water & sanitation
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REPUBLIC OF SOUTH AFRICA

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WATER USE LICENCE APPLICATION SUMMARY REPORT (WU44082)

ABSTRACTION OF GROUNDWATER, STREAM CROSSINGS AND INSTALLATION OF SEPTIC TANKS ON FARMS 563, 564, 565 AND FARM KLEINFONTEIN 954, VILLIERSDORP

NAME OF APPLICANT:
EFRC AGRI OPERATIONS (PTY) LTD

Compiled by

PHS Consulting

PHS
CONSULTING

Date: October 2025

1. Applicant details

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2. Person submitting application

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3. Background and purpose

3.1 Background and purpose

The proposal entails the establishment of a free-range poultry broiler facility (20 houses) on Farms 563, 564, 565 and Farm Kleinfontein 954, Villiersdorp (refer Figure 1 for location and Figure 2 for farm portions). The Applicant is Elgin Free Range Chickens (EFRC) Agri Operations (Pty) Ltd, and the water uses applied for include S21(a) for abstraction from 2 boreholes on site, S21(c) and (i) due to the proximity of planned development to freshwater features on site, and S21(g) for the installation of three septic tanks on site.

The site falls within Quaternary Catchment H40F, which forms part of the Breede-Gouritz Water Management Area (WMA), and the application will be lodged with BOCMA, Worcester office for consideration.

The farms were historically used for dryland grain farming, livestock farming and fruit cultivation, but went through a consolidation and subdivision of Farm 695 and 696 during 2018, after which the farms were sold by Kanaan Trust to Ralph Trust in 2019. EFRC Agri Operations (Pty) Ltd has a sales option with the landowner subject to submission of the required NEMA and NWA authorisation processes to the individual Competent Authorities.

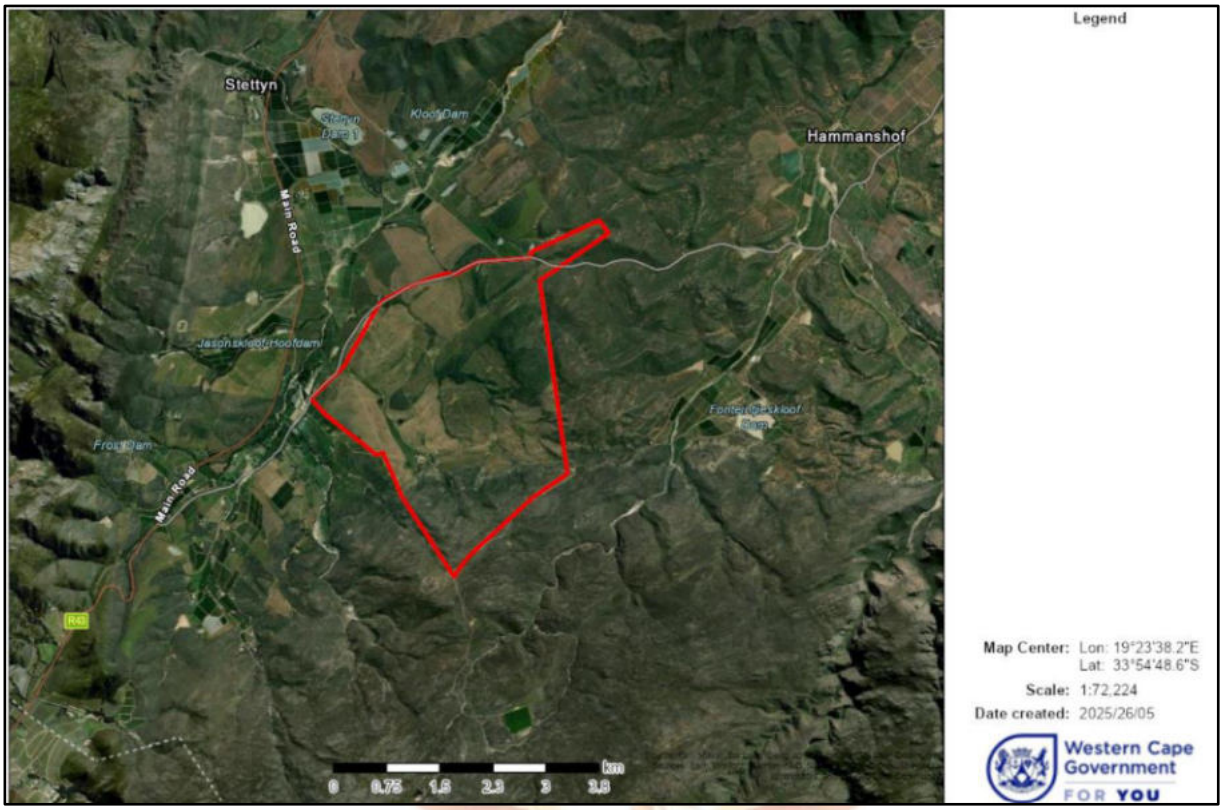

Figure 1: Location of application site (outline of all 4 farms indicated in red)

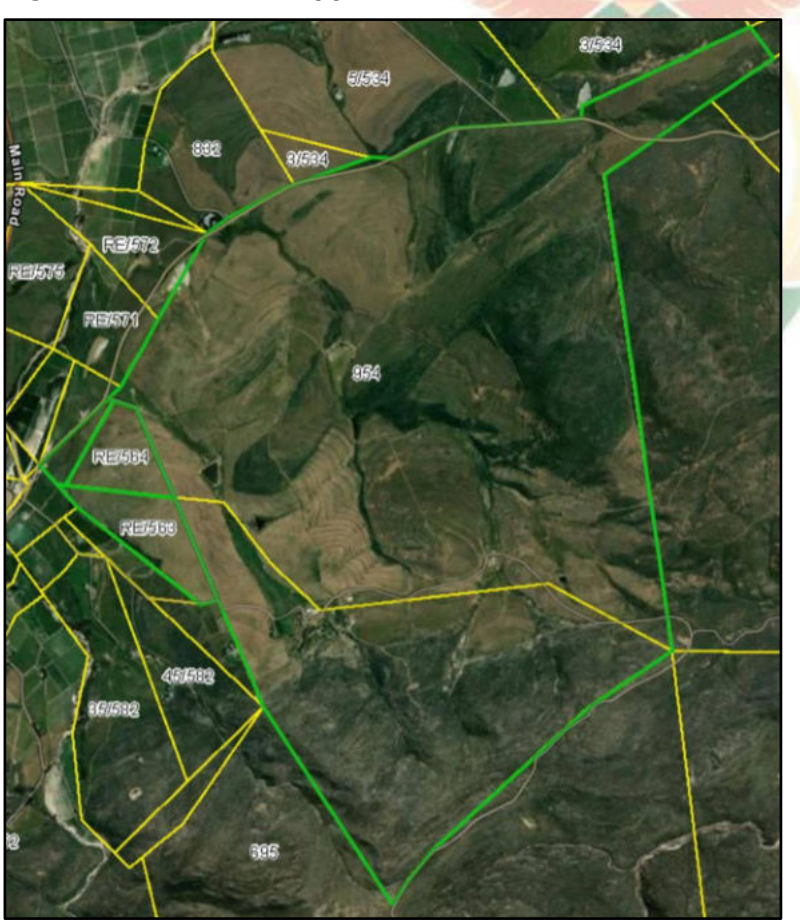

Figure 2: Farm portions relevant to the application (indicated by green outline)

The Applicant proposes the development of a Free-Range Poultry Broiler Facility. The Broiler Facility will involve the establishment of 20 Broiler Houses (approximately 1 044m² per facility). Each facility will house approximately 17,000 birds. An Ablution facility, Guard House, Spray Race and Refrigerated Container will be located at the entrance to the site. Furthermore, an additional Ablution Facility and Residential Dwelling will be located at the broiler facilities.
An existing access road will be utilised, and numerous internal roads will be upgraded and realigned (6m width required) where applicable for biosecurity reasons, to improve traffic flow and safety, and to improve river crossings. Refer Figure 3 for Site Development Plan.
Access roads are required to accommodate heavy vehicles travelling to and from the proposed free-range poultry broiler facility, with the road alignment requiring 4 stream crossings as indicated in Figure 6. In Figure 6 the markings Nr 1, 3 and 4 indicate low waterway bridges and marking Nr 2 indicates a suspended bridge structure. Appendix 1 includes detailed engineering drawings of these proposed structures.

The proposed Water Use Licence application includes S21(c) and (i) for the stream crossings and other infrastructure within the regulated area of mapped freshwater features, S21(a) abstraction from 2 boreholes on site for treatment to potable standard and use on site for the workers and animals, and S21(g) water uses for the installation of three septic tanks on site.

As there is no potable supply to the site, the proposed development includes abstraction of 49 458m^3/annum from two existing boreholes on site (KF_BH1 and KF_BH2), treatment to potable standard and use as potable supply for the chickens and workers on site. Two other boreholes (KF_BH3 and KF_BH4) are also present on site, and were yield and quality tested by GEOSS, but due to their very low yield testing do not form part of the application.
The installation of the three septic tanks will be at the following locations (refer SDP Figure 3):

1) The ablution at the entrance gate to the farm
2) At the ablution for workers
3) At the farm manager's house

Refer Appendix 5 for the proposed septic tank design.

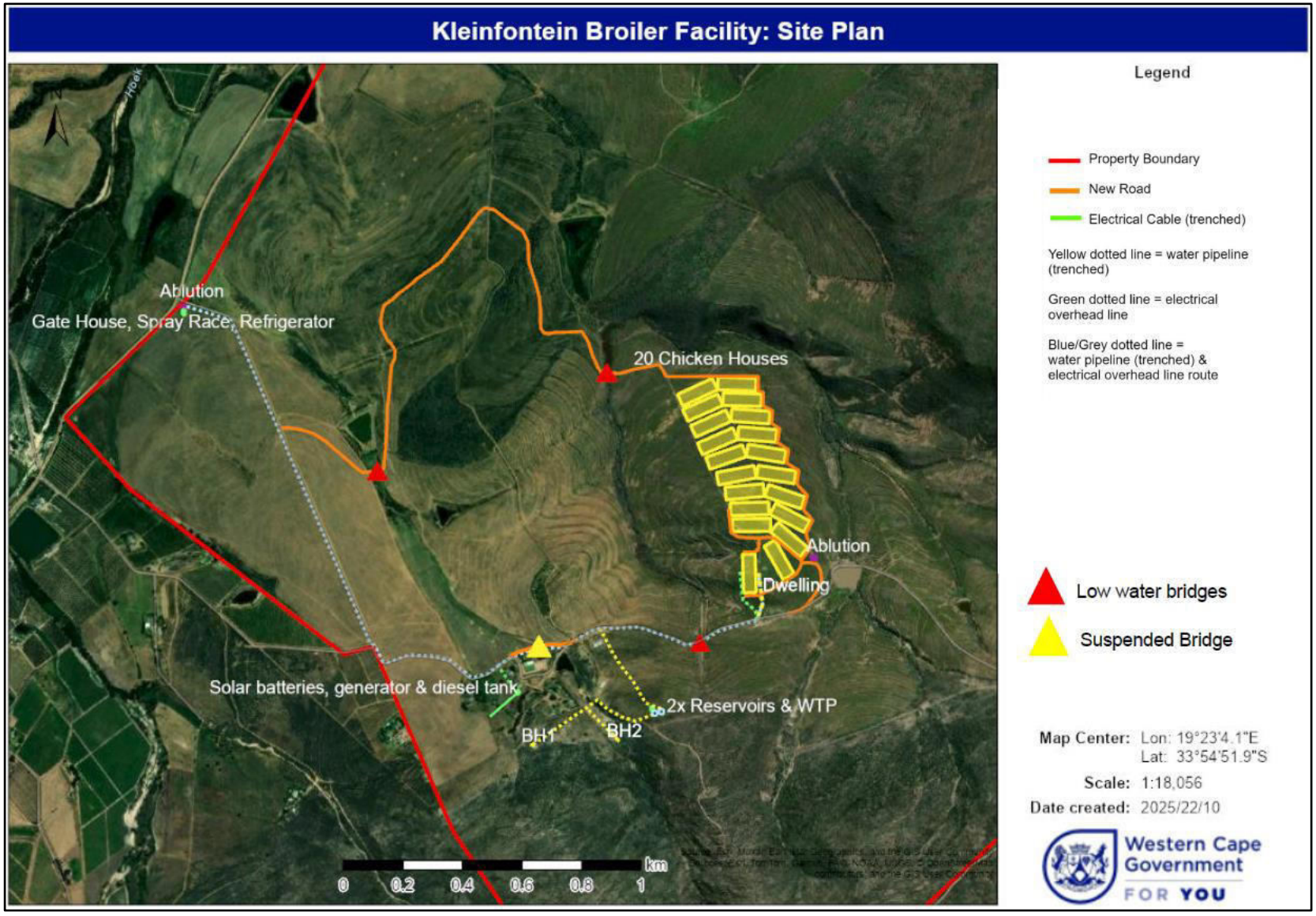

Figure 3: Proposed Site Development Plan (updated September 2025)

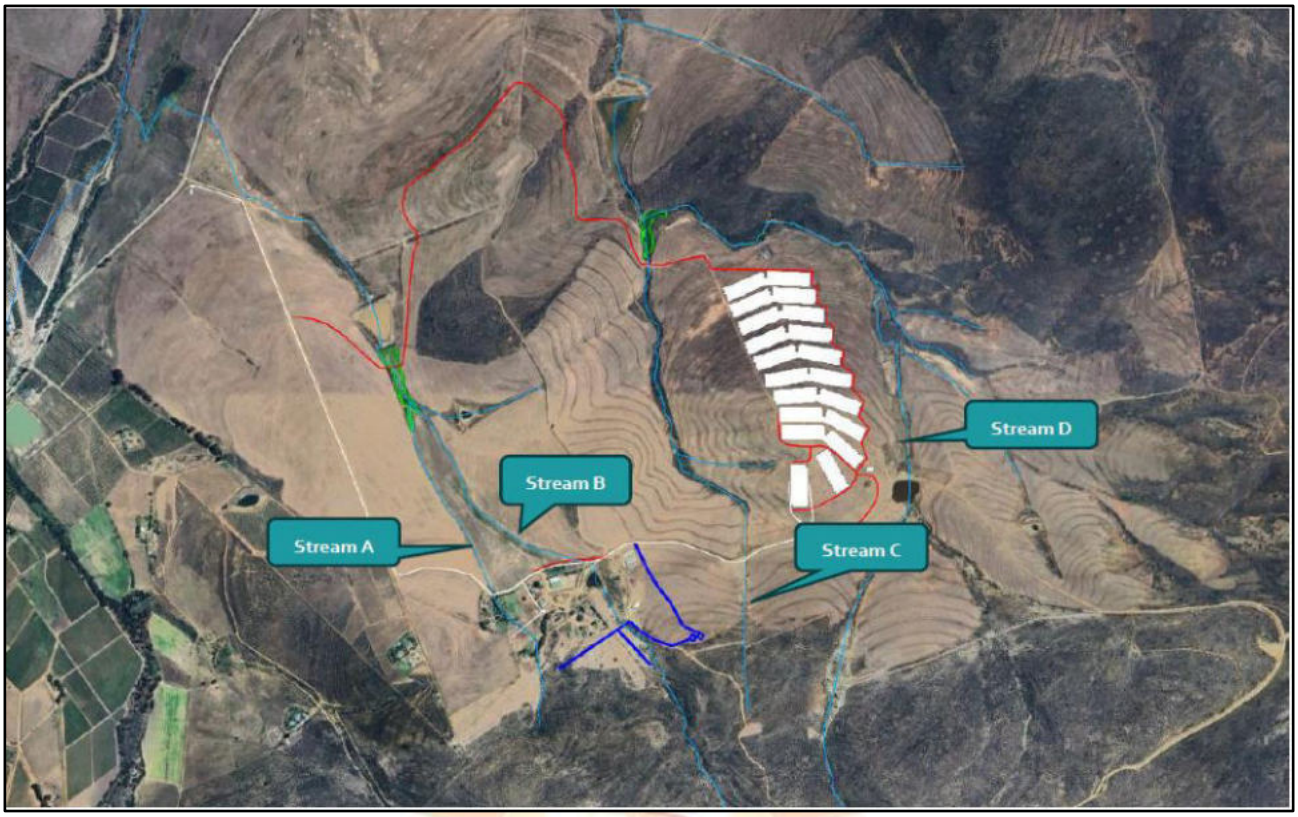

Figure 4: Proposed activities in relation to the affected freshwater features (Everwater Freshwater Consulting Services, October 2025).

Existing Lawful Use authorisations determined for the site includes the 6 dams on site with a combined storage capacity of 19 800m^3 and registered use as “watering of livestock” (refer Figure 5). Wild birds are attracted by the dams on site, and therefor this water cannot be used in the chicken houses due to the biosecurity concern. The water in the dams is planned to be used for the irrigation of the areas outside of the chicken houses during the summer months where the chickens can free range to ensure enough greenery for the birds to feed on, and for the establishment of trees around the houses to provide shade to the chickens in summer.

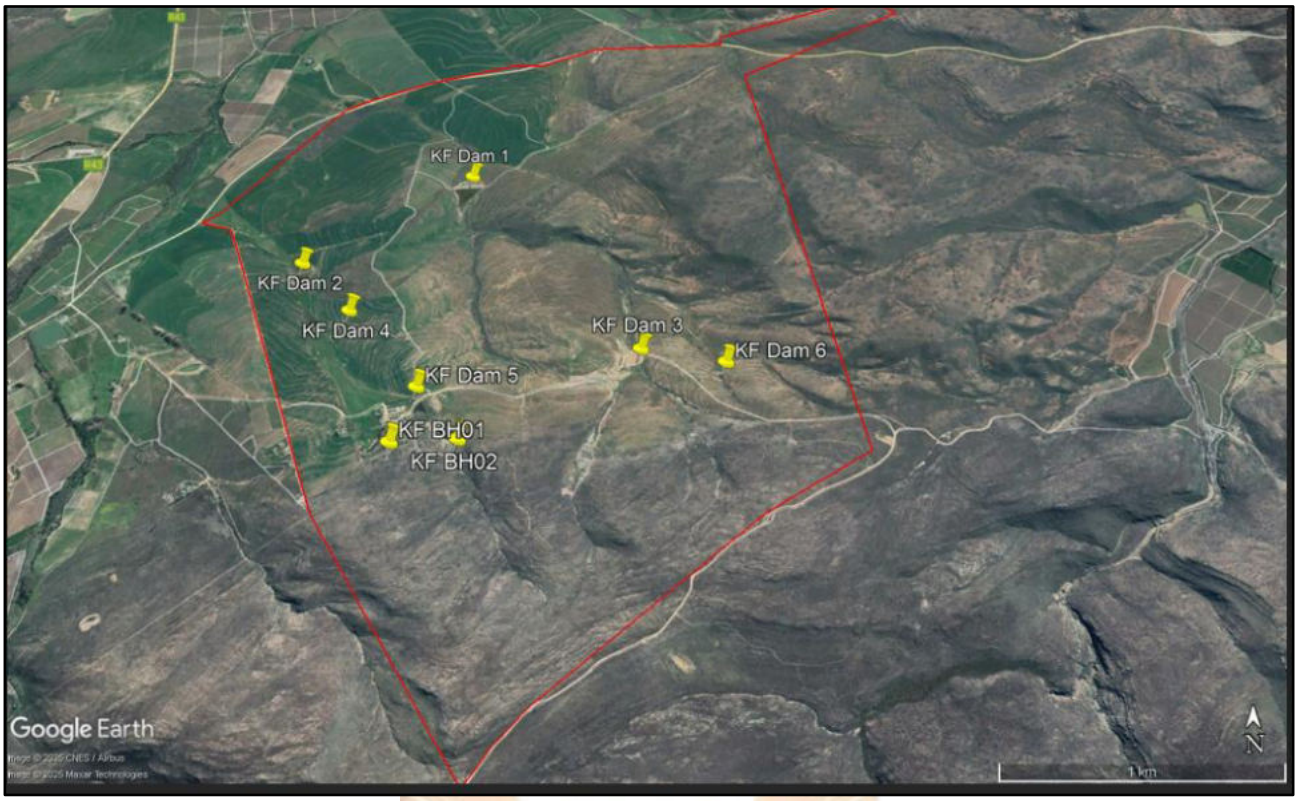

Figure 5: Map showing location of 2 abstraction boreholes and 6 ELU dams

3.2 Location of water uses

The proposed project in respect of which this Water Use Licence Application is submitted is located in the Western Cape Province, within the Breede Valley Municipality, Division Worcester, near Villiersdorp. The geographic location of the properties where the water uses will take place are listed in Table 1.

