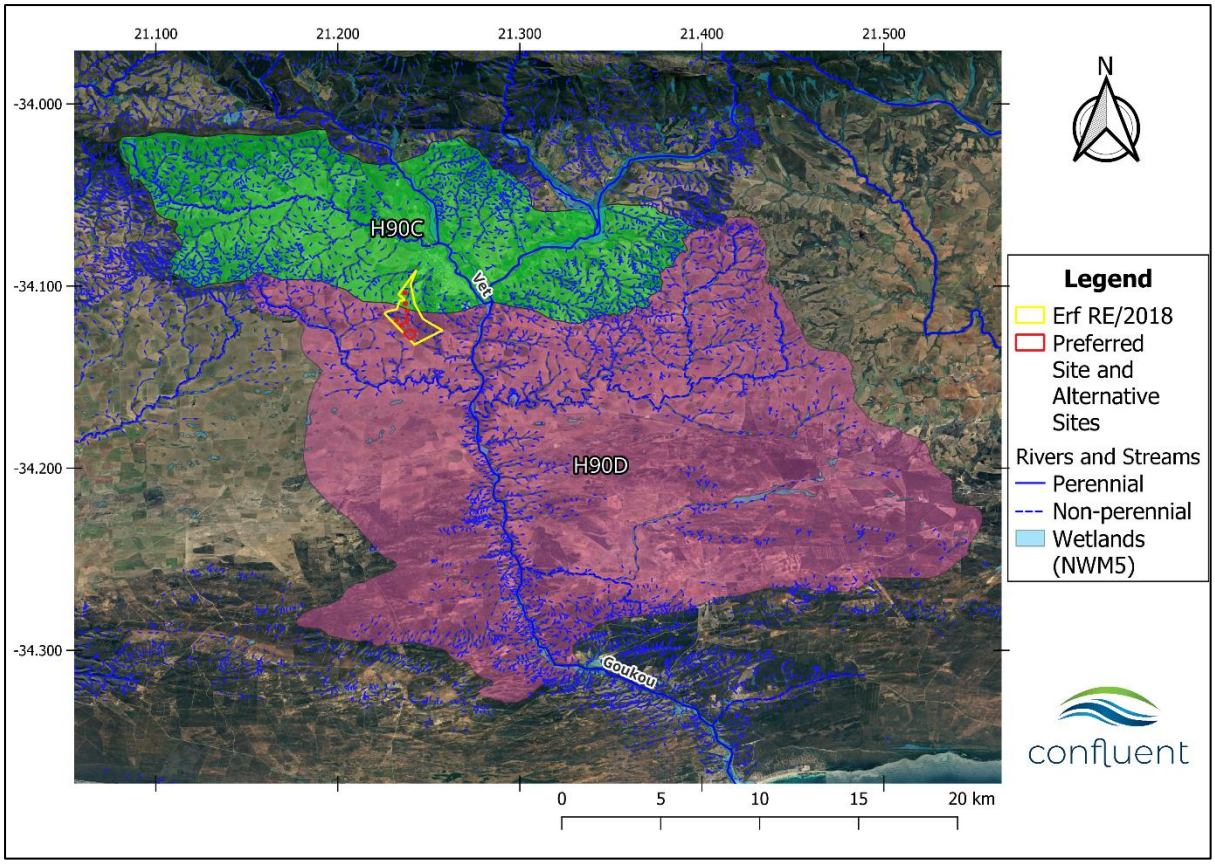

Figure 4. Location Erf RE/2018 and the proposed development sites in the quaternary catchments H90C and H90D.