Table 1: Property Description

Property description	Coordinates	SG Code
Farm 954 Kleinfontein	33°54'48.50"S, 19°23'11.94"E	C08500000000095400000
Farm 563	33°54'57.96"S, 19°22'28.47"E	C08500000000056300000
Farm 564	33°54'46.43"S, 19°22'21.91"E	C08500000000056400000
Farm 565	33°54'42.58"S, 19°22'13.20"E	C08500000000056500000

Table 2: Property details

Property description	Size (ha)	Title Deed / Other	Owner
Farm 954 Kleinfontein	940.74	CERTIFICATE OF CONSOLIDATION NUMBER T40009/2019	Ralph Trust
Farm 563	21.4	T40008/2019 (Title deed)	Ralph Trust
Farm 564	18.9	T40008/2019 (Title deed)	Ralph Trust
Farm 565	6.04	T40008/2019 (Title deed)	Ralph Trust

4. Administrative documents and other technical reports submitted to support the WULA

4.1 Administrative documents

The following administrative documents will be submitted as part of the application:

- Proof of Payment of Water Use Licence Application Processing Fee.
- Copy of Identity Document of applicant representative person and Ralph Trust Resolution.
- Copy of EFRC Agri Operations (Pty) Ltd company registration certificate.
- Power of Attorney for PHS Consulting to lodge the WULA application on behalf of the applicant.
- Title Deed for the Farms 563, 564 and 565.
- Certificate of consolidation for Farm 954.
- V&V for Farm 695 and 696 (from which Farm 954 was subdivided and consolidated)
- WARMS for Farm 695 and Farm 696

4.2 Reports and other technical documents

Table 3: List of reports and other technical documents to be submitted

Number	Report Title	Compiled by	Date of report
1	Engineering Design report	FORE Engineering Solutions	9 July 2025
2	Freshwater Ecological report	Everwater Freshwater Consulting Services	October 2025
3	Water quality and yield test KF_BH1 and KF_BH2	GEOSS	March 2025
4	Geohydrological assessment for abstraction from KF_BH1 and KF_BH2	GEOSS	October 2025
5	S27 Motivation Report (included in this report)	PHS Consulting	n/a

5. Project Description

The proposed project is for the establishment of a new Free-Range Poultry Broiler Facility on the Remainder of Farm Number 563, 564, 565 and the Farm Kleinfontein Number 954, Worcester. The Broiler Facility will involve the establishment of 20 Broiler Houses with free range pasture located at the side of each house. Each facility will house approximately 17 000 birds. An Ablution facility, Guard House, Spray Race and Refrigerated Container will be located at the entrance to the site. Furthermore, an additional Ablution Facility and Residential Dwelling (farm manager) will be located at the broiler facilities. An existing access road will be utilised, and numerous internal roads will be upgraded and realigned (6m width required) where applicable for biosecurity reasons, to improve traffic flow and safety, and to improve river crossings.

According to EFRC, day-old broiler chicks are purchased and immediately placed in chicken sheds for a short brooding period. During the brooding period, the baby chicks are kept indoors, and heaters are used to keep the sheds and the baby chicks warm and safe. This brooding period is typically also the same period that a chick will be protected under its mother's wing in nature. Once the brooding period has been completed, the pop holes are opened, and the birds have the freedom to naturally migrate and roam outdoors during the day on the grass pasture.
Once outside, chickens have the freedom to roam, peck, and dust-bathe which helps them preen and maintain their feathers, soothes their skin and cools them down on hot days. At night the chickens naturally migrate back to their houses for warmth and safety. This is also where they keep themselves dry when it's raining or unpleasant outside. EFRC ensure that they have at least 6 hours of continuous darkness at night to ensure adequate rest. During this time, no bright lights are allowed to be turned on around the chicken houses. The atmosphere of the chicken sheds is not controlled, and the birds breathe normal fresh air.

This WULA is for the application of groundwater abstraction from 2 boreholes (KF_BH1 & KF_BH2) as indicated in Figure 5, and for infrastructure within the regulated area of drainage lines, including the four stream crossings (refer Figure 6).

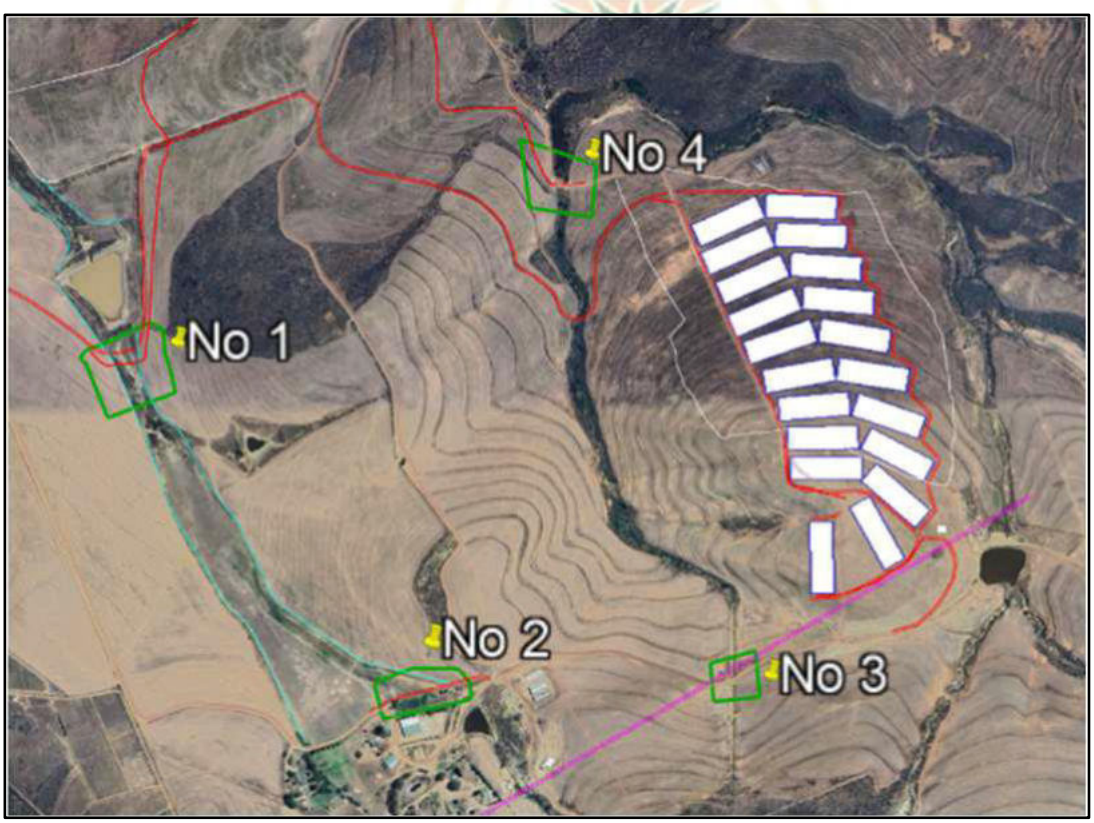

Figure 6: Proposed location of stream crossings (Fore Engineering Design report; July 2025)

The abstracted groundwater will have to be treated to potable standard before being used in the chicken houses and workers houses on site.

A Water Treatment Plant is proposed to treat the water from the existing Boreholes (BH1 & BH2), which will be fed via a pipeline from the boreholes to the Water Treatment Plant. Thereafter, treated water will be sent to two proposed reservoirs (300m^3 each) on site. Water will be sent from the main reservoir directly to the broiler houses. Water storage tanks will be located at each chicken house (1x 5000 L and 1 x 1000 L). All water pipelines will run, as far as possible, on the side of the existing and the new roads. The HT power distribution lines will be located within the same trench / route (or overhead).

The proposed water treatment process is detailed below. A specialist company will be responsible for the design and installation of the treatment plant and the monthly monitoring and maintenance associated with the treatment plant. Refer to Figure 8 which illustrates the proposed treatment plant layout and design to be skid mounted.

The proposed treatment is made up of the following steps:

1) Chemical pre-treatment: Sodium hydroxide will be dosed to raise the pH, which will aid in precipitating dissolved metals such as iron, manganese, and aluminium. Sodium hypochlorite will assist in oxidising dissolved metals like iron, causing them to come out of solution. Additionally, the dosing of flocculants will improve clarifier performance by destabilising and coagulating suspended solids.
2) Sedimentation: The clarifier uses gravity to allow particulate matter to settle into the bottom of the tank. The resulting sludge is then pumped to a Filter Press.
3) Dewatering: The filter press receives sludge from the clarifier and backwash water from the filtration system to dewater the sludge and leave a solid filter cake that can be easily removed and disposed of.
4) Filtration: Glass Filter Media (GFM) will help remove suspended solids and oxidised heavy metals from the water. Granular Activated carbon (GAC) will decrease the organic matter, and cartridge filtration will eliminate particles larger than 5µm.
5) Post Treatment: Remineralisation using calcite will introduce minerals, address the aggressive and corrosive nature of the water, and assist in increasing the pH. Dosing with sodium hypochlorite will disinfect the water up to the point of use.

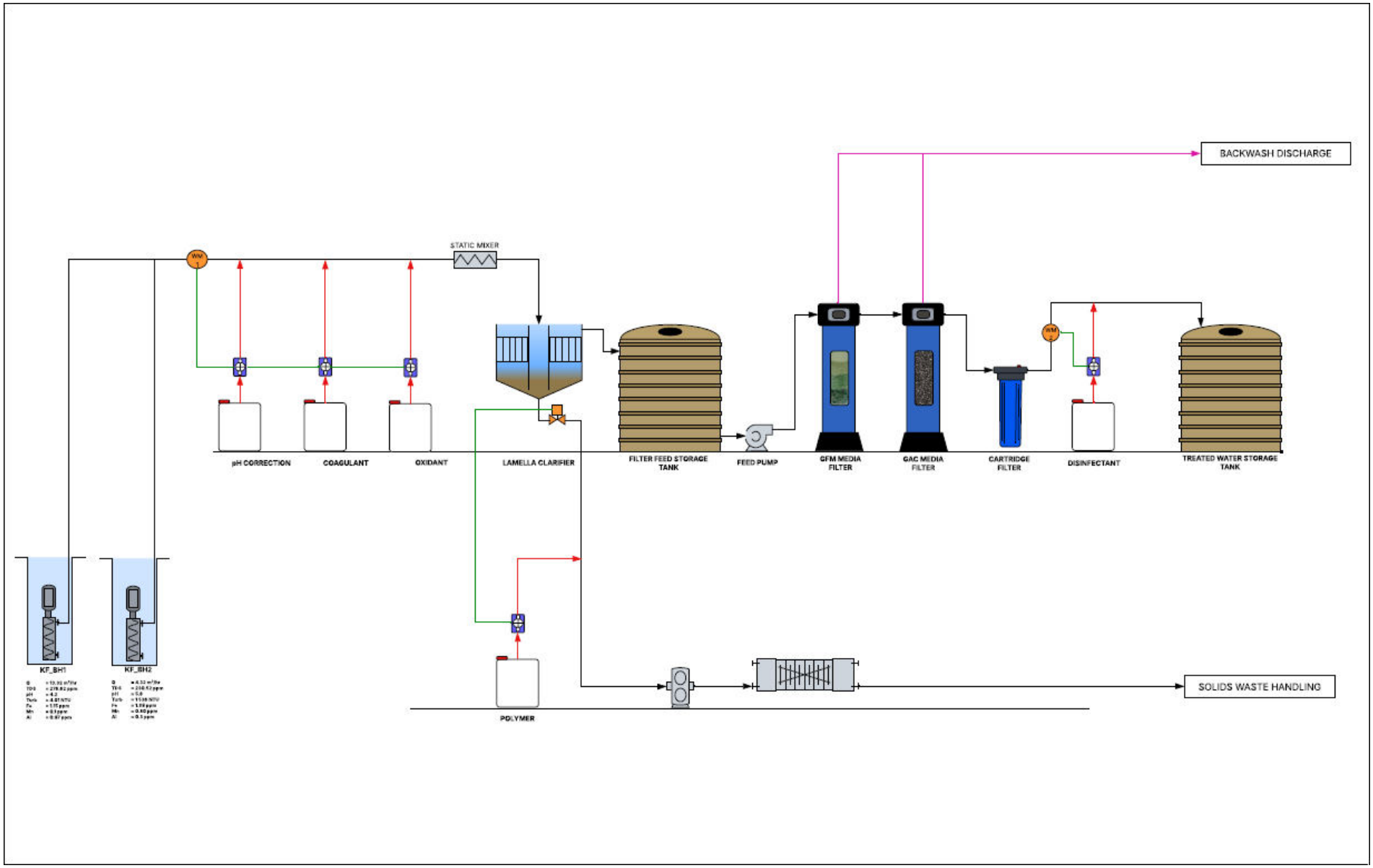

Figure 7: Proposed plant layout

Waste:

Sewage – Three underground septic tanks will be installed for the containment and treatment of sewage at the gatehouse, the manager's house and the workers' ablutions. Refer Appendix 5 for proposed design.

Mortalities - Cold storage will be utilised as temporary storage for mortalities which will then be disposed of at a bio-approved landfill site or processed at an existing rendering plant (off-site).

Solid Waste – Domestic organic materials will be composted onsite as part of each households composting arrangement. The remaining solid waste will be separated into recycled and non-recycled materials and removed from the site on a weekly basis to the local municipal waste facility.

Manure - Manure will be dry swept and cleaned out of the chicken houses whereafter high-pressure hoses (washing pumps) will be used to clean the pens with any residual water lost onto free-range pastures and through evaporation. Chicken Manure will be used directly in the agricultural industry to be collected by surrounding farmers for crop fertilisation.

Treatment plant: No brine will be generated by the proposed treatment process. Oxidised Fe and Mn will go through the filter press and result in a small solid filter cake to be disposed to landfill.

Electrical supply:

The Electrical Network Service Provider (NSP) for the site is Eskom. The site is being fed from the Haamanshof-Farmers 3 11kV overhead line (OHL) feeder which is then stepped down to the 400V voltage level via a 100kVA distribution transformer. As the electrical network of Eskom currently has insufficient capacity to supply the entire project with the necessary electricity, RenEnergy was tasked to design a plan where renewable energy is used to supply the electricity needs of the project.

Based on the electrical equipment that would be installed inside each one of the 20 broiler houses, the broiler houses will have a total peak power requirement of around 301.5kVA, including the new infrastructure at the entrance of the farm and requirement of the existing infrastructure, the total load requirement for the farm is estimated to be 312kVA. Solar panels are proposed on the roofs of the chicken houses. At a designated area close to the delivery point of Eskom the containerised solar batteries will be placed, and a generator room will be built to house the backup generators. A bunded Diesel Tank (2200L) will also be located within close vicinity of the Generator Room and Eskom delivery point.

The existing Eskom supply will therefore be supplemented with solar energy which is more sustainable.

Stream crossings:

The road alignment requires 4 waterway crossings as indicated in Figure 6 - Nr 1, 3 and 4 indicate low waterway bridges and marking Nr 2 indicates a suspended bridge structure.

Low waterway bridges are reinforced concrete structures with a driving surface (final top level) raised above ground (natural ground level) and these structures cross waterways nearly perpendicular to the natural water flow direction of the stream. Pipes will be installed at set intervals across the bridge length to allow water to freely pass through. Bridge foundations are concrete walls. combination of Gabion baskets, blankets and biddim material will be used to prevent erosion directly up and downstream from the bridge. Refer Figures 8, 10 and 11 for detail on the design of stream crossings 1, 3 and 4.

Suspended bridges are reinforced concrete structures with a driving surface (final top level) raised above ground (natural ground level). Bridge support walls (3 in total) are reinforced concrete which is founded on rock. Gabion structures both at the upstream and downstream side of the supporting walls will protect the structure against erosion. Refer Figure 9 for design detail on stream crossing 2.

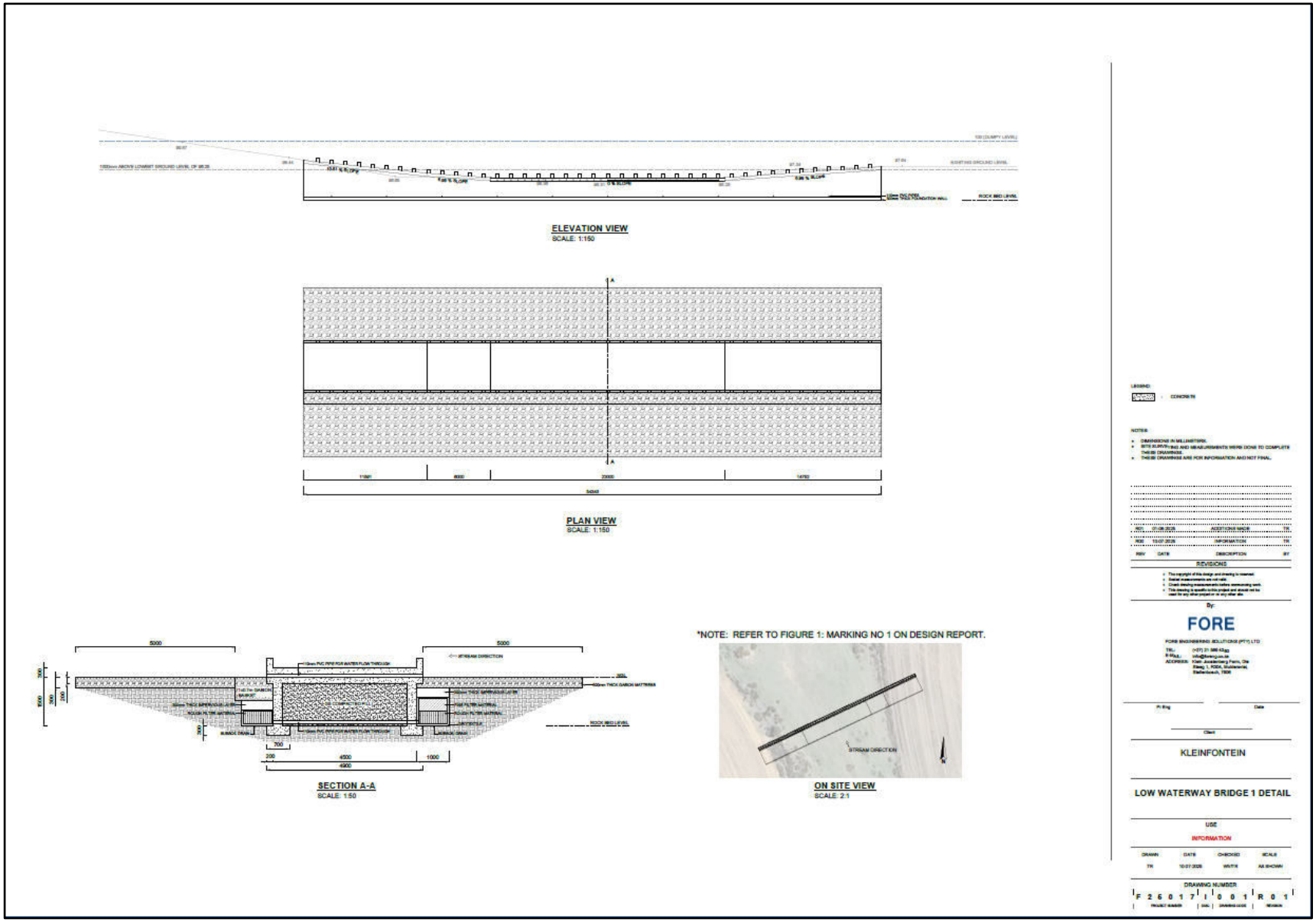

Figure 8: Low waterway stream crossing 1 design detail (Fore Engineering Design report; July 2025)

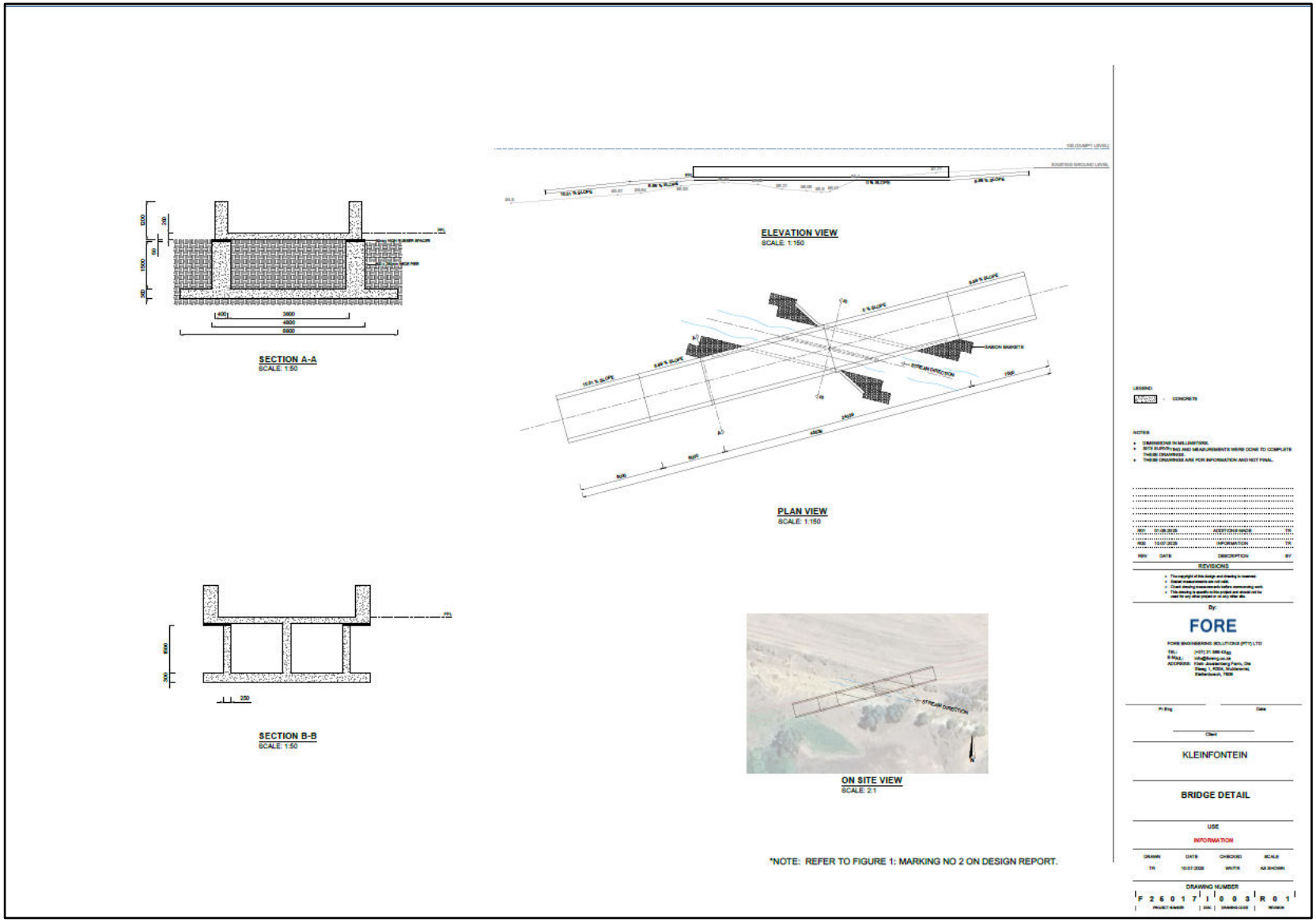

Figure 9: Low waterway stream crossing 2 design detail (Fore Engineering Design report; July 2025)

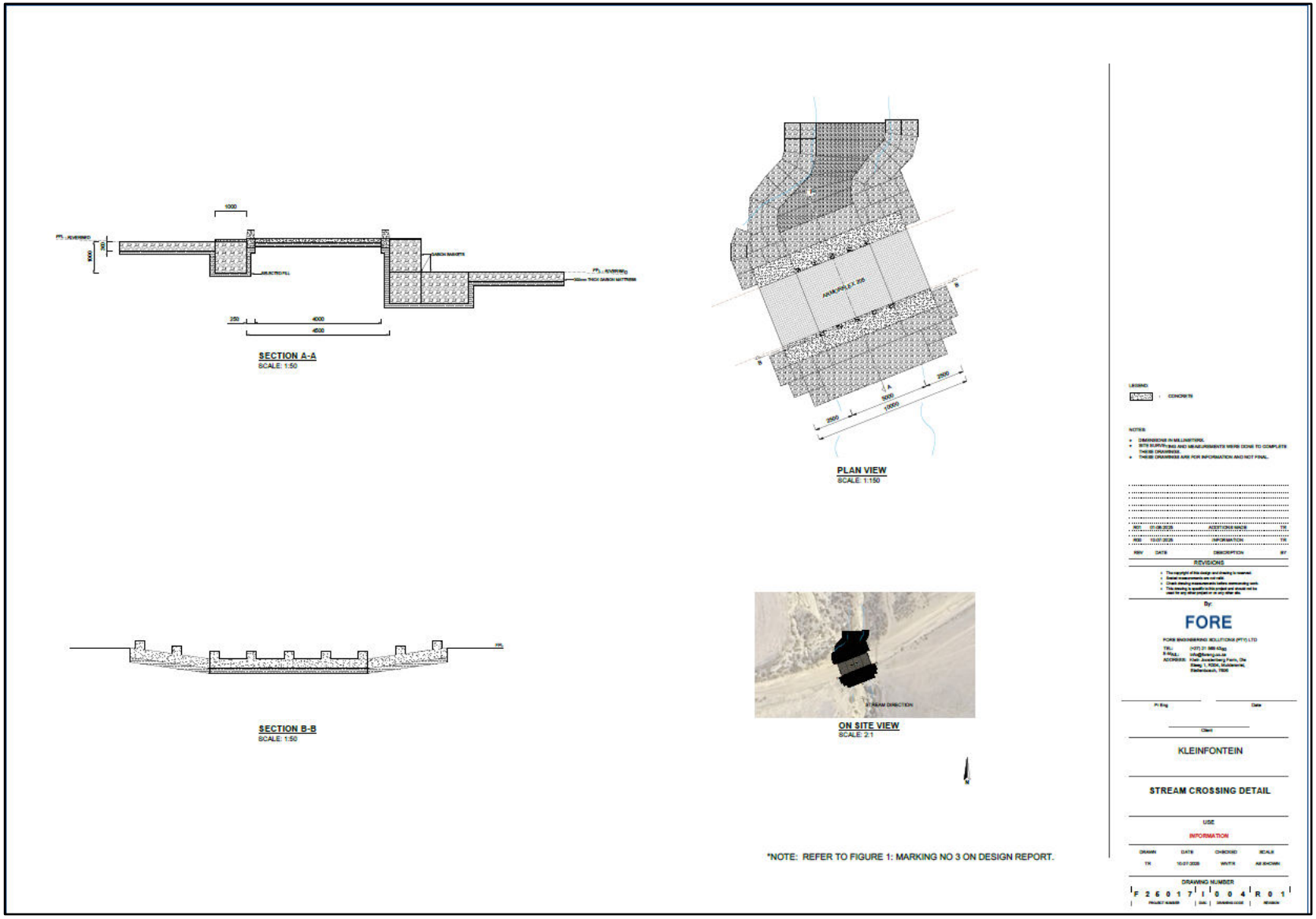

Figure 10: Low waterway stream crossing 3 design detail (Fore Engineering Design report; July 2025)

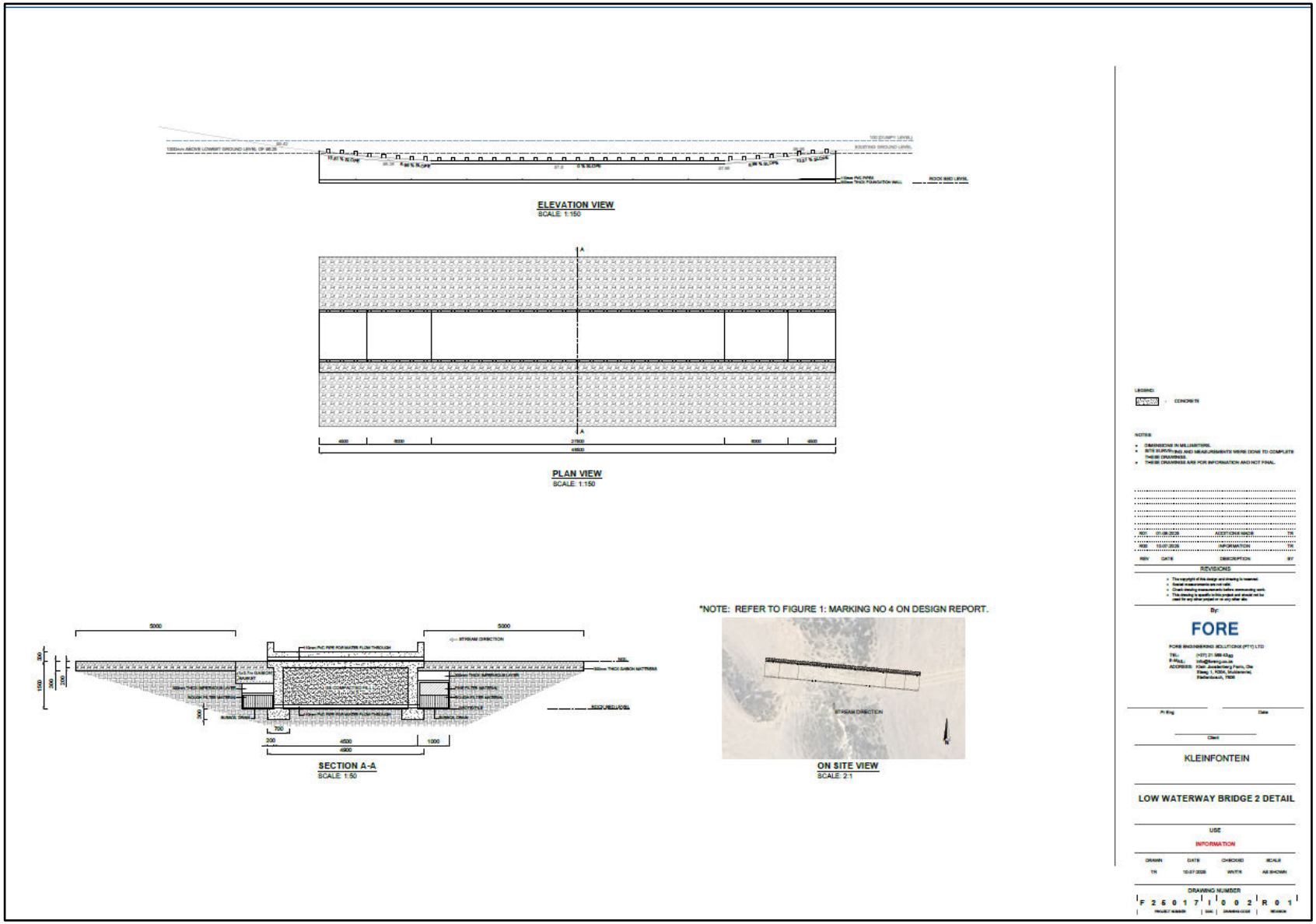

Figure 11: Low waterway stream crossing 4 design detail (Fore Engineering Design report; July 2025)

6. Methods statement (only for 21 (c) and (i) activities)

The following general measures apply to all works undertaken within the regulated area of a watercourse:

- Work should be undertaken within the dry season, except for emergency maintenance works.
- Where at all possible, existing access routes should be used. In cases where none exist, a route should be created through the most degraded area avoiding sensitive / indigenous vegetation areas.
- Responsible management of pollutants through ensuring handling and storage of any pollutants is away from any watercourses on site.
- When machinery is involved, ensure effective operation with no leaking parts and at a safe distance from any watercourses (minimum of 100m as far as feasibly possible) to manage any accidental spillages and pose no threat of pollution.
- At no time should the flow of any watercourse be blocked nor should the movement of aquatic and riparian biota (noting breeding periods) be prevented during maintenance actions. At the low water bridges there is enough space to temporarily divert stream flow to accommodate wet works. At the suspended bridge there is not enough space to divert stream flow to accommodate wet works. An upstream coffer dam must be constructed to temporarily divert stream water away from the wet works during construction.
- In circumstances which require the removal of any topsoil, this must be sufficiently restored through sustainable measures and practices.
- Concerted effort must be made to actively rehabilitate repaired or reshaped banks with indigenous local vegetation.
- The build-up of debris/sediment removed from the site may:
    - be utilised for the purpose of in-filling or other related maintenance actions;
    - not be deposited anywhere within any watercourse.
    - Material that cannot be used for maintenance purposes must be removed to a suitable stockpile location or disposal site, at least 32m from a watercourse.

The following preliminary method statement has been developed for specific activities related to the S21 (c) and (i) water uses:

1) Development, maintenance and operation of the stream crossings and infrastructure within regulated area of wetland / drainage line.

MS1 – Development, maintenance and operation of the stream crossings and infrastructure within regulated area of wetland / drainage line.

Description of activity	**The proposed stream crossings will be developed within the regulated areas and will need to be maintained over time**
Actions	Vegetation removal, groundbreaking, and installation of hardened infrastructure within regulated area; maintenance and operation of stream crossings
Impacts of actions	Altering bed and banks and loss of biodiversity; possible siltation; risk of water quality impacts on freshwater system downstream
Severity of impacts	Low
Measures to mitigate the severity of the impacts	<u>Construction Phase:</u> • All road crossing structures must be designed to avoid obstruction of streamflow, including low flows. • Construction activities directly involving freshwater features (i.e., road and pipeline crossings) should preferably be scheduled during the dry summer months—typically from December to March—when rainfall and runoff are at their lowest. • If any flow is present within the streams during construction, appropriate measures must be taken to divert the water around the work area and ensure its release downstream. • A buffer zone extending 6 meters upstream and downstream of the construction footprint should be clearly demarcated. No disturbance or activity should occur beyond these designated areas within the stream channel. • The boundaries of this buffer zone must be physically demarcated using high-visibility fencing or flagging prior to the commencement of any construction activities. • Work within the stream channels should be limited strictly to essential areas. • Clearing of riparian or wetland vegetation must be avoided where possible or otherwise kept to a minimum. Where practicable, vegetation should be pruned or topped rather than grubbed or uprooted. • All wetland/stream areas disturbed during construction must be rehabilitated and revegetated with appropriate indigenous wetland and riparian buffer species once construction is complete • Special attention should be given to managing water quality impacts in the construction Environmental Management Programme (EMPr).

	• Temporary silt fencing, sandbags, or berms should be installed within downstream channels to prevent sediment generated during construction from entering downstream freshwater features. • Implement a phased clearing approach, limiting vegetation clearance to areas required for active construction only. • Designate stockpile locations at least 50m away from any watercourses or wetland areas. • Prevent contaminated runoff from construction sites from entering adjacent streams or wetlands by using diversion drains and berms. Temporary detention basins or sediment traps should be constructed to capture excess sediment before it reaches wetland or stream areas. • Good Site Management Practices include: o Portable chemical toilets must be provided at all work sites or ensure that conveniently located site toilets are available. Toilet facilities must not be located within 100m of any stream or wetland areas. o Maintain and clean toilets regularly to ensure they remain in good working order and hygienic condition. o No waste or foreign materials may be dumped into streams or wetlands. These areas must also not be used for cleaning clothing, tools, or equipment. o Prevent the discharge of water containing polluting matter or visible suspended solids directly into streams or wetland areas. o Immediately clean any accidental oil or fuel spills or leaks. Do not hose or wash spills into the surrounding natural environment. o All operations involving the use of cement and concrete (outside of the batching plant) must be carefully controlled. o Limit cement and concrete mixing to designated sites wherever possible. • Low water bridges should be installed at or slightly below the natural streambed level to avoid obstructing low flows and to facilitate the unimpeded movement of aquatic biota. • As mentioned under “Loss of Biodiversity”, should flow be present during construction, temporary diversion structures should be implemented to reroute stream and wetland flow around the active work area, ensuring that low flows remain uninterrupted throughout the construction period. • As the client proposes to include subsoil drainage in the low-water bridge structures, the following mitigation should be taken into account:

	o Drainage should consist of several pipes or a continuous stone layer. o The subsoil drain's cross-sectional area should roughly match or exceed the flow cross-section of the natural subsurface seepage path, both up and downstream of the bridge. This should be at a minimum 0.3 –0.5m depth and width. o The subsoil drain must be wrapped in geotextile or similar to keep fine wetland sediments out. o Stone size must be uniform and coarse to maintain voids for long-term flow. <u>Operational and Maintenance Phase:</u> • All rehabilitated and revegetated areas within the wetland/stream areas should be monitored for the following 2 years, ensuring the establishment of good plant biodiversity. • Monitoring of all stream crossings for signs of erosion, debris build-up or nuisance growth around the low water bridges, should be included and addressed in a formal Maintenance and Management Plan for the project. • No use of machinery is allowed within any wetland/stream channels for the operational phase. • All debris must be removed and properly disposed of. • No dumping of debris should be allowed in the stream/wetland areas. • Any wetland/ riparian or instream areas disturbed by Maintenance activities to be rehabilitated and revegetated (if necessary) after maintenance works

7. Stormwater Management Plan

Stormwater management on site aims to protect against erosion through the construction of stormwater swales along access roads to accumulate runoff in designated dry pans. The stream crossing designs also allow for the free flow of stormwater around these structures (refer section 5 in this report and Appendix 1 Engineering Design report.