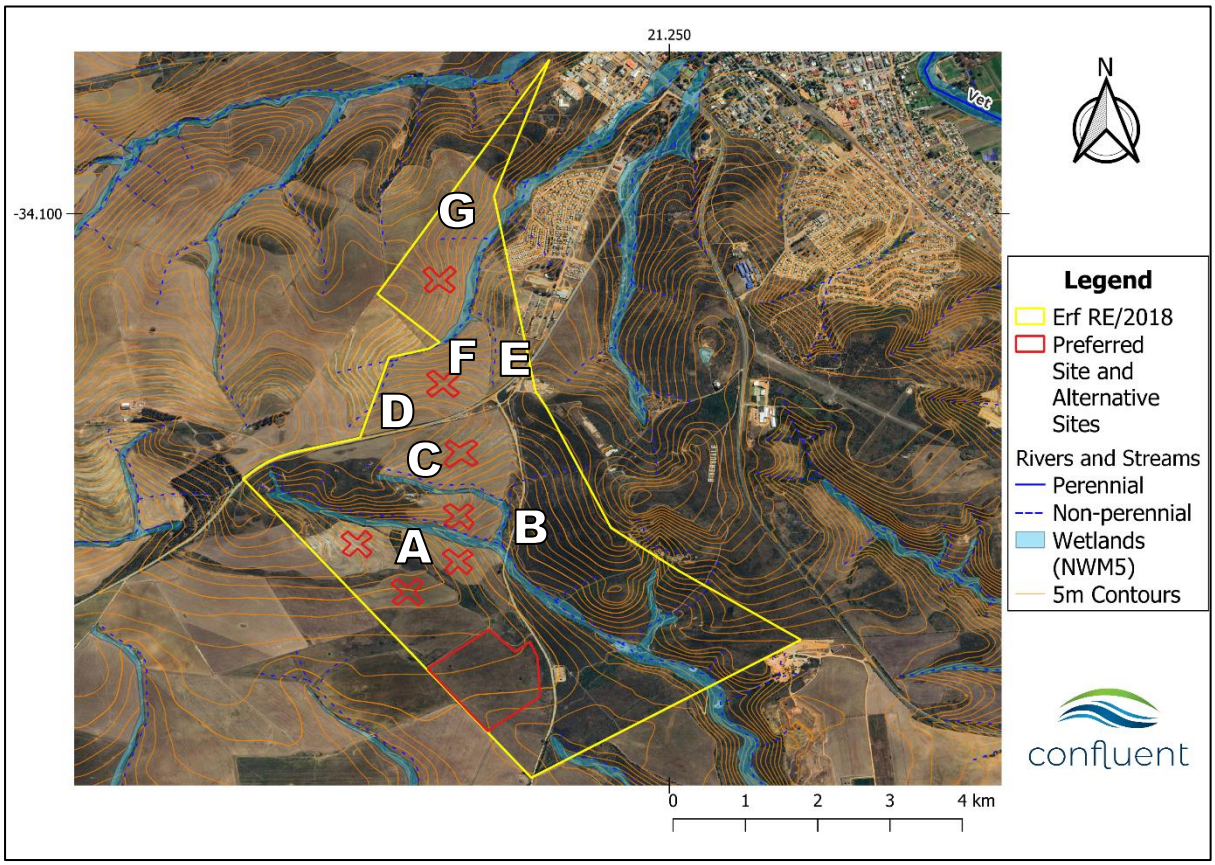

Figure 5: The proposed development sites in relation to mapped watercourses.

Rainfall occurs year-round with seasonal peaks in spring and autumn (Figure 6).

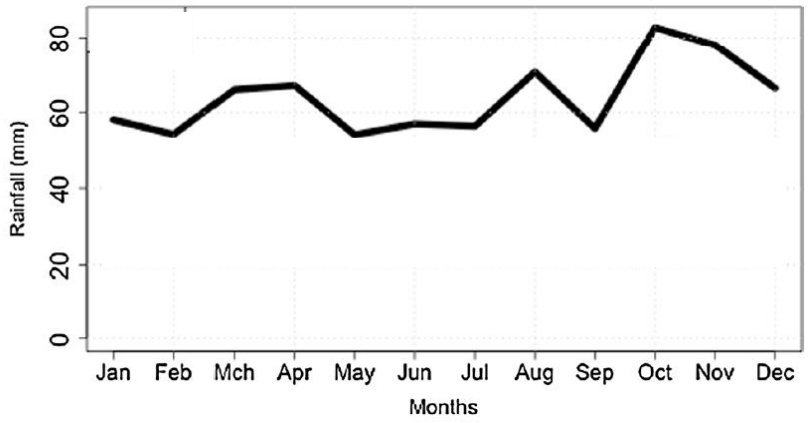

Figure 6. Area-averaged monthly rainfall for the coastal Southern Cape indicating peaks in Mar-Apr, Aug, and Oct. Data averaged between 1979 and 2011 (Engelbrecht et al., 2015).

The project area is located within the southeastern coastal belt (Ecoregion Level 2:20.02). The terrain is described as closed hills of moderate and high relief and moderately undulating plains. Altitude ranges between 0 – 1 300 m.a.m.s.l.

3.2 Vegetation

The mapped vegetation type at the site is Eastern Ruens Shale Renosterveld (FRs13; Critical Endangered; NVM, 2018) and Ruens Silcrete Renosterveld (FRc2; Critical Endangered; NVM, 2018). Both Eastern Ruens Shale Renosterveld and Ruens Silcrete Renosterveld are critically endangered with 80% of Eastern Ruens Shale Renosterveld already transformed manly for croplands, and only a few patches on the steepest slopes remain in a more or less natural state. Small fractions are also conserved in the Bontebok National Park, De Hoop and Werner Frehse Nature Reserves as well as in the private Grootvadersbosch Conservancy. As for Ruens Silcrete Renosterveld, 78% of the vegetation type has already been transformed for agricultural land with only less than 1% conserved in the Werner Frehse Nature Reserve.

3.3 Conservation and Catchment Management

3.3.1 Western Cape Biodiversity Spatial Plan

The Western Cape Biodiversity Spatial Plan (WCBSP; 2017) indicated the following categorised areas on the property and surrounding area;

- An aquatic and terrestrial Critical Biodiversity Area 1 (CBA1),
- a terrestrial Critical Biodiversity Area 2 (CBA2) along with an Ecological Support Area 2 (ESA2).

The main reasons for the categorisation of the area are that the following:

- The area is situated within two critically endangered vegetation types (Eastern Ruens Shale Renosterveld and Ruens Silcrete Renosterveld),
- Watercourse protection area (Southern Coastal Belt) and
- Several wetlands are mapped to occur on the property (Figure 7).