Management practices to prevent water quality impacts on stormwater will include dry sweeping the chicken houses and the removal of manure, followed by high-pressure washing, with wash water directed into surrounding pastures.

8. Rehabilitation Plan

Mitigation measures related to the disturbance from stream crossings or pipe installation within regulated areas is included in Table 5 under Mitigation measures column.

9. Water Uses applied for

The application includes the following water uses as detailed in Table 4.

Table 4: Water Uses Applied for

Water use(s) activities	Purpose	m^3/annum	Property Description	Co-ordinates
Section 21(a)				
Abstraction of groundwater through Borehole (KF_BH1)	Agricultural use	49 458	Farm 954 Kleinfontein	33°55'20.03"S 19°23'7.48"E
Abstraction of groundwater through Borehole (KF_BH2)	Agricultural use		Farm 954 Kleinfontein	33°55'19.49"S 19°23'18.67"E
Section 21 (c & i)				
Stream crossing 1 (low waterway bridge)	Access to site	n/a	Farm 954 Kleinfontein	Start: 33°54'50.49"S 19°22'46.35"E End: 33°54'49.83"S 19°22'48.24"E
Stream crossing 2 (suspended bridge)	Access to site	n/a	Farm 954 Kleinfontein	Start: 33°55'09.43"S 19°23'08.36"E End: 33°55'09.03"S

Water use(s) activities	Purpose	m^3/annum	Property Description	Co-ordinates
				19°23'10.03"E
Stream crossing 3 (low waterway bridge)	Access to site	n/a	Farm 954 Kleinfontein	Start: 33°55'08.90"S 19°23'29.46"E End: 33°55'08.82"S 19°23'29.81"E
Stream crossing 4 (low waterway bridge)	Access to site	n/a	Farm 954 Kleinfontein	Start: 33°54'39.96"S 19°23'16.97"E End: 33°54'40.10"S 19°23'18.76"E
Pipeline from KF_BH1 to reservoir	Move water from borehole to reservoir	n/a	Farm 954 Kleinfontein	Start: 33°55'19.98"S 19°23'07.62"E End: 33°55'14.24"S 19°23'06.91"E
Pipeline from KF_BH2 to reservoir	Move water from borehole to reservoir	n/a	Farm 954 Kleinfontein	Start: 33°55'19.63"S 19°23'18.64"E End: 33°55'15.45"S 19°23'10.43"E
Electrical Cable Trenching	Provide electricity to treatment plant	n/a	Farm 954 Kleinfontein	Start: 33°55'16.92"S 19°23'02.12"E End: 33°55'11.92"S 19°23'03.67"E
Buildings and Houses	Existing infrastructure	n/a	Farm 954 Kleinfontein	33°55'15.18"S 19°23'10.98"E
Sheds and Storage 1	Existing infrastructure	n/a	Farm 954 Kleinfontein	33°55'10.06"S 19°23'15.85"E

Water use(s) activities	Purpose	m^3/annum	Property Description	Co-ordinates
Sheds and Storage 2	Existing infrastructure	n/a	Farm 954 Kleinfontein	33°55'13.70"S 19°23'16.47"E
Section 21 (g)				
Septic tank at gatehouse	Contain and treat / dispose sewage	11m^3 design capacity	Farm 954 Kleinfontein	33˚54'32.81" S 19˚22'22.46" E
Septic tank at manager's house	Contain and treat / dispose sewage	11m^3 design capacity	Farm 954 Kleinfontein	33˚55'03.02" S 19˚23'38.78" E
Septic tank at workers' ablutions	Contain and treat / dispose sewage	11m^3 design capacity	Farm 954 Kleinfontein	33˚54'59.62" S 19˚23'45.12" E

10. Description of the Environment

Climate

According to the Freshwater Ecological report Villiersdorp's climate was used as a benchmark for the site and can be classified as a Mediterranean climate, which is generally characterised by warm, dry summers and cool, wet winters. The surrounding mountains and Theewaterskloof Dam influence the local microclimate, with slightly cooler and wetter conditions compared to more inland or low-lying parts of the Breede Valley. The project area receives about 519mm of rain annually (CFM, 2025). The chart below shows the average rainfall values for Villiersdorp per month. In the last year, it received the lowest rainfall (9,9mm) in February and the highest (155.5mm) in June. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Villiersdorp range from 16°C in July to 30°C in February. The region is the coldest during July, when the mercury drops to 6°C on average during the night.

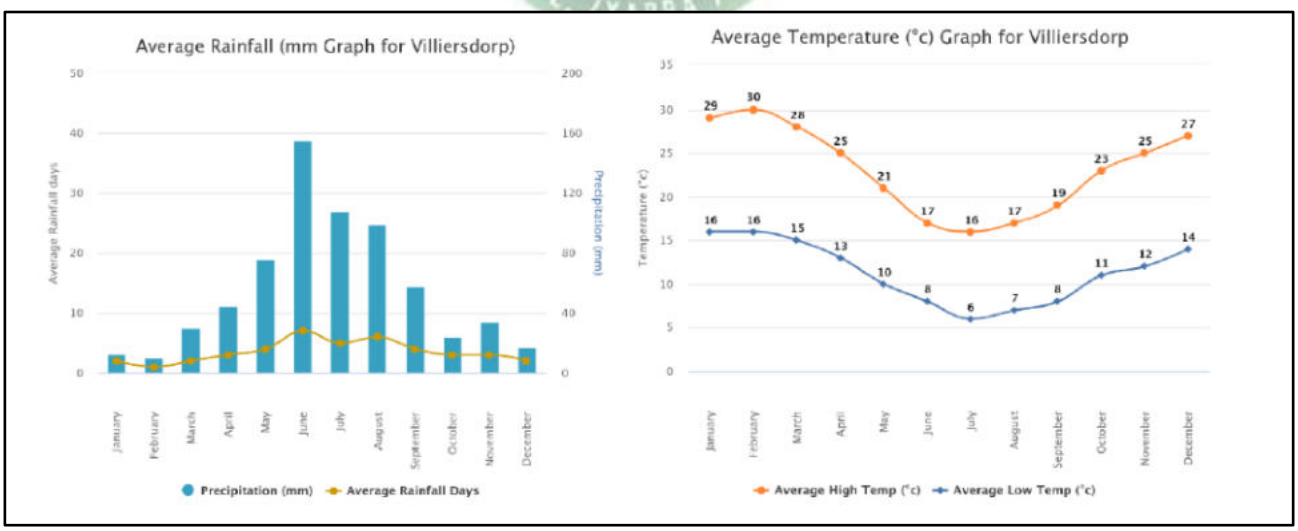

Figure 12: Climate graphs for the Villiersdorp area (Freshwater Ecological report, June 2025)

Geology

KF_BH1 is 96.94m deep, and KF_BH2 is 163m deep. Based on the estimated borehole logs KF_BH1 is drilled into the Gydo Formation of the Bokkeveld Group and KF_BH2 is drilled into the Rietvlei Formation of the Table Mountain Group. It is anticipated that these two boreholes intersect the feldspathic and quartzitic sandstones of the Table Mountain Group (refer Appendix 2 for the Borehole Yield and Quality Testing report).

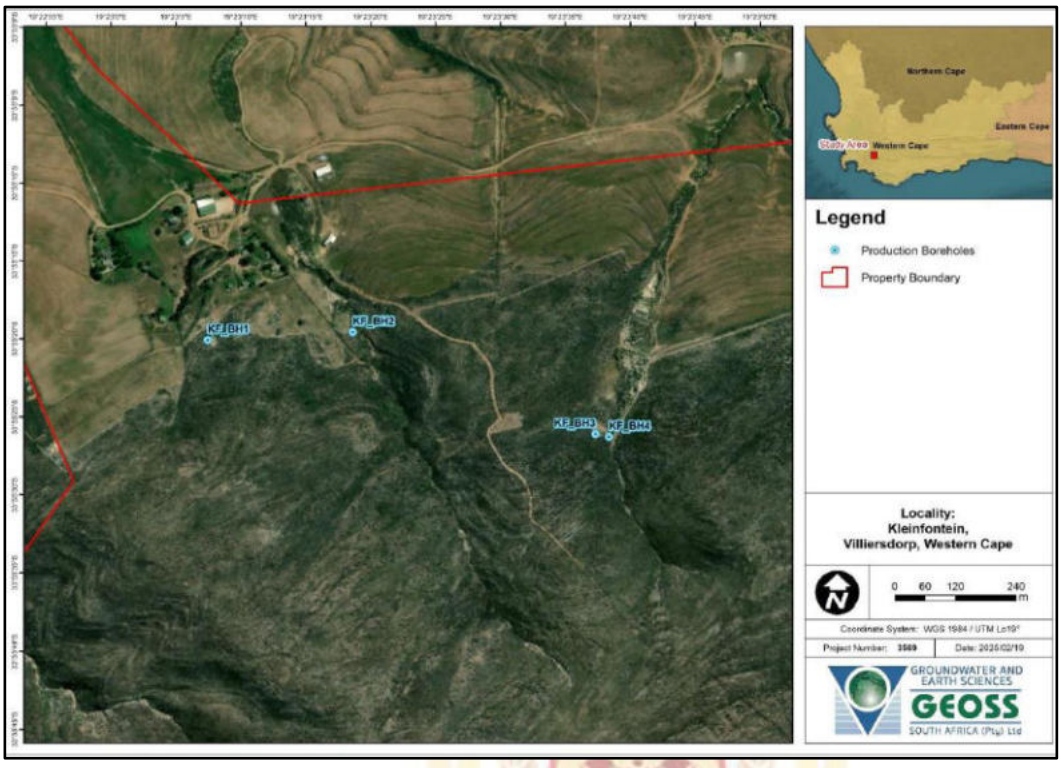

Figure 13: Borehole locality map (GEOSS, March 2025). Note: only KF_BH01 and KF_BH02 form part of this application

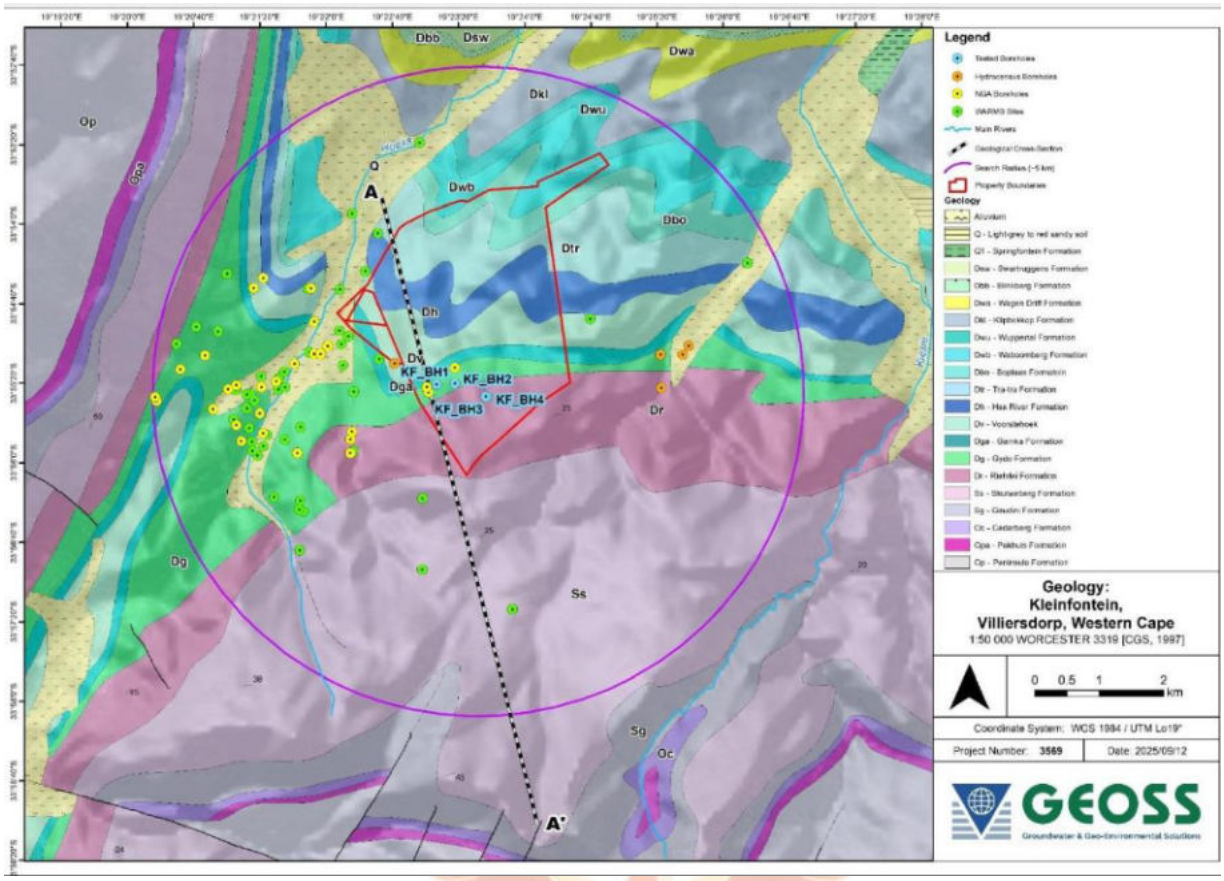

Figure 14: Geological map with the property boundaries (in red) showing the production, hydrocensus, NGA and WARMS boreholes (GEOSS, September 2025). Note: Geological cross section illustrated in Figure 15 below.

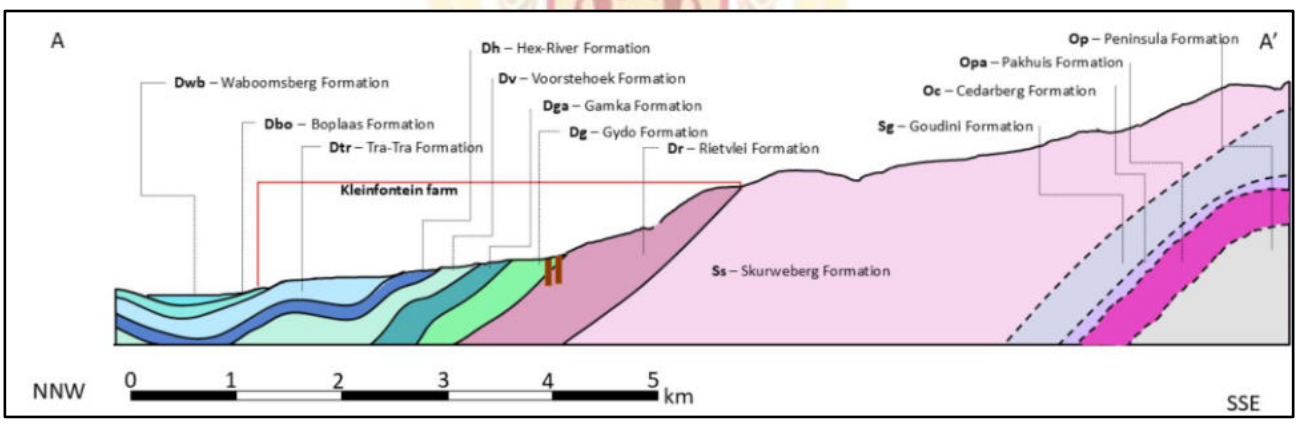

Figure 15: Geological cross section (GEOSS, September 2025)

Geohydrology

Both boreholes lie within quaternary catchment H40E, but according to the aquifer analysis recharge to the aquifer is expected to extend into catchment H40D.

Table 5: Hydrogeological parameters for quaternary catchment H40D and H40E (GEOSS, March 2025)

Parameter	H40D	H40E
Groundwater Level (mbgl)	17.2	13.5
Max Drawdown (m)	5	5
Specific Yield	0.002091	0.002091
Firm Yield (L/s)	75.2	53.3
Firm Yield (L/s/km^2)	0.4136	138.5
Recharge %	3.6	0.4853
Recharge Threshold (mm)	23	22
MAP (mm)	556.7	539.1
Hydrological MAR (mm)	136.3	126.3
Hydrological MAE (mm)	1500	1545
Baseflow: Default (Mm^3/a)	20.15	0
ET Model	Linear	Linear
ET Extinction Depth (m)	4	4
Riparian Zone (%)	3.6	2.6

The aquifer firm yield model was run for both catchments and results are shown in **Table 6** below:

Name	Q (L/s)	Q (m^3/month)	Q (m^3/a)
H40D	75.20	194 918.40	2 373 131.52
H40E	138.50	358 992.00	4 370 727.60

Localised geological features defined the Groundwater Resource Unit (GRU) as illustrated in Figure 14. The volume of 49 458m^3/annum for which a licence is being applied is less than the volume of 86 250.60m^3/annum available within the firm yield of the GRU.

Freshwater Ecological features:

According to the Freshwater Ecological Assessment (Appendix 3 to this report) the site contains four primarily seasonal streams (Streams A to D), which originate in the southeastern hills and flow north-northwest, eventually converging into two tributaries before joining the Ratel River.

The upper reaches of these streams remain largely in a natural state; however, their condition deteriorates to varying degrees (moderately to seriously modified) upon entering farmed areas. In these sections, several historic impacts have been observed, including vegetation removal, agricultural encroachment into riparian zones, the construction of instream dams, and artificial canalisation, particularly in Streams A and B. Both of these converged stream systems terminate in large farm dams shortly before reaching the Ratel River.

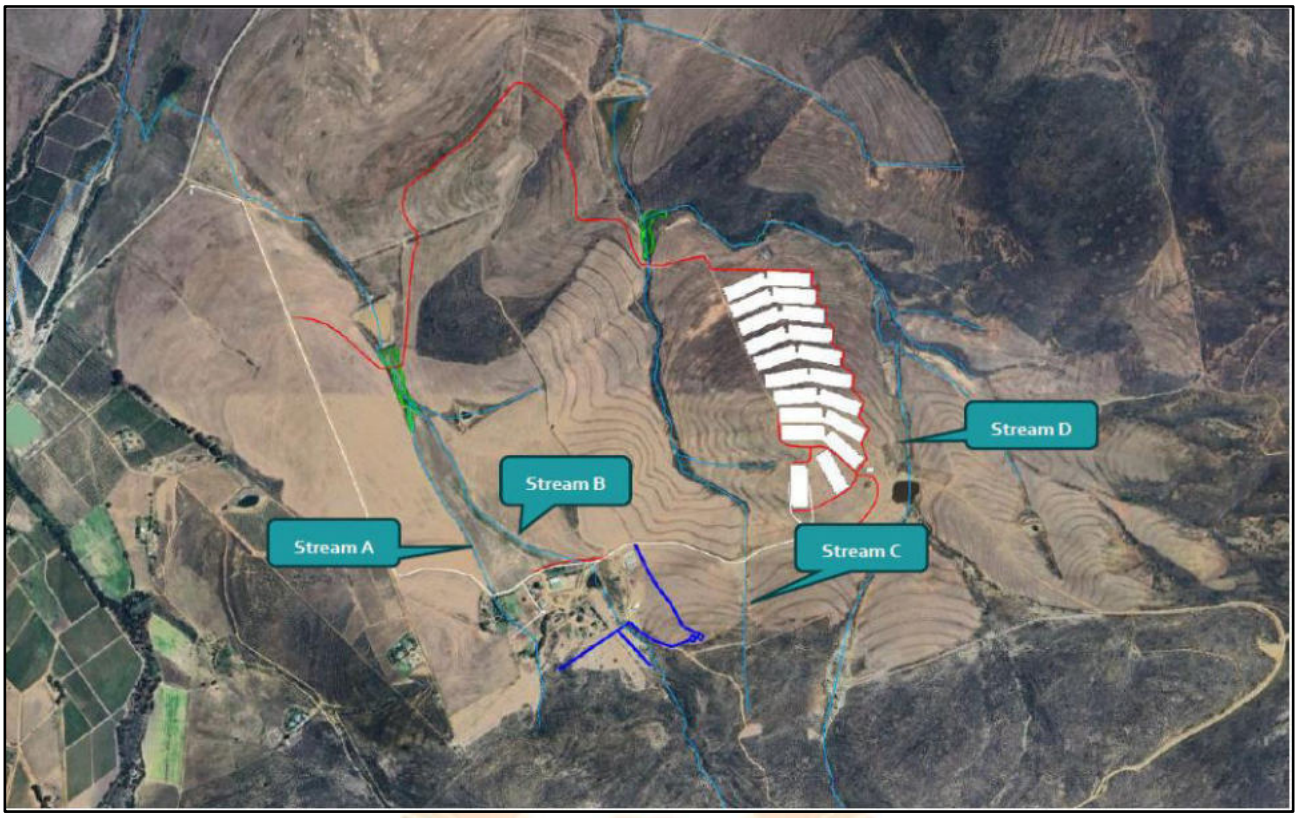

Figure 16: The project site with the proposed new roads (red lines), the broiler area (white polygons) as well as the affected streams (blue lines) with their associated wetland areas (green polygons) (Everlast Freshwater Consulting Services, October 2025).

A large portion of the Streams A and B system likely historically comprised an unchanneled valley bottom wetland. However, this area has been so extensively modified that it has lost all ecological function. Only a small remnant of the wetland remains at the confluence of the two streams. In contrast, Streams C and D have been the least impacted, with large sections still ranging from largely natural to moderately modified in condition.

Due to their similar condition and geomorphological characteristics, as well as the fact that they form two distinct tributaries, Streams A and B were assessed as a single unit, as were Streams C and D. The freshwater assessment result is summarised in Table 7 below.

Table 7: Summary of freshwater assessment of streams A to D (Everwater Freshwater Consulting Services, August 2025)

	Stream A and B	Streams D and E
DWA catchment	$H_{40}F$	
Vegetation type	Breede Shale Renosterveld (Critically Endangered)	
Rainfall region	Winter	
System	Inland System	
Regional Setting	Western Folded Mountains	
Landscape unit	Slope to Valley Floor	
Hydrogeomorphic Unit	Stream (Seasonal)	
Longitudinal zonation/Landform/ Outflow drainage	Foothill - Sand Bed	
Landform/Inflow drainage	Active Channel	
Substratum type	Loam and Clay	
Special conservational features (from desktop study)	**WCSBP (2017)**	Based on the 2023 WCBSP map (Figure 6), terrestrial Critical Biodiversity Areas (CBA's) were found around the remaining natural areas on the property
		Furthermore, aquatic Ecological Support Areas (ESA1: Ground Water Source) were also indicated specifically towards the south and east of the property.
	NFEPA	According to the National Freshwater Ecosystem Priority Areas (NFEPA) dataset and the National Wetlands Map (NWM5) (refer to Figure 10), the broader catchment in which the project site is located is classified as a FishFEPA (Fish support area). In addition to the above, the National Wetlands Map classifies the Ratel River and its larger associated floodplain as East Coast Shale Renosterveld_Floodplain wetland, currently in a C condition (FEPA rank 5).
PES	D/E: Largely to Seriously modified	A/B: Natural to Largely Natural
EIS	Low to Moderate	High
RMO and REC	RMO – D: Maintain; REC – D	RMO – A: Maintain; REC – A/B
Proposed Buffer Zone	**Road Crossings:** As the proposed work will occur within the stream channels, the implementation of a buffer zone is not considered feasible. **Other Activities:** All other activities should be located outside a 30-meter buffer zone measured from the edge of the streams' riparian areas.	

11. Impacts and mitigation measures

The potential impacts and mitigation measures that are expected from the proposed activities are presented in Table 8.

Table 8: Summary of impacts and mitigation measures

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
S21(c) and (i) - stream crossings and work within regulated areas - Installation of three new road crossings, two over Streams A and B, and one over Stream C, as well as one pipeline crossing over Stream B. The road crossings	*Potential loss of biodiversity and ecological structure.* *Streams A and B have already been assessed as being in a largely to seriously modified state with low EIS at the proposed crossing locations, with significant existing alterations to the streambed and banks, as well as extensive vegetation removal. Consequently, the*	*Impact on biodiversity and ecological structure at the crossing points.*	<u>Construction Phase:</u> • All road crossing structures must be designed to avoid obstruction of streamflow, including low flows. • Construction activities directly involving freshwater features (i.e., road and pipeline crossings) should preferably be scheduled during the dry summer months—typically from December to March—when rainfall and runoff are at their lowest. • If any flow is present within the streams during construction, appropriate measures must be taken to divert the water around the work area and ensure its release downstream. • A buffer zone extending 6m upstream and downstream of the construction footprint should be clearly demarcated. No disturbance or activity should occur beyond these designated areas within the stream channel. • The boundaries of this buffer zone must be physically demarcated using high-visibility fencing or flagging prior to the commencement of any construction activities. • Work within the stream channels should be limited strictly to essential areas. • Clearing of riparian or wetland vegetation must be avoided where possible or otherwise kept to a minimum. Where practicable, vegetation should be pruned or topped rather than grubbed or uprooted.

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
will require soil excavation, vegetation clearance, and in-stream construction. The pipeline crossing will consist of a treated timber pole spanning the watercourse, with the pipeline mounted above the stream.	*construction of road crossings over Streams A and B is expected to result in a <u>short-term, low negative impact.</u>* *Although the general condition of Stream C was found to be in a largely natural state with high EIS, the proposed road crossing will be located at an existing informal crossing that has already undergone vegetation*		• All wetland/stream areas disturbed during construction must be rehabilitated and revegetated with appropriate indigenous wetland and riparian buffer species once construction is complete. <u>Operational Phase:</u> • All rehabilitated and revegetated areas within the wetland/stream areas should be monitored for the following 2 years, ensuring the establishment of good plant biodiversity. • Monitoring of all stream crossings for signs of erosion, debris build-up or nuisance growth around the culverts, should be included and addressed in a formal Maintenance and Management Plan for the project. • No use of machinery is allowed within any wetland/stream channels for the operational phase. • All debris must be removed and properly disposed of. • No dumping of debris should be allowed in the stream/wetland areas. • Any wetland/ riparian or instream areas disturbed by Maintenance activities to be rehabilitated and revegetated (if necessary) after maintenance works.

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
	clearance and soil compaction. The formalisation of this crossing, combined with the rehabilitation of the surrounding disturbed areas, is anticipated to result in a <u>long-term, low to medium positive impact</u> on the directly surrounding section of the stream. *<u>With mitigation:</u>* *Construction Phase:* *<u>Short-term, Low Negative nature</u>*		

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
	Operational Phase: Long Term, Low to Medium Positive nature.		
S21(c) and (i) - stream crossings and work within regulated areas - Construction phase vegetation clearing and physical disturbances to stream banks and wetland areas and increased	*Potential Water Quality Impairment* *Increased erosion, sedimentation and risk of pollution during construction phase - short-term, low to medium negative nature.* *Eutrophication in downstream areas, particularly following the first seasonal rains. could*	*Water quality impairment and possible erosion*	Construction Phase: • Construction activities should preferably take place during the drier months, and special attention should be given to managing water quality impacts in the construction Environmental Management Programme (EMPr). • Temporary silt fencing, sandbags, or berms should be installed within downstream channels to prevent sediment generated during construction from entering downstream freshwater features. • Implement a phased clearing approach, limiting vegetation clearance to areas required for active construction only. • Designate stockpile locations at least 50m away from any watercourses or wetland areas. • Prevent contaminated runoff from construction sites from entering adjacent streams or wetlands by using diversion drains and berms. Temporary detention basins or sediment traps should be constructed to capture excess sediment before it reaches wetland or stream areas. • Good Site Management Practices include:

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
risk of pollution; Operational phase runoff from the broiler site	*substantially degrade water quality and indirectly impact aquatic biodiversity associated with the streams during Operational Phase- very low negative impact on water quality within Streams C and D.* *With mitigation: Low to very low negative impact.*		- Portable chemical toilets must be provided at all work sites or ensure that conveniently located site toilets are available. Toilet facilities must not be located within 100m of any stream or wetland areas. - Maintain and clean toilets regularly to ensure they remain in good working order and hygienic condition. - No waste or foreign materials may be dumped into streams or wetlands. These areas must also not be used for cleaning clothing, tools, or equipment. - Prevent the discharge of water containing polluting matter or visible suspended solids directly into streams or wetland areas. - Immediately clean any accidental oil or fuel spills or leaks. Do not hose or wash spills into the surrounding natural environment. - All operations involving the use of cement and concrete (outside of the batching plant) must be carefully controlled. - Limit cement and concrete mixing to designated sites wherever possible. Operational Phase: The existing plans would sufficiently address the possible water quality impacts posed by the broiler site.

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
S21(c) and (i) - stream crossings and work within regulated areas – Impeded flow and flow disruption during construction phase. Operational flow modifications associated with design of stream crossings.	*Flow modification and change in sediment balance.* *With mitigation measures in place:* - *Construction Phase: <u>Short-term, Low Negative nature</u>* - *Operational Phase: <u>Long Term, Low to Negligible Negative nature.</u>*	*Flow modification and change in sediment balance.*	<u>Construction Phase:</u> • Low water bridges should be installed at or slightly below the natural streambed level to avoid obstructing low flows and to facilitate the unimpeded movement of aquatic biota. • As mentioned under “Loss of Biodiversity”, should flow be present during construction, temporary diversion structures should be implemented to reroute stream and wetland flow around the active work area, ensuring that low flows remain uninterrupted throughout the construction period. • As the client proposes to include subsoil drainage in the low-water bridge structures, the following mitigation should be taken into account: - Drainage should consist of several pipes or a continuous stone layer. - The subsoil drain’s cross-sectional area should roughly match or exceed the flow cross-section of the natural subsurface seepage path, both up and downstream of the bridge. This should be at a minimum 0.3–0.5m depth and width. - The subsoil drain must be wrapped in geotextile or similar to keep fine wetland sediments out. - Stone size must be uniform and coarse to maintain voids for long-term flow. <u>Operational Phase:</u>

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
			Regular maintenance should be conducted to remove debris accumulation and control nuisance vegetation growth, as outlined under the “Loss of Biodiversity” section, to prevent blockages and ensure continued flow over the bridge structure.
S21(a) – abstraction from boreholes	*Water Quality and volume impact due to over abstraction* • *Over abstraction from the borehole would drop the regional groundwater level.* • *Over-abstraction of groundwater can degrade water quality*	*Unless properly managed, over abstraction of groundwater could impact on the groundwater availability for neighbouring water users as well as groundwater-reliant ecosystems. Although this specific abstraction is*	For borehole KF-BH1 it is recommended that a continuous abstraction rate of 3.7l/sec is maintained. A pump suitable to deliver this rate should be installed at 55mbgl. During abstraction a maximum level cut off switch should be installed at 47.33mbgl to ensure the groundwater level does not drop to the pump inlet. For borehole KF-BH2 it is recommended that a continuous abstraction rate of 1.2l/sec is maintained. A pump suitable to deliver this rate should be installed at 115mbgl. During abstraction a maximum level cut off switch should be installed at 110.80mbgl to ensure the groundwater level does not drop to the pump inlet. To address the potential for iron to clog the boreholes and abstraction infrastructure, it is recommended to maintain a constant and continuous pumping schedule. Should a daily volume of less than 319 680l/day (KF_BH1) or 103 680l/day (KF_BH2) be required it is recommended that the pump rate be decreased and not the pumping duration (24hrs). Through long term water level monitoring data, the abstraction volumes can be optimised by adjusting the abstraction rate if required. Mitigation for over-abstraction would be a reduction in abstraction.

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
	and iron clogging can occur, which can clog the fractures in the borehole and the equipment	*low enough to not cause a regional impact, large scale over abstraction can impact on groundwater flow paths.* *Unless properly managed, other groundwater users may face reduced water quality, leading to potential health risks and increased treatment costs. Additionally,*	The boreholes should be equipped with a variable frequency drive to enable adjustments to the flow rate of required. The boreholes should be equipped with monitoring infrastructure and equipment: - 32mm observation pipe from the pump depth to the surface, closed at the bottom and slotted to the bottom 5 to 10m. - Electronic water level logger (to monitor water level) - Sampling tap (to monitor water quality) - Flow volume meter (to monitor abstraction rates and volumes). Water levels must be monitored and should not drop below the critical water level (47.33mbgl for KF_BH01 and 110.80mbgl for KF_BH02). Monitoring information must be assessed regularly (suggest monthly in summer). If the water level in the borehole drops below the critical water level, abstraction will immediately be reduced by 10%. Monitoring will persist and after 30 days, if the water level in the borehole did not recover to above the critical water level, abstraction will be reduced by a further 10%. This process will continue until the water level in the borehole is stable. A groundwater management plan needs to be implemented. Monitoring information must be assessed regularly (suggest monthly in summer). If an increase of 25% in electrical conductivity is observed, abstraction will immediately be reduced

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
		ecosystems dependent on groundwater may be disrupted, as contaminated or lower-quality water can harm vegetation, aquatic life, and overall biodiversity, potentially leading to long-term ecological damage.	by 10%. Monitoring will persist and after 30 days if the water quality of the borehole did not recover, abstraction will be reduced by a further 10 %. This process will continue until the water quality has stabilised. Groundwater Management Plan: • It is recommended to maintain a constant and continuous pumping schedule as much as possible. Thus, should a daily volume of less than 319 680L/d for KF_BH1 and 103 680L/d for KF_BH2 be required, it is recommended to decrease the pumping rate and not the pumping duration. By pumping continuously instead of a stop-start schedule, iron oxidation in the borehole is minimised, decreasing the amount of iron precipitation inside the boreholes and pumps. • An "observation pipe" needs to be installed (32mm inner diameter, class 10) from the pump depth to the surface, closed at the bottom and slotted for the bottom 5 – 10m, for the production borehole. This allows for a 'window' of access down the borehole which enables manual water level monitoring and can house an electronic water level logger. • Continuous monitoring of groundwater levels using pressure transducers in the borehole is ideal. The water level in the borehole may not drop below the critical water level. If the water level in the borehole drops below the critical water level, abstraction must be immediately reduced by 10%. Monitoring must continue and after 30 days, if the water level in the borehole does not recover to above the critical water level.

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
			abstraction must be reduced by a further 10%. This process must continue until the water level in the borehole is stable. • Water quality monitoring which includes sampling and analysis of the groundwater at an accredited laboratory, is important. A sampling interval of quarterly is recommended for the first year of monitoring; thereafter, the water quality monitoring should be reviewed and can potentially be reduced to annual. • The monitoring data should be reviewed on quarterly basis for the first two years and can then be scaled down to bi-annually. • Installation of a sampling tap at the production borehole (to monitor water quality) is essential. • Installation of a flow volume meter at the production borehole (to monitor abstraction rates and volumes) is also important. External flow (e.g. mag-flow) meters are recommended. • Abstraction volumes must be monitored and recorded by a designated person on site. Depending on the frequency of use, daily, weekly or monthly abstraction should be recorded. • The appropriate borehole pump must be installed. i.e. not an over-sized pump that is choked with a gate valve. If the monitoring shows that more water can be abstracted, then the duration of pumping time can be increased (not the flow rate).

Water Use activity	Impacts on the water resources	Impacts of the activity on other water users	Mitigation Measures
			• If required, the pump and borehole casing (and associated infrastructure) can be serviced annually and cleaned. • A geohydrologist should review the above information at least annually to ensure optimal groundwater abstraction and management occurs. • The relevant DWS monitoring officer (as specified in the Water Use Licence) should be informed if water levels are dropping to critical level or if any parameters changes by 20%. • The groundwater abstraction should be reviewed to ensure that it is sustainable based on the monitoring data obtained.
S21(a) – abstraction from boreholes	*The risk of groundwater abstraction impacting surface water*	*Given the depth of the aquifer relative to the surface water and the other hydrogeological data available, the perceived risk of abstraction impacting the*	Proper management of the boreholes is essential to avoid over-abstraction. Groundwater monitoring is recommended to ensure sustainable abstraction and to detect any potential impacts on surface water early. Mitigation measures can then be implemented to prevent long-term impacts. In the event of over-abstraction, a reduction in pumping is the primary mitigation measure. Groundwater levels and chemistry must be assessed regularly (suggest monthly in summer). If a change of 25% in electrical conductivity is observed, abstraction will immediately be reduced by 10%. Monitoring will persist and after 30 days if the water quality of the borehole did not recover, abstraction will be reduced by a further 10 %. This process will continue until the water quality has stabilised. A groundwater management plan needs to be implemented.