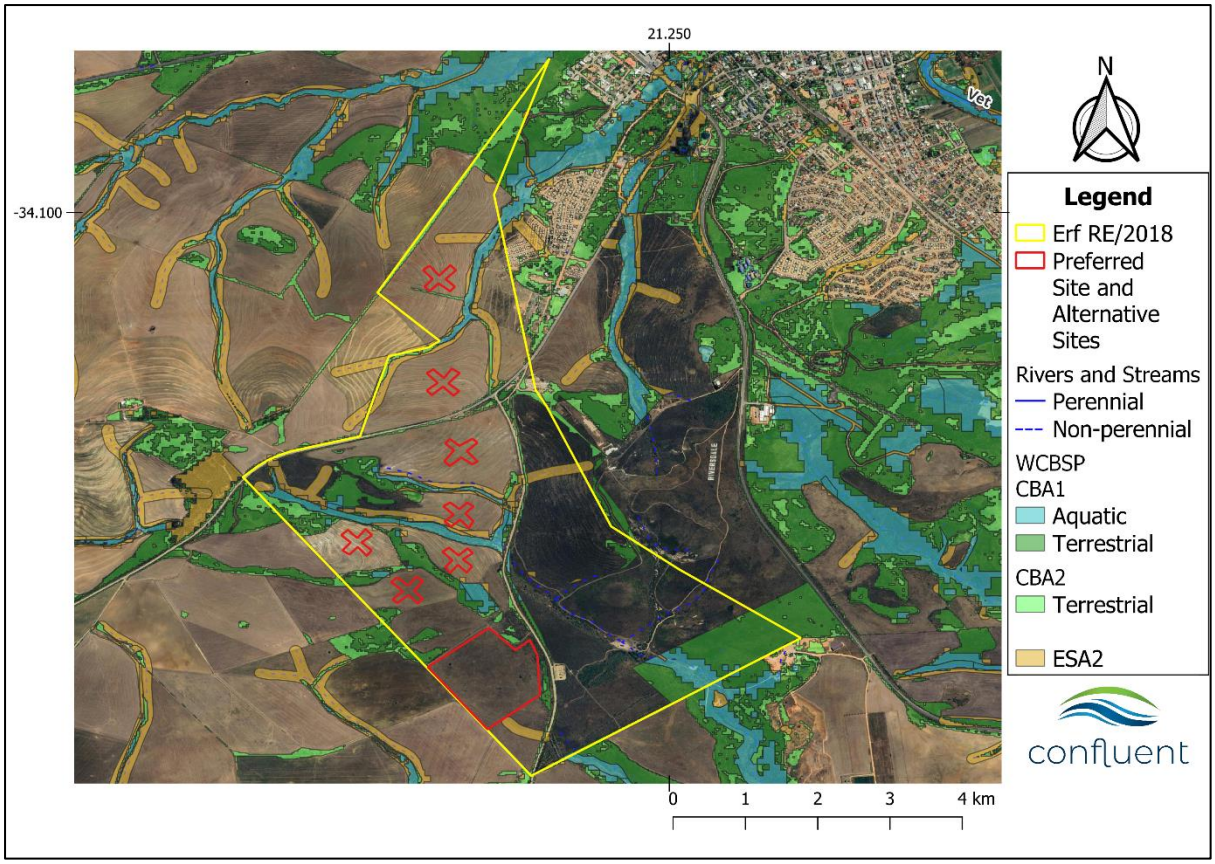

Figure 7. The proposed development area to mapped conservation features of the Western Cape Biodiversity Spatial Plan (2017).

Necessary actions in relation to the WCBSP are to ensure that development on the site does not result in negative impacts on the ecological structure and function of watercourses adjacent to the site (Table 2).

Table 2. Definitions and objectives for conservation categories identified in the Western Cape Biodiversity Spatial Plan (WCBSP, 2017).

WCBSP Category	Definition	Management Objective
Critical Biodiversity Area 1 (CBA1)	Areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.	Maintain in a natural or near-natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.
Critical Biodiversity Area 2 (CBA2)	Areas in a degraded or secondary condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure.	Maintain in a natural or near-natural state, with no further loss of habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are appropriate.
Ecological Support Area 2 (ESA2)	Areas that are not essential for meeting biodiversity targets, but that play an important role in supporting the functioning of PAs or CBAs, and are	Restore and/or manage to minimize impact on ecological processes and ecological infrastructure functioning, especially soil and water-related

	often vital for delivering ecosystem services.	services, and to allow for faunal movement.

3.3.2 Strategic Water Source Area

Erf RE/2018 is situated in the Langeberg Strategic Water Source Area for surface water (SWSA-sw). SWSAs are defined as areas of land that supply a disproportionate (i.e. relatively large) quantity of mean annual runoff in relation to their size and are therefore considered nationally relevant (Le Maitre *et al*., 2018). A key objective in the management of SWSAs is to ensure the quantity and quality of water within and flowing from SWSAs is protected from developments that cause unacceptable and irreparable impacts.

Development of roads, parking areas and other impervious surfaces, along with wetland draining or infilling has the potential to change quantities of water in watercourses by intercepting, increasing, reducing or diverting flows from their normal path. Water quality can be impacted by flow-related alterations, particularly increased flows as this usually results in altered sediment transport causing scouring, sedimentation, and increased turbidity due to suspended sediments, especially during the construction phase. The operational phase of a development increases the risk of toxic hydrocarbons and other road-based pollutants as well as sewage from leaking or blocked drains or pump stations impacting water quality.

3.3.3 National Freshwater Ecosystem Priority Areas

According to the National Freshwater Ecosystem Priority Atlas (NFEPA; Nel *et al*., 2011) the sub-quaternary reaches (SQR 9220, 9282 & 9287) are not classified under any of the NEFPA categories (NFEPA; Nel *et al*., 2011).

3.4 Mapped Watercourses

Seven non-perennial rivers or streams and associated wetland habitat are mapped to occur within relatively close proximity to the proposed development sites (Figure 5). For convenience, the non-perennial rivers or streams are labelled A-G from south to north. Streams A to C are located in quaternary catchment H90D. Streams (D-G) are associated with the quaternary catchment H90C (Figure 5).

Stream A flows in an easterly direction, and is located north of the preferred site and three of the alternative sites. It passes through the neighbouring nature reserve, and, according to the NWM5 geospatial layer, is associated with a channelled valley bottom wetland (Figure 5).

Stream B flows southwards connecting to stream A, and is located north of the preferred development site. According to the NWM5 geospatial layer stream B has a seep wetland associated with it (Figure 5).

Stream C flows almost parallel with Stream A, flowing into Stream B, north of the junction of Stream A and B and, according to the NWM5 geospatial layer, is associated with a channelled valley bottom wetland.

Stream D flows in northerly direction till it connects with stream F, just west of the second most northerly alternative site and adjacent to the property boundary (Figure 5).

Stream E flows parallel with stream D following the contours diverting to the west to connect with stream F (Figure 5).

Stream F flows in a northerly direction, passing the northern most alternative site on the west and, according to the NWM5 geospatial layer, is associated with a channelled valley bottom wetland.

Steam G flows in an easterly direction till it connects to stream F, north of the northern most alternative site (Figure 5).

3.5 Historical assessment

Erf RE/2018 seem to have undergone minimal changes during the past 70 years from 1954 till 2024. One of the most notable changes that occurred on the property was between 1954 and 1974, when the southern part of the property was covered with indigenous vegetation in 1954 and cleared for agricultural purposes sometime between 1954 and 1974. Another notable change between 1954 and 1974 is the presence of a cut channel on the property in 1954 which ran next to stream F and was removed in the year leading up to 1974. Furthermore, a power substation was constructed on the property between 1954 and 1974 (Figure 8). Additionally, according to historical records, the Werner Frehse Nature Reserve was founded in 1967 and includes a large part of Erf RE/2018 East of the gravel road cutting through the property towards the south. However, agriculture activities only seem to have stopped in the reserved area of the property between 2005 and 2007, as observed in the historical imagery below (Figure 9).