<table>
<tr><th>Water Use activity</th><th>Impacts on the water resources</th><th>Impacts of the activity on other water users</th><th>Mitigation Measures</th></tr>
<tr><td></td><td></td><td>streams remains low.</td><td></td></tr>
<tr><td>S21(g) – installation of septic tanks</td><td>The risk of groundwater contamination due to a leaking septic tank which may detrimentally impact a water resource</td><td>If the septic tank is leaking, it can lead to widespread water quality issues and ecosystem impacts.</td><td>Groundwater quality must be monitored. Use early warning systems to detect potential contamination sources and address them promptly.
It is advised that the boreholes be tested for the parameters outlined below which refers to the General Notice 169 of 2013, Table 2.2: Monitoring requirements for domestic wastewater discharge:
General Notice 169 of 2013, Table 2.2: Monitoring requirements for domestic wastewater discharges
<table>
<tr><th>Discharge volume on any given day</th><th>Minimum Monitoring Requirements</th></tr>
<tr><td rowspan="3">10-100 cubic meters</td><td>Faecal Coliforms (per 100 ml)</td></tr>
<tr><td>pH</td></tr>
<tr><td>Electrical Conductivity (mS/m)</td></tr>
</table>
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12. Water demand and water supply Analysis

12.1 Water demand

The water demand for the 20 chicken houses was calculated as approximately 1 732.50m^3/house/annum, based on other similar operations owned by the Applicant, and taking into account the site circumstances. Added to this is an additional amount for the misters used inside the houses during summer to keep the livestock cool and high-pressure cleaning inside the houses after completion of each rearing cycle (187,5m^3/house/annum). Potable needs for the 20 workers on site (including the biosecurity showers) were calculated at 3 400m^3/annum.
The farm lends itself to sheep grazing on sections of the remaining farmland, and watering of 2 000 sheep plus irrigation of grazing in summer has been calculated at 7 300m^3/annum.
Refer Section 5 in this report for the proposed treatment.

Additional water needed for the irrigation of the free-range areas outside the chicken houses and the establishment of trees around the houses to provide shade to the chickens during summer months, will be obtained from the 6 dams on site (20 houses @ 4 050m^2/house = 8.1ha area to irrigate in summer). These dams have been confirmed as ELU and have a total storage capacity of 19 800m^3.

Table 9: Demand analysis breakdown

	ABSTRACTION
Usage per Annum - 20 houses	34 650
Additional potable needs (misters and high pressure washing inside houses @ 3 750m^3/and 20 workers on site @ 3 400m^3/a)	7 508
Watering of 2 000 sheep and grazing irrigation (summer only)	7 300
Total abstraction from KF_BH1 and KF_BH2	**49 458**

12.2 Water supply analysis

The V&V for the farm confirmed the 6 dams with total storage capacity as 19 800m^3 and will provide the water needs for the irrigation of the free-range areas outside the houses in summer and the establishment of trees around the houses to provide shade in summer.

The two boreholes have been yield and water quality tested (refer Appendix 2 to this report). KF_BH1 can possibly provide 319,68m^3/day and KF_BH2 can possibly provide 103,68m^3/day. The water quality does not meet potable standard, with high Fe in both boreholes and high Mn in KF_BH1, requiring treatment before complying with potable standards. Due to the need for treatment, the abstraction volume from the two boreholes is estimated at 49 458m^3/annum (approximately 135.5m^3/day) pre-treatment. Treatment losses are minimal.

According to the Geohydrological report (GEOSS September 2025), no influence was observed between the two boreholes during the yield testing process. A drawdown of up to 3m and 1.1m, respectively. can be expected 1km away from KF_BH1 and KF_BH2 at the recommended rates (3.7L/s and 1.2L/s for 24 hours per day) after 2 years of abstraction without recharge.

For borehole KF_BH1 it is recommended that continuous abstraction can occur at a rate of up to 3.7L/s. A pump suitable to deliver the recommended rate should be installed at a depth of 55mbgl. It is anticipated that abstraction at the recommended rate will cause the water level to drop to a depth of approximately 34mbgl – this is referred to as the dynamic water level. During abstraction, a maximum level cut off switch should be installed to 47.33mbgl to ensure the groundwater level does not drop to the pump inlet.

For borehole KF_BH2 it is recommended that continuous abstraction can occur at a rate of up to 1.2L/s. A pump suitable to deliver the recommended rate should be installed at a depth of 115mbgl. It is anticipated that abstraction at the recommended rate will cause the water level to drop to a depth of approximately 77mbgl (dynamic water level). During abstraction, a maximum level cut off switch should be installed to 110.80mbgl to ensure the groundwater level does not drop to the pump inlet.

Table 10: Borehole Abstraction Recommendations (GEOSS, October 2025)

Borehole Details				
Borehole Name	**Latitude (DD)**	**Longitude (DD)**	**Borehole Depth (m)**	**Inner Diameter (mm)**
KF_BH1	-33.922230	19.385410	96.	150
KF_BH2	-33.922080°	19.388520°	163.00	210
Abstraction Recommendations				
Borehole Name	**Abstraction rate (L/s)**	**Abstraction Duration (hrs)**	**Recovery Duration (hrs)**	**Possible Volume Abstracted (L/d)**
KF_BH1	3.7	24	0	319 680
KF_BH2	1.2	24	0	103 680
			Total	**423 360**

13. Water Balance

Table 11: **Overall Water Balance (NOTE: quantities indicated as m^3/annum)**

Facility Name	Water In		Water Out		Balance	Comment
	Water Stream	**Quantity**	**Water Stream**	**Quantity**		
6 ELU dams on site	Runoff	19 800	Irrigation of areas around chicken houses for feed and for establishment of trees	19 800		Only in summer months when needed
	Total	19 800		19 800	-	Adequate
Water treatment plant	Water from KF_BH1 and KF_BH2	49 458	Potable supply	49 458		
	Total	49 458	Total	49 458	-	Adequate

14. Water quality

According to the Freshwater Assessment, the nature of the development (a chicken broiler facility), together with some management activities, could potentially pose a risk of indirect impacts on water quality and hydrology.

All chicken waste is managed responsibly and sustainably with minimal to zero impact on the environment (soil, air, water). Chicken manure in the sheds at the end of the cycle is used for composting.

These activities might have an impact on the following:

- Loss of biodiversity, aquatic habitat and ecological structure;
- Potential hydrology modification and change in sediment balance;
- Potential Water Quality impacts.

In order to mitigate the above, several mitigation measures have been included and would be applicable to all affected freshwater features / stream crossings along the road.

To address the potential for iron to clog the boreholes and abstraction infrastructure, it is recommended to maintain a constant and continuous pumping schedule as much as possible. Thus, should a daily volume of less than 319 680L/d for KF_BH1 and 103 680L/d for KF_BH2 be required. it is recommended to decrease the pumping rate and not the pumping duration. By pumping

continuously instead of a stop-start schedule, iron oxidation in the borehole is minimised, decreasing the amount of iron precipitation inside the boreholes and pumps.

The aquifer vulnerability is 'low to medium' as determined by the DRASTIC methodology, the risks associated with leakage of wastewater from the septic tank are determined as medium risk since the upper formation of the aquifer consists of the Gydo Formation, which acts as an aquitard. Even with a low vulnerability, there is always a chance that leakage can occur. Therefore, management and preventative measures are crucial to safeguard the aquifer from contamination and mitigate its potentially severe consequences. Refer Table 8 for management and mitigation measures.

15. Public participation

The public participation process for the WULA will be conducted in terms of Section 41 (4) of the National Water Act, Act no 36 of 1998. The outcome of the process will be summarised in Table 12. The PPP will run concurrent with the Basic Assessment (in terms of NEMA requirements) for the proposed project, which is planned as follows:

- All documentation will be in English. Site Notices & Notification Letters will be in English and Afrikaans.
- The WULA 60 days PPP will be split into 2 phases of 30 days each (within the NEMA Pre-application Phase and within the NEMA statutory Phase).

<u>NEMA Pre-application Phase (completed):</u>

- Interested and Affected Parties (I&APs) were identified throughout the process and included the contacts from the hydrocensus.
- Notification letters were emailed to all identified I&APs informing them of the activity and the opportunity to comment. Neighbouring landowners were requested to inform all those residing on their farms of the application and the opportunity to comment.
- Site notices were erected at the entrance to the farm.
- An advertisement was placed in the Worcester Standard.
- A copy of the draft Basic Assessment Report and WULA technical summary report and supporting documents was available on our company website [www.phsconsulting.co.za]
- A 30-day commenting period was allowed. Comment Period: Thursday 21st August – Monday 22 September 2025.

<u>NEMA Statutory Application Phase (still to be completed):</u>

- All comments received during the pre-application phase commenting period will be included in the Statutory Draft Basic Assessment Report and WULA technical summary report which will be circulated to I&APs, Organs of State and State Departments for a further 30-day commenting period in the statutory process.

- Notification letters will be emailed to Registered I&APs informing them of the activity and the opportunity to comment.
- A Comments and Response Table will also be included and updated.
- Further comments on the BAR and WULA are received and responded to where applicable.
- Preparation of the FINAL BAR for submission to DEA&DP and FINAL WULA technical report to BOCMA: to include the proof of the Public Participation Process, comments received and responses to these comments.

Table 12: Outcome of the public participation

Person who commented	Comments (support/ object/ concerns)	Reasons for objections / concerns	Applicant's response to the objection/concerns
To be completed once PPP finalised			

16. Inputs/Authorisations from other Departments /Stakeholders

There are no inputs from other departments/ stakeholders at this stage.

17. Section 27 (1)

The requirements contained in Section 27(1) of the National Water Act, 1998 (Act 36 of 1998) have been considered and are discussed further below.

a) Existing lawful water uses

An existing lawful water use (ELU) is a water use that lawfully took place in the period two years before the commencement of the National Water Act (Act 36 of 1998). This allows any water use that lawfully took place to continue until such time as it can be converted into a Licence.
Existing lawful Use authorisations determined for the site includes the 6 dams on site with a combined storage capacity of 19 800m^3.

b) Need to redress the results of past racial and gender discrimination

EFRC Agri Operations (Pty) Ltd sees itself as a responsible corporate citizen contributing on an ongoing basis to the wellbeing of the local communities wherein it does business.
It runs several community-based upliftment projects in the Grabouw area where its head office is based.
Current projects that EFRC has to fulfil its social responsibility:

1. Donations and sponsorship to individuals in need, including to reputable Non-Profit Making Organisations, for example substantive donations to the Grabouw Development Agency and SA Harvest to mention just a few.

2. EFRC continuously invests in education of the youth as well as existing employees through approved study funding opportunities including bursaries, internships and learnerships.
3. EFRC supports the growth of the small developing enterprises in its value chain by providing them with cash subsidies and/or business skills through our Broad-based Black Economic Empowerment and Enterprise initiatives.
4. EFRC provides socio-economic development support to its workforce through investing in pre-approved employee welfare and wellness initiatives including and not limited to:

- Free staff transport to and from work for employees residing in Grabouw and surrounding farms.
- Free primary health care for the immediate employees at the EFRC onsite staff clinic.
- Access to psychological support through the company's employee assistance program.
- Sponsor employee extracurricular activities including participation in sporting tournament/s with other companies in our community.

Regarding BEE there is currently no shareholdings for employees. On suppliers EFRC has a preferential procurement policy in place and endeavour is to use suppliers that are B-BBEE compliant so as to help in the promoting of socio-economic objectives relating to race, gender, disability, job creation and poverty alleviation.

c) Efficient and beneficial use of water in the public interest

The proposed water use linked to the site will make use of underground water. There is no alternative potable supply to the site. Due to the risk from wild birds on the dams and the transfer of birdflu to the stock through water supplies, the decision was made to use water from groundwater supplies that can be contained, enclosed and the risk of birdflu minimised in the process. The additional planting of trees around the houses to provide shade to the chickens during the hot summer months and the irrigation of their free-range areas around the houses, requires irrigation, which will then make use of the existing allocated surface water in the 6 dams. This will minimise borehole abstraction to only required uses.

Water conservation is practiced on site:

- Cleaning of houses is done with high pressure hoses to minimise water usage
- Ablutions for workers use water saving devices in toilets and showers and taps to minimise the use on site
- Irrigation of grazing for sheep and the free-range areas for chickens around the houses is only during summer months when rainfall is low. The irrigation is to enable growth of grazing areas to provide food to the animals.

Mitigation in terms of impacts of stream crossings and other infrastructure on the freshwater features on site have been developed and included in Table 8.

The aquifer vulnerability is 'low to medium' as determined by the DRASTIC methodology, the risks associated with leakage of wastewater from the septic tanks are determined as medium risk since the upper formation of the aquifer consists of the Gydo Formation, which acts as an aquitard. Even with a low vulnerability, there is always a chance that leakage can occur. Therefore, management and preventative measures are crucial to safeguard the aquifer from contamination and mitigate its potentially severe consequences. Refer Table 8 for management and mitigation measures.

d) Socio-economic impact –

The proposed water use includes the abstraction of groundwater. There is no alternative municipal supply to the site.

In response to the growing demand for affordable protein and the need to support a stable food supply, the applicant wishes to development a broiler facility to expand its overall production capacity.

The "need and desirability" will be evaluated by considering the broader community's needs and interests as reflected in a credible Integrated Development Plan (IDP), Spatial Development Framework (SDF) etc as well as determined by the Basic Assessment process.

The following policies were considered:

- Western Cape Land Use Planning Guidelines Rural Areas, March 2019
- Western Cape Provincial Spatial Development Framework (PSDF) (2014)
- Breede Valley Municipality IDP 2022 – 2027
- Breede Valley Municipality SDF 2020
- Western Cape Biodiversity Spatial Plan (2023)

<u>Western Cape Land Use Planning Guidelines Rural Areas, March 2019:</u>

According to this rural guideline, "cultivatable soils and mineral resources are non-renewable assets that are important underpinnings of the Western Cape economy. As agricultural output is the foundation of the Western Cape's rural economy and an important input to the urban economy, safeguarding the Province's agricultural resources, and productively using them without compromising biodiversity, heritage and scenic resources, remains a key challenge. There is limited suitable land available for extension of the Province's agricultural footprint, and water availability limits the use of cultivatable soils. Ineffective and inefficient farming practices impinge on agricultural productivity and contribute to the loss of valuable topsoil."

"The evaluation of sustainable land management is an integral part of the process of harmonizing agriculture and food production with the, often conflicting, interests of urban development, economics

and the environment. To ensure sustainable use of agricultural land and to build resilience, land management practices (e.g. maintaining and enhancing the production potential of soil, including grazing carrying capacity by introducing correct cropping systems such as conservation agriculture, veld rotation and rehabilitation, and eradication of declared weeds and invasive plants), control processes of land degradation (e.g. salination, erosion) and their efficiency in this respect will largely govern the sustainability of a given land use."

"The basis of sustainable agriculture, is implementing agricultural activities, that combine technology, policies and activities to integrate natural resources with socio-economic principles by:

- Productivity: Maintaining or enhancing services and the biological productivity of the land.
- Security: Reducing all levels of production risk to ensure security (socio-economic and natural resources).
- Protection: Maintaining the quality and functions of natural resources through the protection of the potential of the soil and water quality.
- Viability: Ensuring economically viability.
- Acceptability: Implementing actions that are socially acceptable and responsible.

A good balance must be found between these five principles, as the basic 'pillars' on which sustainable land management for agriculture must be constructed."
"In approving development applications, authorities must consider the impact that a development may have on the municipality, agriculture and the rural landscape and must ensure through appropriate conditions and other measures that activities are appropriate in a rural context, that the development generate positive socio-economic returns, and do not compromise the environment or ability of the municipality to deliver on its mandate."

As mentioned, 'agricultural output is the foundation of the Western Cape's rural economy and an important input to the urban economy' therefore 'safeguarding the Province's agricultural resources, and productively using them without compromising biodiversity, heritage and scenic resources' forms the basis of this EIA.

The development will play an important role in increasing the agricultural potential of the property and the long-term economic viability of the existing farming operation – which will help to sustain existing and future employment opportunities. Through implementation of suitable mitigation and management measures, the establishment and operation of the proposed development will not negatively impact the natural environment or surrounding land users. As such, all three pillars of sustainability can be promoted within the development proposal.

The proposed development site is a working farm located within an agriculturally dominated landscape. The location of the property is thus suitable for the expansion of agricultural activities that will support local economic development and generate employment opportunities within the agricultural sector. Furthermore, the proposed agricultural activities (poultry production) are not currently a main commodity in the region and will assist in diversification of the local agricultural sector. The proposed agricultural development will also run year-round and provide more permanent job opportunities compared to the traditional forms of agriculture in the region. Lastly, poultry broiler facilities produce a valuable byproduct in the form of nutrient rich manure which can be used in the existing farming undertaken on the property or surrounding areas thereby facilitating sustainable, circular agricultural practices.

Western Cape Provincial Spatial Development Framework (PSDF) (2014):

The Western Cape PSDF is a planning document that guides district and local spatial initiatives such as IDP's and SDF's. It aims to create a coherent framework for the province's urban and rural areas. The PSDF aims to guide the location and form of public investment in the western cape's urban and rural areas. Whilst it cannot influence private sector investment patterns, it has an important contribution in terms of reducing business risk by providing clarity and certainty on where public Infrastructure investment will be targeted, thereby opening new economic opportunities in these areas. The current economic state with increasing levels of unemployment, and recent job losses in agriculture, all add to the high levels of rural poverty and unemployment. The provincial SDF emphasizes the importance and need for economic growth, job creation and poverty alleviation. The proposed development will create new direct and indirect job opportunities during the construction and operational phase of the development.

Agricultural output is foundational to the rural economy in the Western Cape. However, there is limited suitable land available for the expansion of agricultural activities and using these land areas without compromising biodiversity, heritage, and scenic resources, remains a key challenge. The property on which the development activities are proposed, is a working farm located in a broader agricultural landscape. The location of the proposed new development is on old agricultural fields, does not coincide with archaeological and cultural heritage resources and given the development location, it is unlikely that any palaeontological resources will be impacted. The development activity is thus in line with the PSDF in that it will allow feasible expansion of agriculture within the Western Cape and facilitate job creation within this sector.

Furthermore, the PSDF promotes sustainable development which requires that economic, social, and environmental aspects relating to a development proposal are considered. The development will play an important role in increasing the agricultural potential of the property and the long-term economic viability of the existing farming operation – which will help to sustain existing and future

employment opportunities. Through implementation of suitable mitigation and management measures, the establishment and operation of the proposed development will also not negatively impact the natural environment or surrounding land users. As such, all three pillars of sustainability can be promoted within the development proposal.

Breede Valley Municipality IDP 2022 – 2027:

The Breede Valley Municipality IDP (2022-2027) encourages local economic development with a focus on creating employment opportunities for residents. One of the 6 Strategic Objectives of the IDP is "to create an enabling environment for employment and poverty eradication through proactive economic development and tourism (SO2)" through:

- Creating a healthier investor-friendly environment;
- Market Breede Valley as a a preferred area for business investment; and
- Strengthen relations with business chambers, tourism and agricultural sectors.

Furthermore, Programme 5.9A specifically looks at "expanding Rural and Agricultural development". The proposed development site is a working farm located within an agriculturally dominated landscape. The location of the property is thus suitable for the expansion of agricultural activities that will support local economic development and generate employment opportunities within the agricultural sector. Furthermore, the proposed agricultural activities (poultry production) are not currently a main commodity in the region and will assist in diversification of the local agricultural sector. The proposed agricultural development will also run year-round and provide more permanent job opportunities compared to the traditional forms of agriculture in the region. Lastly, poultry broiler facilities produce a valuable byproduct in the form of nutrient rich manure which can be used in the existing farming undertaken on the property or surrounding areas thereby facilitating sustainable, circular agricultural practices.

Programme 5.7 (A) looks at Development of Alternative Energy Sources. In order to address the challenges of climate change, Breede Valley Municipality will increasingly have to transition to a Green Economy in the future. The current crisis in the electricity sector relates to electricity supply shortages and an increasing carbon footprint. It is imperative that the green economy concept be regarded and pursued as a tool to transform the current state of the local economy to one that is more sustainable from an economic, social and environmental perspective. The proposed development will include the installation of Solar Panels to supplement the energy requirements of the Broiler Facilities and therefore reduce the demand on Eskom. The proposed activities are thus well aligned with the IDP of the local municipality.

While no specific EMF has been outlined for the region, several strategic documents for the area include environmental management aspects. The Breede Valley IDP includes "to ensure a safe,

healthy, clean and sustainable external environment for all Breede Valley's people" (SO3) as one of the 6 Strategic Objectives of the IDP. One of the aims is to "ensure the optimal use of land within a political, social, cultural, environmental and economic context". The proposed development allows for intensification of agricultural practices on non-productive land within an existing farm and thus minimises the transformation of additional land, whilst protecting and promoting food production.

In response to aspects of water scarcity and drought the IDP encourages the Investigation of the possible use of alternative water resources i.e. groundwater and increased rainwater harvesting. The proposed chicken farm intends to use Groundwater from existing boreholes on the property. Furthermore, Rainwater harvesting will be encouraged throughout the farm.

Breede Valley Municipality Spatial Development Framework:

The development principles are the guiding factors that will endeavour to assist with the spatial structuring of the urban environment, which will further shape Breede Valley Municipality into a place where people can live, work, play and visit. Development Principle 1 is 'Economic development': "A diverse economic base attracts new business and investment. The Breede Valley Municipality promotes local talent and provides various opportunities for everyone to start and grow business ventures. This development principle will be achieved through:

- The establishment of a secondary commercial hub;
- Identifying niche market opportunities;
- Revitalisation of the Central Business District (CBD); and
- The protection of agricultural land as an economic contributor."

Agricultural is one of the spatial structuring elements of the SDF: According to Section 3.1.4 (Agriculture) Historically agricultural land has not played a significant role in urban structuring. This is based on the need for agricultural production areas in close proximity to the settlements on account of cost advantages due to proximity to the market, direct and indirect employment opportunities for the inhabitants, stimulation of secondary business activities (e.g. marketing) and food security. These areas should be reserved as prime agricultural land in the municipality and be protected from any development or land uses that may have a negative impact on the agricultural potential of the area.

Under Key Typologies, 'Agriculture' is defined as "The cultivation of land for crops and plants or the breeding of animals or the operation of a game farm on an extensive basis on natural veld or land." The proposed Broiler Facility is therefore in keeping with the SDF.

Western Cape Biodiversity Spatial Plan (WCBSP) (2023):

The 2023 Western Cape Biodiversity Spatial Plan (WCBSP) was formally adopted into law on 13 December 2024 (Gazette Extraordinary No. 9017), in terms of the Western Cape Biodiversity Act (Act No. 6 of 2021). This plan supersedes the 2017 WCBSP and now serves as the official spatial framework for biodiversity conservation and land-use decision-making in the province. Based on the 2023 WCBSP map, several terrestrial Critical Biodiversity Areas (CBA's) were found along the remaining natural areas on the property. These areas are areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure, and such areas are to be maintained 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. Furthermore, aquatic Ecological Support Areas (ESA1: Ground Water Source) were also indicated specifically towards the South and East of the property. These areas play a vital role in helping to sustain the baseflow of surrounding rivers, wetlands, and streams during dry periods.

As confirmed by the site visit and desktop information, the proposed development will largely be located within fallow agricultural fields and the existing Farmyard. The proposed activities fall outside the Riviersonderend Mountain Catchment Area (marked as a Protected Area) as well as the Cape Winelands Biosphere Reserve. Furthermore, the majority of the proposed activities all fall outside the areas indicated as CBAs and ESAs. Minor associated infrastructure might overlap with a CBA area however this is addressed as follows:

- The proposed road and river crossings were assessed by the Freshwater Specialist.
- KF_BH1 and KF_BH2 already exist and are currently utilised by the Farm for the purposes of distributing water where required.

Freshwater Ecosystem Priority Areas (FEPAs) are strategic spatial priorities identified to support the long-term conservation of freshwater ecosystems and the sustainable use of water resources. According to the National Freshwater Ecosystem Priority Areas (NFEPA) dataset and the National Wetlands Map (NWM5), the broader catchment in which the project site is located is classified as a FishFEPA (Fish support area). FishFEPAs, or fish sanctuaries, are sub-quaternary catchments that are critical for the protection of threatened and near-threatened freshwater fish species indigenous to South Africa. These catchments are denoted by either a red or black fish symbol on the map. The sub-quaternary catchment associated with the project area is marked with a black fish, indicating the presence of at least one population of vulnerable or near-threatened fish species, or a population of special concern. The primary objective of FishFEPAs is to prevent further decline in the condition of aquatic ecosystems, particularly those supporting sensitive fish species. As such, no further deterioration in river condition should occur within fish sanctuaries, and no new permits should be issued for the introduction or stocking of invasive alien fish species in these catchments.

In addition to the above, the National Wetlands Map classifies the Ratel River and its larger associated floodplain as East Coast Shale Renosterveld Floodplain wetland, currently in a C condition (FEPA rank 5). These wetlands are marked as being critically endangered – both from a vegetation and wetland ecosystem perspective. The aquatic ecosystems have been assessed in the Freshwater Impact Assessment.

The NEMA authorisation process is run concurrent with the WULA process and found:
The proposed development is planned on previously disturbed, unproductive agricultural land, repurposing an area no longer viable for high-yield farming. This approach avoids impacting undisturbed ecosystems and makes efficient use of degraded land. Strategically located near essential service infrastructure, including water (existing boreholes) and electricity (combination of existing Eskom and new solar facility), the development can integrate into existing networks, reducing the need for extensive new installations. Existing farm roads and water crossings are being utilised where possible.

i) Of water use or uses if authorised:

The chicken farm and proposed additions provide socio-economic benefits for the region in terms of job creation, economic growth and food security. The intention is facilitating production of free-range chickens in response to the growing market need for free range chicken. A number of job opportunities will be provided during the construction phase (approximately 50 jobs), and an additional 30 job opportunities will result directly from the operational phase of the development. Furthermore, 6 additional job opportunities will result in the Elgin Free Range Hatcheries and the associated supply chain. It is estimated 20 job opportunities will be generated downstream in EFRC Limited, and an estimated 20 job opportunities in supply chain to the farm. It is estimated that the farm turnover will amount to an estimated R110 million per annum with the farm producing 4 359 168kg of poultry meat per annum once in operation. Furthermore, the farm will require the use of 6 357 tons of feed and a number of products that will benefit from the supply chain. The proposed development will have knock-on effect for trade in local economy of the surrounding area, facilitate the provision of more affordable protein to local markets, have direct and indirect employment opportunities (temporary and permanent) and allow for skills transfers to new employees. The development would therefore address the needs of the local community in the form of job creation, skills development and contributing significantly to the local economy resulting in the upliftment of the area.

Table 13: Direct and indirect Job opportunities

Job Opportunities	Number of Job Opportunities	Type of employment	Affected sectors of the economy
Direct	*50*	*Temporary*	*Construction*
Direct	*76*	*Permanent*	*Agriculture*
TOTAL	**126**		

ii) Of the failure to authorise water use or uses:

The 'No-Go' option, where the development of the poultry broiler facility is not pursued, was evaluated as part of the NEMA process. This alternative would result in the loss of positive socio-economic opportunities in the form of significant income generating employment opportunities and a significant financial contribution within the local economy. The company needs to expand its chicken broiler operations to meet the growing demand in the market and this will not be realised within the no-go alternative. Minor negative environmental impacts are associated with the Preferred Alternative however these have been avoided or mitigated to be of a LOW significance. The no-go option will result in the loss of the Medium – High positive socio-economic impacts associated with the proposed activities. Therefore, the No-Go option is not considered the best-practicable environmental option. Refer (i) above for positive socio-economic impacts.

e) Any catchment management strategy applicable to the relevant water resource

None at this time.

f) Likely effect of the water use to be authorized on the water resource and on other water users.

The Geohydrological study in support of the WULA was commissioned to ascertain any potential effect from the additional groundwater abstraction on the surrounding landowners' boreholes. A hydrocensus forms part of the study.

The National Groundwater Archive (NGA) was consulted to indicate any existing boreholes and groundwater users in the area. A search radius of 5km was used to research any known information surrounding the site of interest.

According to the NGA there are 29 boreholes within the search radius shown spatially in Figure 17. Borehole depths range between 34.0 – 130.0mbgl with associated EC values recorded ranging between 12.0 – 122.0mS/m, the water is classified as a good water quality based on DWAF 1998 domestic standards). Discharge rates were also available; however, there was no indication of whether it was the tested yield or blow yields. No water levels and lithology were available on the NGA records.

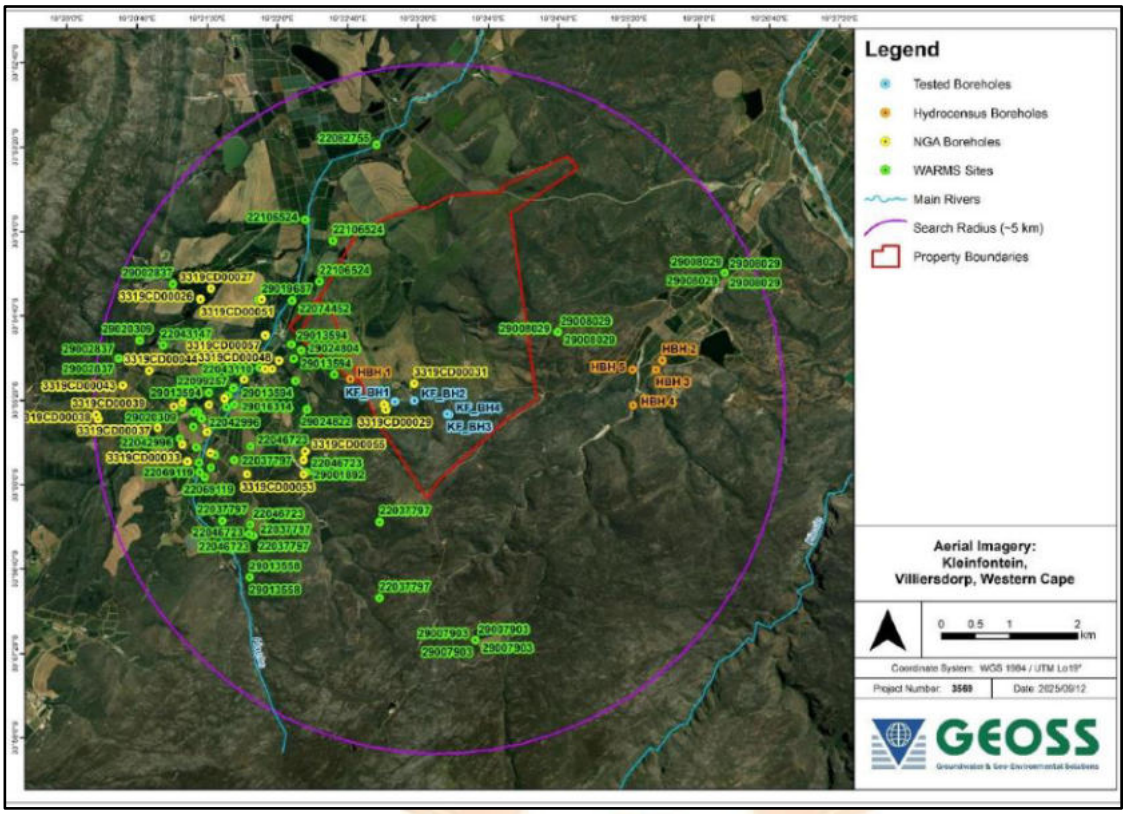

Figure 17: The study site with the property boundary showing the production, hydrocensus, NGA and WARMS boreholes, superimposed on a satellite image (GEOSS, October 2025)

The WARMS database (last assessed in May 2025) was consulted to indicate any existing registrations for groundwater use in the area. There are four sites registered on the WARMS database within the H40D catchment, and 21 sites registered within the H40E catchment, within the search radius of 5km from the property boundary. These are also indicated in Figure 17.

A hydrocensus site visit was conducted on the 19th of August 2025 to assess groundwater use within the study area, and seven boreholes were visited.

The information gathered during the hydrocensus can be summarised as follows:

- It was noted that the depths of the boreholes were generally deep (>80m).
- Water levels are between 15-32mbgl.
- Groundwater is used for both domestic and irrigation purposes.

g) Class and the resource quality objectives of the water resource

According to the Freshwater Ecological assessment, the Department of Water and Sanitation has released the proposed classes of water resources and Resource Quality Objectives (RQOs) for the Breede-Gouritz Water Management Area, as published in Government Notice 1298 of Gazette 42053 on 23 November 2018, in terms of Section 13(4) of the National Water Act (1998). For the H40E Catchment, which falls within the A3 Middle Breede Renosterveld zone, only general RQOs are applicable. These, along with RQOs specific to rivers within this quaternary catchment, have

been set out for the section of the Breede River that runs through this area (and is not specifically applicable to the tributaries located on the property or the Ratel and Hoeks Rivers running through the catchment area).

Table 14: Summary of water resource classes per integrated unit of analysis and ecological categories (Everwater Freshwater Consulting Services, August 2025)

Integrated Unit of Analysis (IUA)	Water Resource Class for IUA	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Natural MAR (million m^3/a)
A3 Middle Breede Renosterveld	III	H40D		Doring River	Niv13	E	47.50
		H40F	A3-R04	Breede River	Nvii8	C/D	1042.80
		H40F		Breede River	Ni1	A/B	1043.40
		H40G		Poesjenels River	Nvii11	D	16.10
		H40H		Vink River	Niv15	D/E	15.60
		H40J		Willem Nels River	Nvii2	D/E	5.20
		H40J		Breede River	Nvii19	A/B	1081.90
		H40K		Keisers River	Nvii12	D	7.10
		H40K		Keisers River	Niv14	D	12.60
		H40L		Breede River	Nvi1	D	1099.90
		H30E		Kogmanskloof River	Nii2	D	52.00
		H50A		Breede River	Niii3	D	1153.40
		H50B	A3-R05	Breede River	Ni2	D	1170.10

h) Investments already made and to be made by the water user in respect of the water use in question

To date EFRC Agri Operations Pty Ltd has already spent R544 000 on the proposed project. Total project cost is estimated at R155m.

i) Strategic importance of the water use to be authorised

The authorisation of the proposed water use will be strategic from an economic point of view:

1) enabling the use of available groundwater to enable the development and change in agriculture on site,
2) minimising the biosecurity risk to the farm by using treated groundwater and not surface water,
3) contribution to production growth of one of the cheapest sources of protein,
4) creation of localised economic activity and securing long term employment opportunities within the local community.

j) The quality of water in the water resource which may be required for the Reserve and for meeting international obligations

There is at present no reserve determined for the underlying aquifer.
There are no international obligations to be met as far as water distribution is concerned.

k) Probable duration of any undertaking for which a water use is to be authorised

The WULA is linked to a long-term investment and operational presence of EFRC Agri Operations (Pty) Ltd in the area and should be issued for a minimum 40-year period. Review by BOCMA every 5 years is recommended.

18. Declaration by the applicant with signature confirming that the information submitted is correct.

We the Applicant, EFRC Agri Operations Pty Ltd (registration number: 2017/074447/07), hereby confirm that the information submitted as part of this WULA application is true.

Signed By: JI Viljoen

Signature: 

Date: 2025-10-30

Appendix 1

Engineering Design Report

FORE
ENGINEERING SOLUTIONS
FORE ENGINEERING SOLUTIONS (PTY) LTD
TEL: (+27) 0215694360
E-MAIL: info@foreng.co.za
ADDRESS: Klein Joostenberg Farm, Die Steeg 1, R304, Muldersvlei, Stellenbosch, 7606

01/08/2025
Our Ref: 25017-R-01

EFRC AGRI OPERATIONS PTY LTD
PORTION 5 OF THE FARM
KLEIN STEENBOKS RIVIER
NO 487

DESIGN INFORMATION FOR FOUR WATER CROSSING STRUCTURES AT KLEINFONTEIN FARM

The farm Kleinfontein is being developed, and vehicular access roads is required to accommodate heavy vehicles travelling to and from a chicken production facility. The road alignment requires 4 waterway crossings as indicated in figure 1. In the figure markings No 1, 3 and 4 indicate low waterway brides and marking no 2 indicate a suspended bridge structure. Addendum A include detail drawings of the proposed structures.

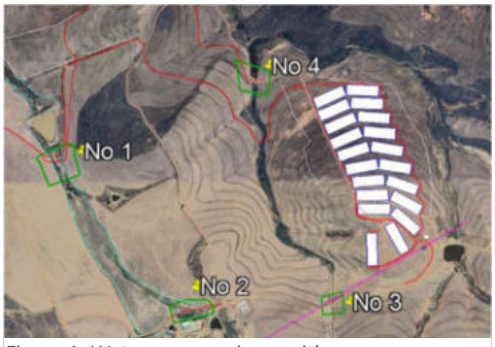

Figure 1: Waterway crossing positions

Low waterway bridges

Low waterway bridges are reinforced concrete structures with a driving surface (final top level) raised above ground (natural ground level) and these structures cross waterways nearly perpendicular to the natural water flow direction of the stream (see drawing in addendum A). Pipes will be installed at set intervals across the bridge length to allow water to freely pass through.

The final top level of the bridge is horizontal (level) and extends across the total width of the existing stream. Where the horizontal bridge section ends at the edge of the stream a further concrete slab on both ends extends at an incline (approach ramps) to a level 1m above natural ground level. This is to mitigate vehicle approach at a slope towards the bridge.

Bridge foundations are concrete walls with footings varying between 1,0 to 1,5m deep below natural ground level or until suitable founding material is found. G5 type materials will be used to fill the void between foundations walls to support the concrete slab (driving surface). However, where suitable founding materials is reached less than 1.0m deep below natural ground level, foundation walls are not required, and G5 type fill material is adequate.

A combination of Gabion baskets, blankets and biddim material will be used to prevent erosion directly up and downstream from the bridge. These erosion prevention measures will continue along the total length of the bridge structure, including the approach ramps on either side. Along the upstream side of the bridge the top of the gabion baskets will be level with the invert level of

the pipes going through the concrete. On the downstream side the top of the gabion baskets will be flush with the top of the driving surface.

Protruding concrete blocks will be placed at intervals on top of the driving surface along the edge of the road to indicate the side of the road during flood conditions. The height of the blocks will indicate if the water level is suitable for safe vehicle crossing.

Stream low flow conditions

Provision is made for pipes through the concrete with invert levels situated at natural ground level. An adequate number of pipes spaced along the bridge allows water to freely pass through and to prevent channelling or damming of the natural stream.

Stream high flow conditions

During high flow conditions the throughput capacity of the pipes is exceeded, and water will dam up and overtop the structure. Due to the top of the bridge being horizontal (level), water will evenly cross over along the total length and no channelling will occur. Vehicles will still be able to cross the bridge whilst water is overtopping until the water reaches a critical depth (pre-determined depth) when it will be unsafe to do so. Once the water level subsides to below the critical depth vehicle traffic may continue.