From 2007 till the present, the activities on the property have remained the same, with livestock farming being conducted outside the reserve area and no obvious invasive activities being conducted within the reserved area (Figure 9).

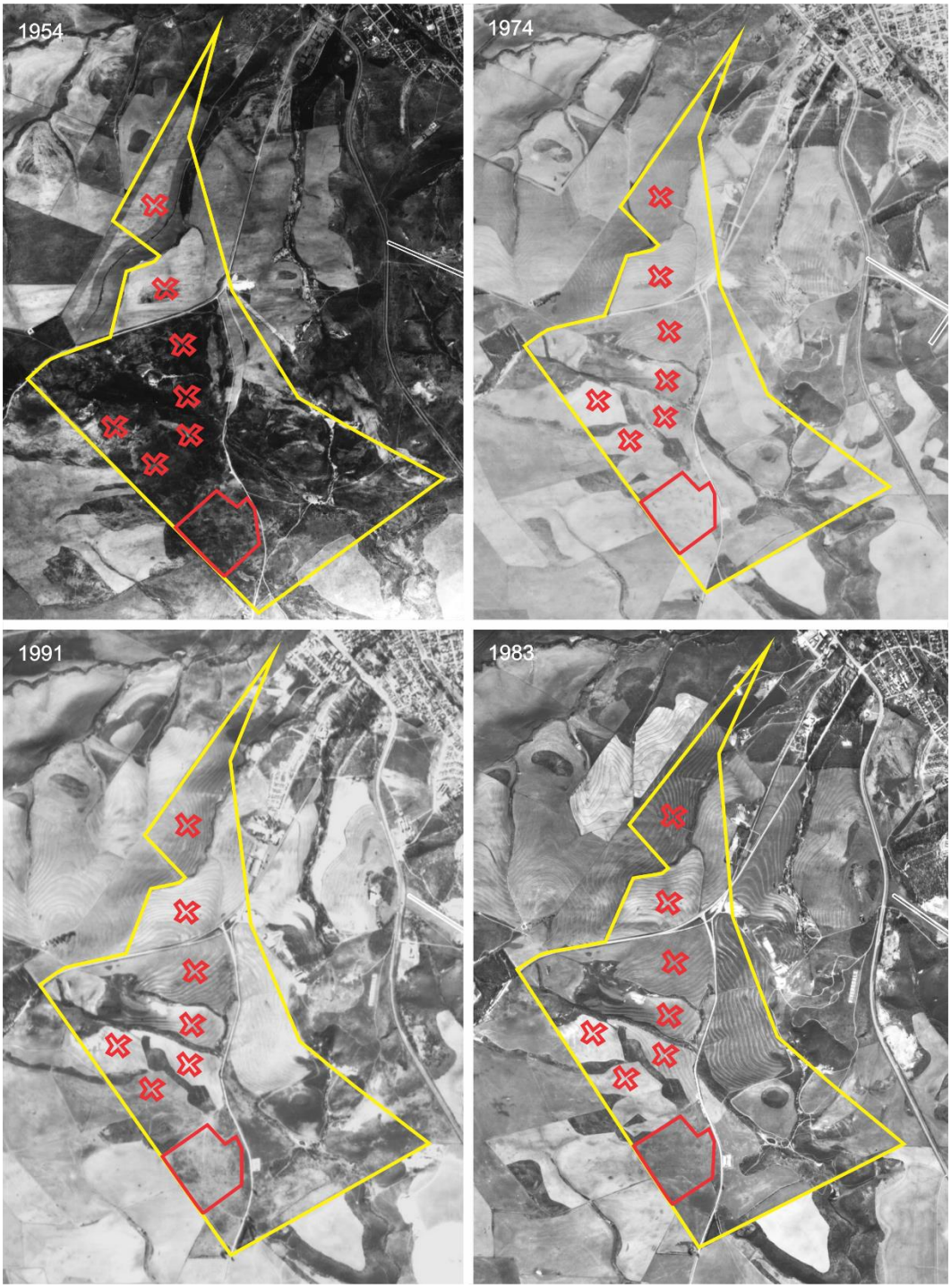

Figure 8. Historical photos showing Erf RE/2018 through notable changes between 1954 and 1983 (CD:NGI & Google Earth imagery).

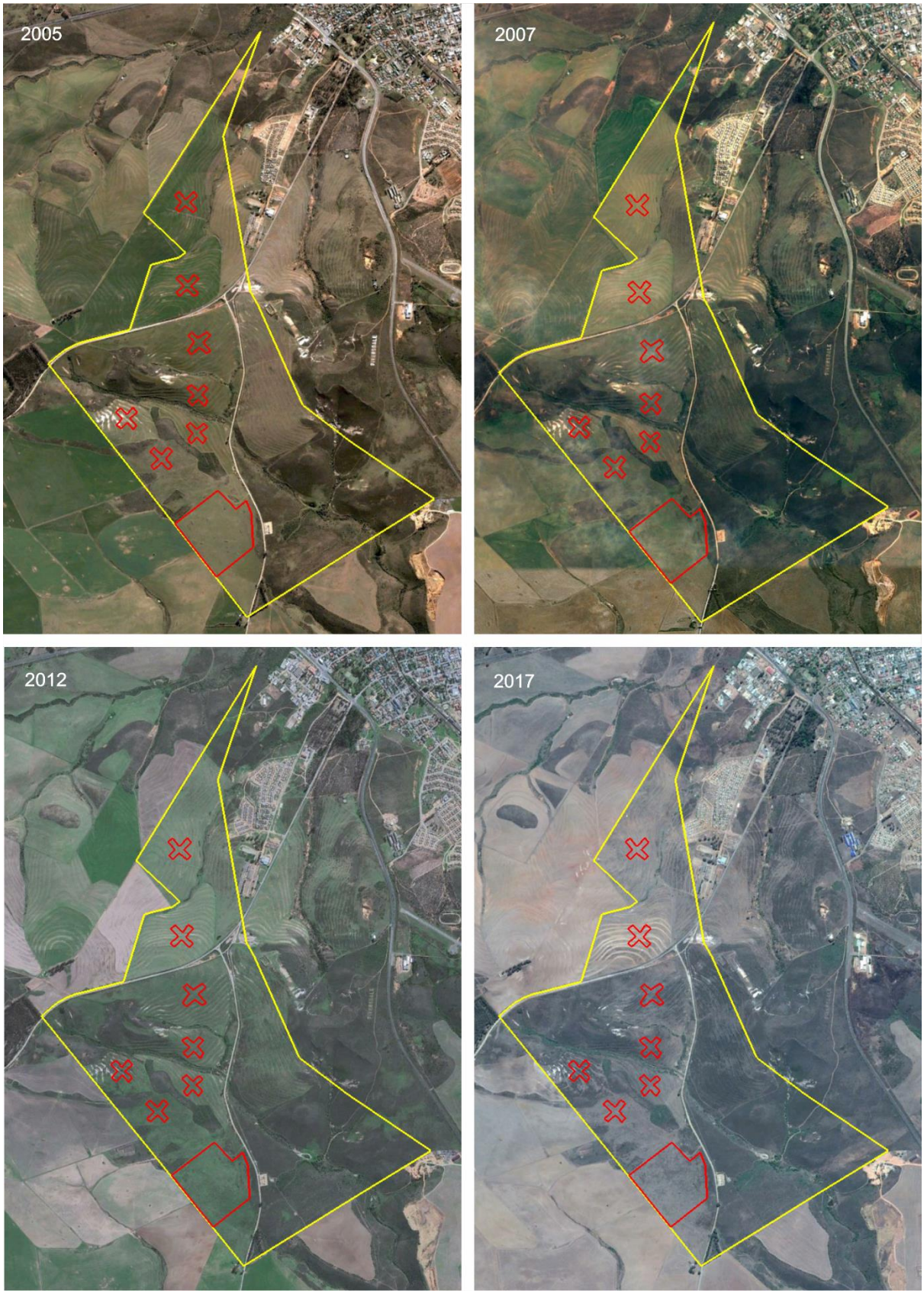

Figure 9: Historical photos showing Erf RE/2018 through notable changes between 2005 and 2017 (CD:NGI & Google Earth imagery).

4. SITE ASSESSMENT

4.1 Site Visit

The site was visited on 25 January 2024. At the time of the site visit the weather was clear. All mapped watercourses, near all the proposed development sites were investigated. The site is somewhat hilly becoming steeper towards the north of the site. It was very apparent that most of the property is being used for grazing and minimal indigenous vegetation was present near all the proposed development sites.

4.2 Site Assessment

All mapped watercourses, near all the proposed development sites were investigated, finding that five of the seven mapped watercourses did not resemble characteristics associated with an active aquatic ecosystem, lacking definite channels or banks or aquatic biota. The observations of the investigated watercourses are as follows:

Stream A has no clearly defined channel or banks in the upper reaches. The channel was well vegetated along its entire length comprising but not limited to the following species: *Searia longispina, Gymnosporia buxifolia*, *Searia tomentosa, Eulea undulatai, Grewia occidentalis* and *Aloe ferox*. The soil present in the drainage was relatively sandy. There was no obvious aquatic biota or habitat associated with the mapped watercourse and no wetland characteristics were observed. The stream is therefore classified as a non-perennial drainage line that flows only intermittently following high rainfall periods (Figure 10, A).

Stream B has no clearly defined channel or banks associated with the mapped watercourse, however at the northern and southern part of the watercourse wetland characteristics are present. Unfortunately, the large number of disturbances that include informal housing towards the east of the watercourse, a road through the watercourse, a dam in the water course, a lot of cattle movements through the watercourse as well as earthworks, makes it difficult to determine the boundaries of the wetland (Figure 10, D). At the northern part of the watercourse, a wet area is present with mottling and gleying present in the auger samples. The area is dominated by grass with one *Juncus acutus* present (Figure 10, D and E). The edge of the wet area was walked and mapped (Figure 11, Wetland 1). The Southern part of the watercourse contains the dam with saturated soil upstream of the dam dominated by grass, with an abundance of *Juncus acutus* (Figure 11, Wetland 1) (Figure 10, B and C). Given onsite observations the entire zone of drainage upstream of the dam has been classified as a seep wetland (Figure 11, Wetland 1).

Stream C has a more defined channel and banks and in some reaches, showed clear signs of channel erosion. No aquatic biota or habitat were observed as well as no wetland features. The vegetation within the drainage line was terrestrial containing but not limited to the same species as Stream A (Figure 10, F). The stream is therefore classified as a non-perennial drainage line that flows only intermittently following high rainfall periods (Figure 11).

Stream D was cleared of indigenous vegetation and has no definite channel, banks, or aquatic biota associated with the mapped watercourse indicating that Stream E is only a natural line of drainage and not a watercourse (Figure 11).

Stream E was cleared of indigenous vegetation and has no definite channel, banks, or aquatic biota associated with the mapped watercourse indicating that Stream E is only a natural line of drainage and not a watercourse (Figure 10, G and Figure 11).

Stream F it is located along a valley-bottom and displayed clear wetland characteristics associated with the mapped watercourse. Mottling and gleying were observed in the auger samples – indicating permanently saturated soils - and surface water flow was visible along much of the length of the wetland. Vegetation along the wetland was dominated by *Juncus acutus* with some *Ficinia nodosa* and *Phragmites* sp. (Figure 10, H and I). The wetland is classified as an unchanneled valley bottom wetland as the wetland is situated in a valley with no distinct channel flowing through it (Figure 11, wetland 2).

Steam G was cleared of indigenous vegetation and has no definite channel, banks, or aquatic biota associated with the mapped watercourse indicating that Stream E is only a natural line of drainage (Figure 11).

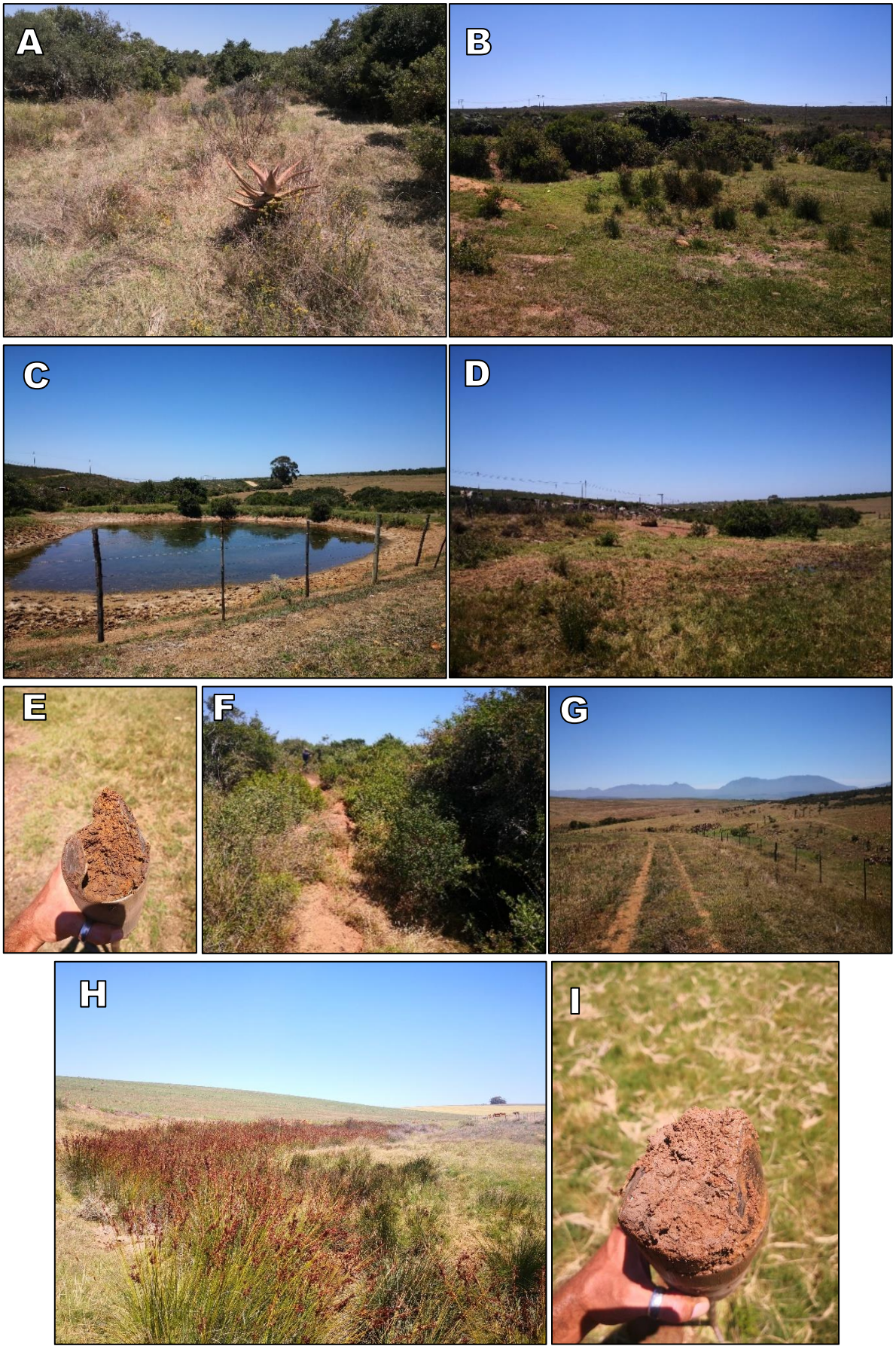

*Figure 10: **A**-General appearance of Stream A; **B**-Southern part of Stream B with Juncus acutus present; **C**-Dam in the Southern part of Stream B; **D**-Northern part of Stream B with wet area, informal*

*housing towards the east of thewater course, a road through the watercourse, as well as earthworks; **E**-Mottling and gleying in the auger samples at the northern part of Stream B; **F**-General appearance of Stream C; **G**-General appearance of Stream E; **H**- Unchanneled valley bottom wetland with the dominant vegetation Juncus acutus at Stream F; **I**- Mottling and gleying in the auger samples at Stream F.*

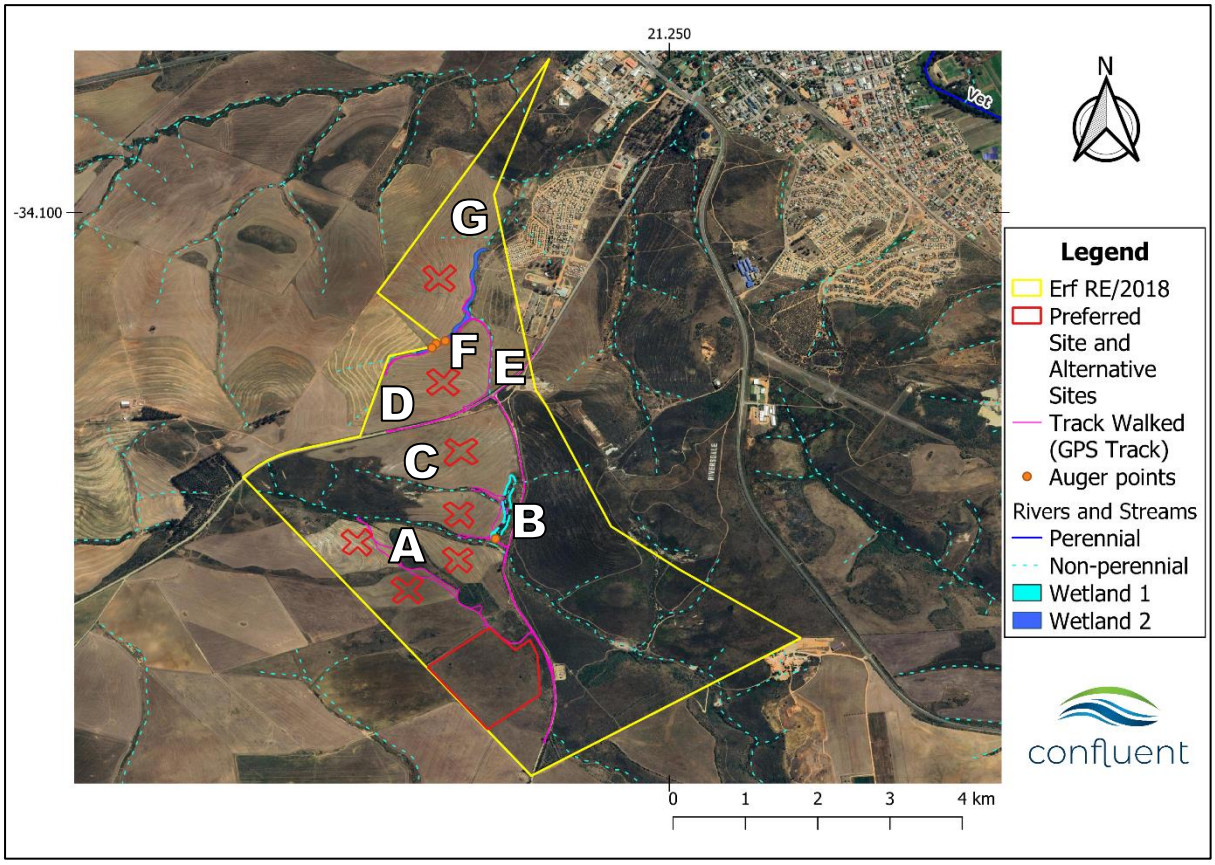

Figure 11: Erf RE/2018 in relation to verified non-perennial drainage line and delineated wetlands.

5. MANAGEMENT RECOMMENDATIONS

5.1 Stormwater Management

A key impact related to solar developments is the generation of large volumes of stormwater associated with an increased area of impermeable surfaces. Stormwater is typically conveyed into watercourses, where high volumes (and associated high energy) cause degradation of watercourses, mainly due to the erosion of the bed and banks. In this respect given the steep slopes within the property, even though the drainage line is located outside of the development footprint, it is potentially vulnerable to stormwater impacts.

Given the location of the property in a SWSA, it is therefore important that stormwater generated on site should, as far as possible, be managed according to Sustainable Drainage System (SuDS) principles. This requires that as much stormwater as possible should be attenuated within the development footprint. In this respect the following measures, *inter alia*, should be considered:

- Use of swales and detention ponds to attenuate stormwater runoff, encourage infiltration and reduce the speed, energy and volumes at which stormwater is discharged from the site;

- Use of permeable paving to encourage infiltration into the soil; and
- Use of retention ponds and artificial wetlands to capture stormwater runoff and prevent its discharge from the site.

5.2 Erosion Management

The steep slopes of the property will be vulnerable to erosion during clearance of the site and the construction phase. It is therefore important that appropriate erosion control measures are implemented, which include *inter alia,* the following:

- Ensure that construction activities do not cause any preferential flow paths and concentrated surface runoff during rainfall events.
- Clearly demarcate the construction area and ensure that heavy machinery does not compact soil or disturb vegetation outside of these demarcated areas.
- Reduce transport of sediment through use of structures such as silt fences or biodegradable coir logs placed along a contour below the development footprint (Figure 12).

Figure 12: Examples of silt fences (left) and coir logs (right) used to trap sediment mobilised from steep slopes.

- Ensure that vegetation clearing is conducted in parallel with the construction progress to minimise erosion and runoff.
- Revegetate exposed areas, with indigenous vegetation, once construction has been completed.
- Ensure that stormwater and runoff generated by hardened surfaces is discharged in retention areas (i.e. swales or retention ponds), to avoid concentrated runoff and associated erosion.

6. AQUATIC BIODIVERSITY COMPLIANCE STATEMENT

A conservative 30 m buffer has been applied to all watercourses verified on site. While the proposed development is located within a SWSA (only a small proportion of the preferred alternative falls within a SWSA), the implementation of the proposed management recommendations, together with the implementation of the conservative buffer will prevent impacts to aquatic biodiversity and the ability of the land to continue to produce high quantities of good quality water. The preferred alternative falls well outside of the 30 m buffer and therefore the sensitivity of aquatic biodiversity on this site is considered to be Low. The aquatic

biodiversity sensitivity of any of the other alternatives is Low, provided that the entire development footprint remains outside any of the 30 m buffers (Figure 13).

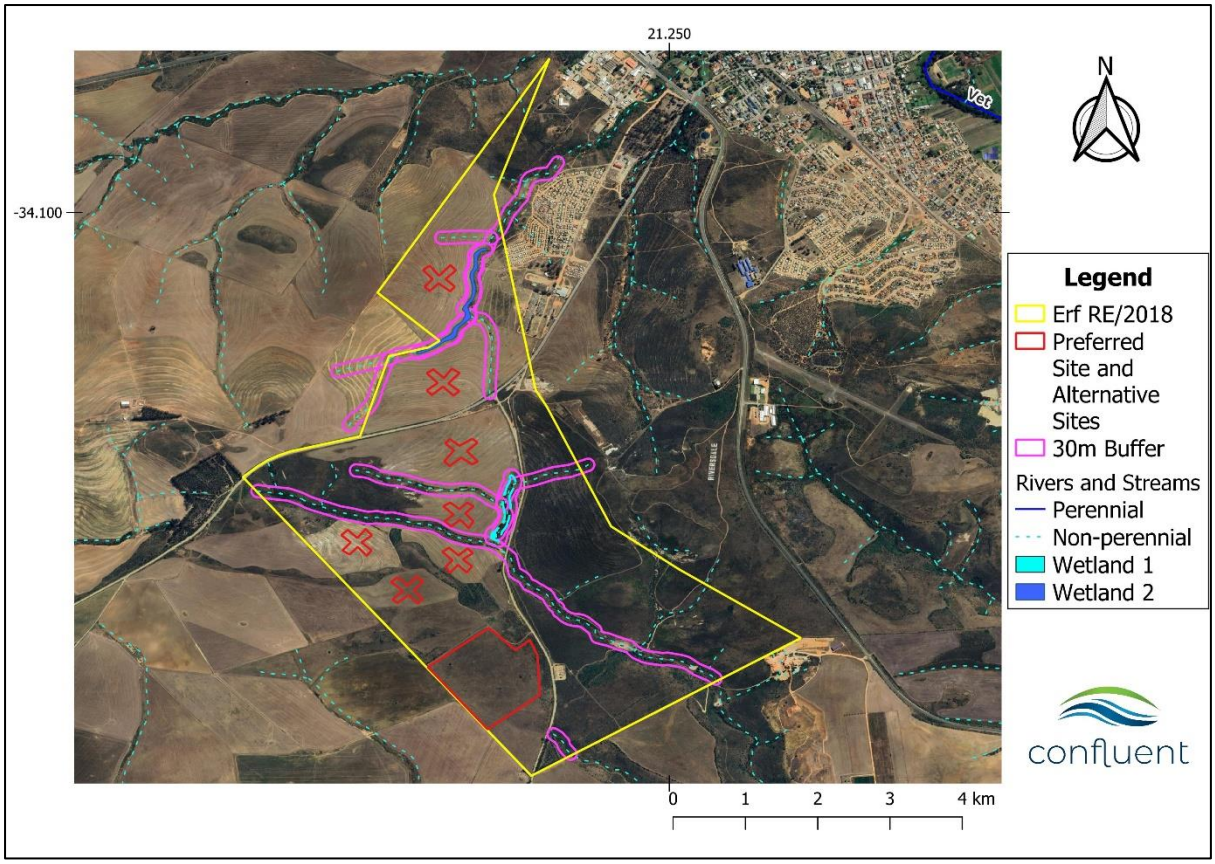

Figure 13: Map indicating 30 m buffer zones.

7. WATER USE AUTHORISATION

Based on the results of the newly revised legislation and the site verification, it can be concluded that any development taking place outside the 100 m and 500 m regulated area (as illustrated in Figure 14) would not require any water use authorisation. In this respect the preferred alternative is considered to be ideal and would not require any water use authorisation. Many of the other alternatives would fall in the regulated area and would require a GA (without the need to compile a DWS Risk Assessment Matrix) provided that:

a) There will be no direct impact/destruction on any watercourse; and
b) Sewage infrastructure is located more than 100 m away from a watercourse.

Any sites that do not meet these criteria would need to be assessed using the DWS Risk Assessment Matrix to determine whether a GA or WUL would be required.

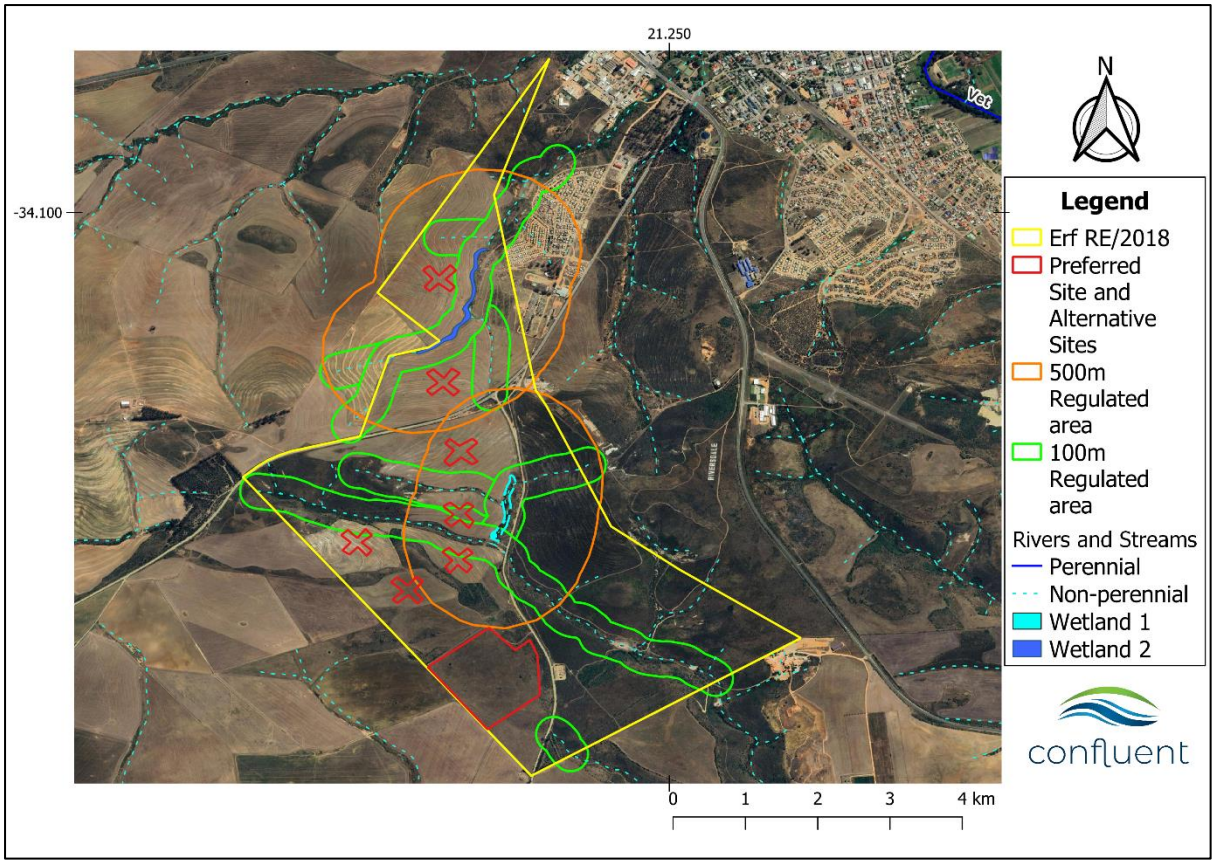

Figure 14: Proposed development sites in relation to the 500 m and 100 m regulated areas.

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