Stream sub-soil flow conditions

Free water inside the soil, below natural ground level, will seep downstream during times when the soil is saturated. When this water reaches the low water bridge (upstream side) a no fines sub-soil drain will collect the water and direct it through a pipe network underneath the bridge to the other side (downstream side). Water will then be released into another no fines drain along the downstream side of the bridge where it will be evenly distributed to continue seeping downstream.

Suspended bridge structure

Where the natural runoff channel is deep and narrow (marking no 2 in figure 1) a suspended bridge will span across. Suspended bridges are reinforced concrete structures with a driving surface (final top level) raised above ground (natural ground level). The structure crosses the waterway at a skew angle to align with the approach roadway alignment (see drawing in addendum A). The final top level of the bridge is horizontal (level) and has upstand beams on both sides. Where the horizontal bridge section ends at the edge of the stream a further concrete slab on both ends extends at an incline (approach ramps) to natural ground level. This is to mitigate vehicle approach at a slope towards the bridge. There are 3 walls supporting the bridge, 2 on both sides of the stream and one in the centre.

Bridge support walls (3 in total) are reinforced concrete which is founded on rock. The foundations are sunk 300mm deep into the rock and water will flow in between the supporting walls. The flow area through bridge support walls is more than the width of the existing natural channel hence no channelling of the stream occurs.

Gabion structures both at the upstream and downstream side of the supporting walls will protect the structure against erosion.

Earthworks

Installation of concrete structures requires a 2m workspace all round. Excavation depth for the low water bridges is a maximum of 2.0m and for the suspended bridge 3.0m deep. Backfilling will be with selected materials imported from commercial sources.

Concrete

Both ready mix concrete from commercial sources and concrete mixed on site (wet works) is required during construction. At the low water bridges there is enough space to temporarily divert stream flow to accommodate wet works. At the suspended bridge there is not enough space to

divert stream flow to accommodate wet works. An upstream coffer dam must to be constructed to temporarily divert stream water away from the wet works during construction.

Appendix 2

Borehole Yield and Quality Report

Borehole Yield and Quality Testing at Kleinfontein farm, Villiersdorp.

Prepared by
GEOSS
13 March 2025

GROUNDWATER AND EARTH SCIENCES
GEOSS
SOUTH AFRICA (Pty) Ltd

Executive Summary

Jaco Viljoen of Elgin Free Range Chickens appointed GEOSS South Africa (Pty) Ltd to conduct yield and groundwater quality testing of four boreholes at Kleinfontein farm, Villiersdorp. ATS undertook the yield testing under the management and supervision of GEOSS SA from 31 January to 05 February 2025 This included a Step Test, Constant Discharge Test (CDT) and Recovery Test at each borehole and sampling of the groundwater for chemical analysis. It is recommended that groundwater abstraction can occur within the below mentioned parameters from the tested boreholes. Aquifer over-abstraction is unlikely to occur if these rates are adhered to and if the boreholes are managed through long-term monitoring data. It should be noted that boreholes KF_BH3 and KF_BH4 have very low yields as such the testing was stopped after the Step Test for both boreholes. These boreholes are considered too low yielding for the desired use.

Borehole Details				
Borehole Name	**Latitude (DD)**	**Longitude (DD)**	**Borehole Depth (m)**	**Inner Diameter (mm)**
KF_BH1	-33.922230°	19.385410°	96.94	150
KF_BH2	-33.92208°	19.38852°	163.00	210
KF_BH3	-33.923882°	19.393724°	206.00	210
KF_BH4	-33.923930°	19.394008°	90.30	210
Abstraction Recommendations				
Borehole Name	Abstraction rate (L/s)	Abstraction Duration (hrs)	Recovery Duration (hrs)	Possible Volume Abstracted (L/d)
KF_BH1	3.7	24	0	319 680
KF_BH2	1.2	24	0	103 680
KF_BH3	*Low yield - testing stopped*			-
KF_BH4	*Low yield - testing stopped*			-
			Total	**423 360**
Pump Installation Details				
Borehole Name	Pump Installation Depth (mbgl)	Critical Water Level (mbgl)	Dynamic Water Level (mbgl)*	Rest Water Level (mbgl)
KF_BH1	55.00	47.33	34.00	22.97
KF_BH2	115.00	110.80	77.00	5.31

* Typical water level expected during long-term production

Through long-term water level monitoring data, the abstraction volumes can be optimised by adjusting the abstraction rate if required. It is recommended that the boreholes are equipped with variable frequency drives. This enables adjustments to the flow rate to be made if required, as determined by the hydrogeological analysis of water level and flow rate monitoring data.

Laboratory results show that groundwater from the boreholes does not meet potable water quality standards due to elevated levels of several parameters, including high iron in all four boreholes and manganese in all except KF_BH1. Turbidity levels are significantly high (4.01–1 536 NTU), likely linked to iron and manganese, increasing the risk of biofouling and clogging of infrastructure. While the pH and electrical conductivity are generally acceptable, KF_BH1 has a low pH (4.1), and KF_BH3 shows elevated fluoride (9.15 mg/L) exceeding the chronic health limits. Low levels of arsenic (0.015 mg/L) and lead (0.010 mg/L) were detected in KF_BH3 and KF_BH2, respectively,

posing chronic health risks per SANS 241-1:2015. Ongoing monitoring of arsenic and lead is recommended. The groundwater is unsuitable for potable use without treatment but remains viable for irrigation if turbidity and iron concentrations are managed.

To address the potential for iron to clog the borehole and abstraction infrastructure, it is recommended to maintain a constant and continuous pumping schedule as much as possible. Thus, should a daily volume of less than 319 680 L/d for KF_BH1 and 103 680 L/d for KF_BH2 be required, it is recommended to decrease the pumping rate and not the pumping duration. By pumping continuously instead of a stop-start schedule, iron oxidation in the borehole is minimised, decreasing the amount of iron precipitation inside the boreholes and pumps.

The proposed groundwater consumption from the boreholes is 70 000 m^3/annum. With regards to the regional groundwater availability within the local aquifer, a more localised aquifer (i.e., a groundwater resource unit (GRU)) was defined. The GRU encompassed an area of 9.78 km^2. Using the GRAII recharge values, the combined direct vertical recharge was calculated to be 202 063.33 m^3/a, with a firm yield of 132 048.60 m^3/a. The current volume of groundwater abstracted within the GRU, based on the registered WARMS boreholes (database last updated in May 2023), is 45 798.00 m^3/a. Based on these volumes, a volume of 86 250.60 m^3/a is available within the GRU.

As the proposed application volume is within the sustainable yield of the borehole and can be supported by the Firm Yield calculated for that GRU, the abstraction of the total volume of 70 000 m^3/a can be considered within the local aquifer`s capacity and sustainable. The proposed additional abstraction is not likely to impact on the regional groundwater flow, however site-specific long-term monitoring is required to ensure the sustainability of the abstraction.

As of January 2018 the Department of Water and Sanitation released a Government Gazette stating that: "All water use sector groups and individuals taking water from any water resource (surface or groundwater) regardless of the authorisation type, in the Berg, Olifants and Breede Gouritz Water Management Area, shall install electronic water recording, monitoring or measuring devices to enable monitoring of abstractions, storage and use of water by existing lawful users and establish links with any monitoring or management system as well as keep records of the water used."

To facilitate monitoring and informed management of the borehole, it is recommended to equip the boreholes with the following monitoring infrastructure and equipment:

- Installation of a 32 mm (inner diameter, class 10) observation pipe from the pump depth to the surface, closed at the bottom and slotted for the bottom 5 – 10 m.
- Installation of an electronic water level logger (for automated water level monitoring)
- Installation of a sampling tap (to monitor water quality)
- Installation of a flow volume meter (to monitor abstraction rates and volumes)

This report is an important document for obtaining legal authorisation with the Department of Water and Sanitation with regard to the use of the groundwater. However, it does not serve as a Geohydrological Assessment Report in support of a Water Use Licence Application. Such a report would need to incorporate and expand upon the information provided here. GEOSS SA cannot guarantee that there is sufficient water in the aquifer to support the intended usage, or that the Department of Water and Sanitation will authorise the desired abstraction from this aquifer.

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Principal Author(s) and Reviewer(s):

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Abbreviations

AD	Available Drawdown
bh	Borehole
CDT	Constant Discharge Test
CGS	Council for Geoscience
DD	Decimal degree
DWA	Department of Water Affairs (pre- 1994)
DWAF	Department of Water Affairs and Forestry (1994 – 2009)
DWS	Department of Water and Sanitation (2009 – ….)
EC	Electrical Conductivity
FC	Flow Characteristic
GRF	Generalised Radial Flow
IARF	Infinite Acting Radial Flow
ID	inner diameter
L/d	litres per day
L/s	litres per second
m	metres
m^2/d	meters squared per day
mamsl	metres above mean sea level
mbch	metres below collar height
mbgl	metres below ground level
mg	milligram
mg/L	milligram per litre
mm	millimetres
nd	not detected
OD	outer diameter
RWL	rest water level below ground level
SANS	South African National Standard
T	Transmissivity
TDS	total dissolved solids
WGS84	The official co-ordinate system for South Africa
WL	water level
WULA	Water Use Licence Application

Glossary of Terms

aquifer	a geological formation, which has structures or textures that hold water or permit appreciable water movement through them [from National Water Act (Act No. 36 of 1998)].
available drawdown	available drawdown in a borehole is the difference between the rest water level or piezometric surface and the depth that the water level may drop to (typically major water baring unit, boundary inflection or pump depth).
borehole	includes a well, excavation, or any other artificially constructed or improved groundwater cavity which can be used for the purpose of intercepting, collecting or storing water from an aquifer; observing or collecting data and information on water in an aquifer; or recharging an aquifer [from National Water Act (Act No. 36 of 1998)].
confined aquifer	an aquifer confined between two impermeable beds
dynamic water level	the stabilised water level in the borehole during production over long periods of time.
electrical conductivity	the ability of groundwater to conduct electrical current, due to the presence of charged ionic species in solution (Freeze and Cherry, 1979).
fractured aquifer	Fissured and fractured bedrock resulting from decompression and/or tectonic action. Groundwater occurs predominantly within fissures and fractures.
groundwater	Water found in the subsurface in the saturated zone below the water table or piezometric surface i.e., the water table marks the upper surface of groundwater systems.
intergranular aquifer	an aquifer in which groundwater is stored in and flows through open pore spaces in the unconsolidated Quaternary deposits.
isotope	atoms of a chemical element with the same number of protons (atomic number) but different number of neutrons (differing mass). Isotopes have nearly identical chemical behaviour but possess different physical properties.
rest water level	the groundwater level in a borehole not influenced by abstraction or artificial recharge.
sustainable yield	sustainable yield is defined as the rate of withdrawal that can be sustained by an aquifer without causing an unacceptable decline in the hydraulic head or deterioration in water quality in the aquifer.
transmissivity	the rate at which water is transmitted through a unit width of an aquifer under a unit hydraulic gradient.
unconfined aquifer	an aquifer which has free water surface - which means the water table exists for this type of aquifer; primarily recharged by the infiltration of precipitation from the ground surface

SPECIALIST EXPERTISE

CURRICULUM VITAE – Reuben Lazarus

GENERAL

Nationality:	South African
Profession:	Hydrogeologist
Specialisation:	Groundwater development, yield testing, geochemistry and camera logging
Position in firm:	Hydrogeologist, Business Unit Leader: Yield and Water Quality Testing at GEOSS South Africa (Pty) Ltd
Date commenced:	October 2017
Year of birth & ID #:	1992 – 9207075195083
Language skills:	Afrikaans (mother tongue) English (excellent)

KEY SKILLS

- Groundwater component of Catchment Management Strategies and other Groundwater Resource Directed Measures.
- Groundwater development – borehole drilling and test pumping supervision and analysis.
- Groundwater monitoring – development and analysis of groundwater level and quality data.
- Groundwater management – sustainable aquifer development and management.
- Groundwater contamination assessments – geochemical analysis.
- Writing of hydrogeological reports
- ArcMap / Geochemist's Workbench / WISH and typical software skills.

EDUCATIONAL AND PROFESSIONAL STATUS

Qualifications

2018	BSc (Geology – Environmental Geochemistry)	University of Stellenbosch, South Africa
2016	BSc (Hons) (Earth Science)	University of Stellenbosch, South Africa
2015	BSc (Earth Science)	University of Stellenbosch, South Africa

Courses and symposiums

2023	VFD Level 1 and Level 2 (ElectroMechanica)
2023	PLC Level 1 and Level 2 AS 200 (ElectroMechanica)
2023	Basic hydraulics & Pumps (Dudley Willer)
2022	Environmental Sampling Workshop (Van Walt)
2019	SA remediation workshop (Enviro Workshops)

Memberships/Organisations

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- Groundwater Division of the Geological Society of South Africa UID 9661/21
- Geological Society of South Africa Mem. No. 970021

EMPLOYMENT RECORD

June 2021 – present:	GEOSS South Africa (Pty) Ltd, Stellenbosch *Project Hydrogeologist: Yield and Water Quality Testing Business Unit Leader*
October 2018 – June 2021:	GEOSS South Africa (Pty) Ltd, Stellenbosch *Project Hydrogeologist*
October 2017 – October 2018:	GEOSS - Geohydrological and Spatial Solutions International (Pty) Ltd *Student Hydrogeologist*

SPECIALIST DECLARATION

We, Reuben Lazarus and Julian Conrad, as the appointed independent specialist(s) hereby declare that we:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to our specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the South African National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes);
- have and will not have no vested interest in the proposed activity proceeding;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not

Reuben Lazarus
GEOSS South Africa (Pty) Ltd
SACNASP – Pr.Sci.Nat: 120711
13 March 2025

Julian Conrad
GEOSS South Africa (Pty) Ltd
SACNASP – Pr.Sci.Nat 400159/05
13 March 2025

1 Introduction

GEOSS South Africa (Pty) Ltd was appointed by Jaco Viljoen of Elgin Free Range Chickens to conduct yield and water quality testing of four (4) boreholes at Kleinfontein farm, Villiersdorp.

The boreholes were tested by under the management and supervision of GEOSS SA from 31 January to 05 February 2025, and details of this are presented in this report. The borehole's details are presented in **Table 1** below with their locations spatially shown in **Map 1.** No drilling logs were made available, however; estimations of the borehole constructions are presented in **Appendix A.** The geological setting of the area suggests that KF_BH1 was drilled into the Gydo Formation of the Bokkeveld Group while KF_BH2, KF_BH3 and KF_BH_4 was drilled into the Rietvlei Formation of the Table Mountain Group. The Bokkeveld Group typically overlies the Table Mountain Group and therefore it is anticipated that all four (4) boreholes intersect the feldspathic and quartzitic sandstones of the Table Mountain Group (**Map 2**).

Table 1: Borehole details.

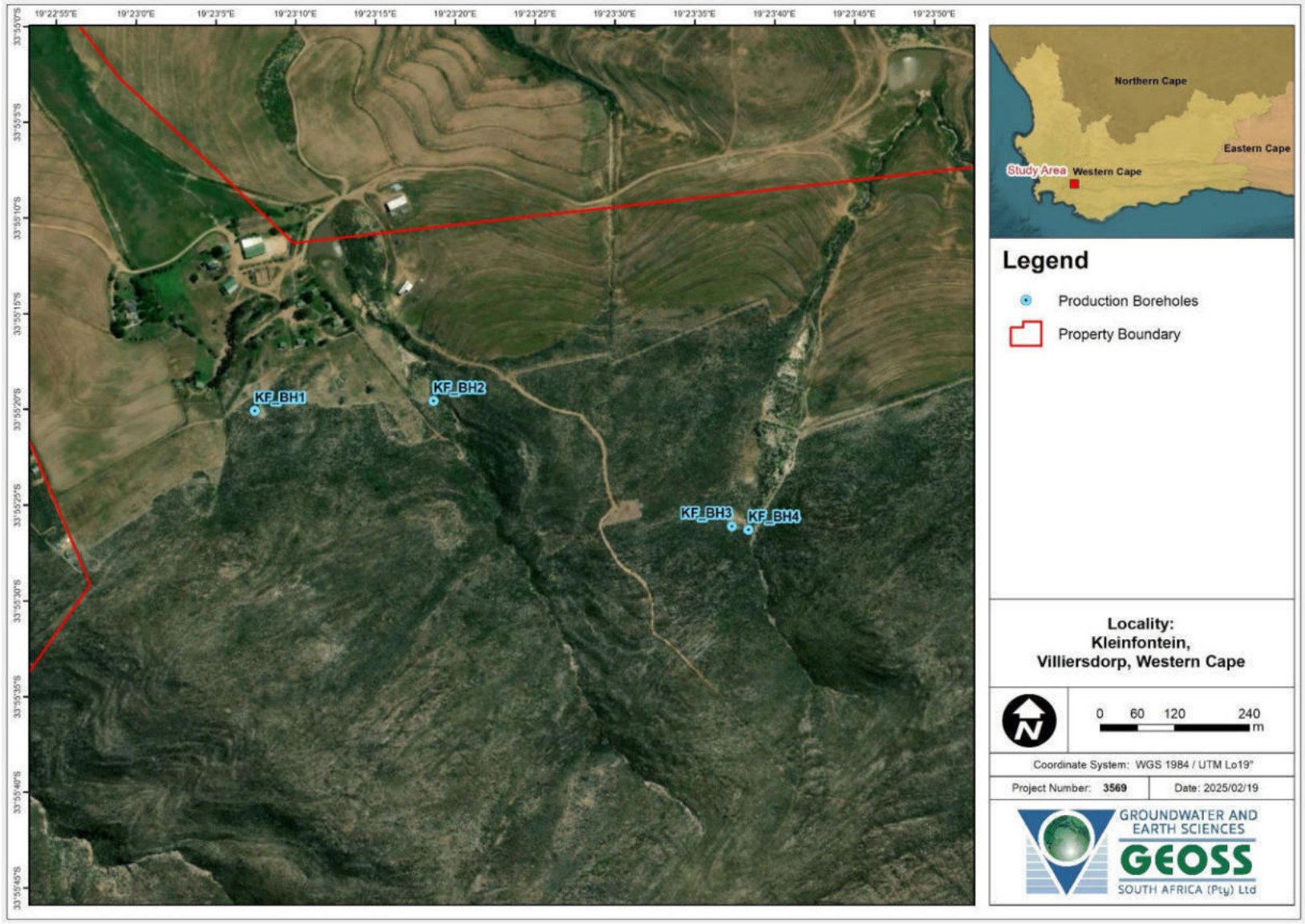
Borehole	Latitude (DD, WGS84)	Longitude (DD, WGS84)	Depth (m)
KF_BH1	-33.922230°	19.385410°	96.94
KF_BH2	-33.922080°	19.388520°	163.00
KF_BH3	-33.923882°	19.393724°	206.00
KF_BH4	-33.923930°	19.394008°	90.30

Figure 1: KF_BH1, KF_BH2, KF_BH3 and KF_BH4, respectively (from left to right).

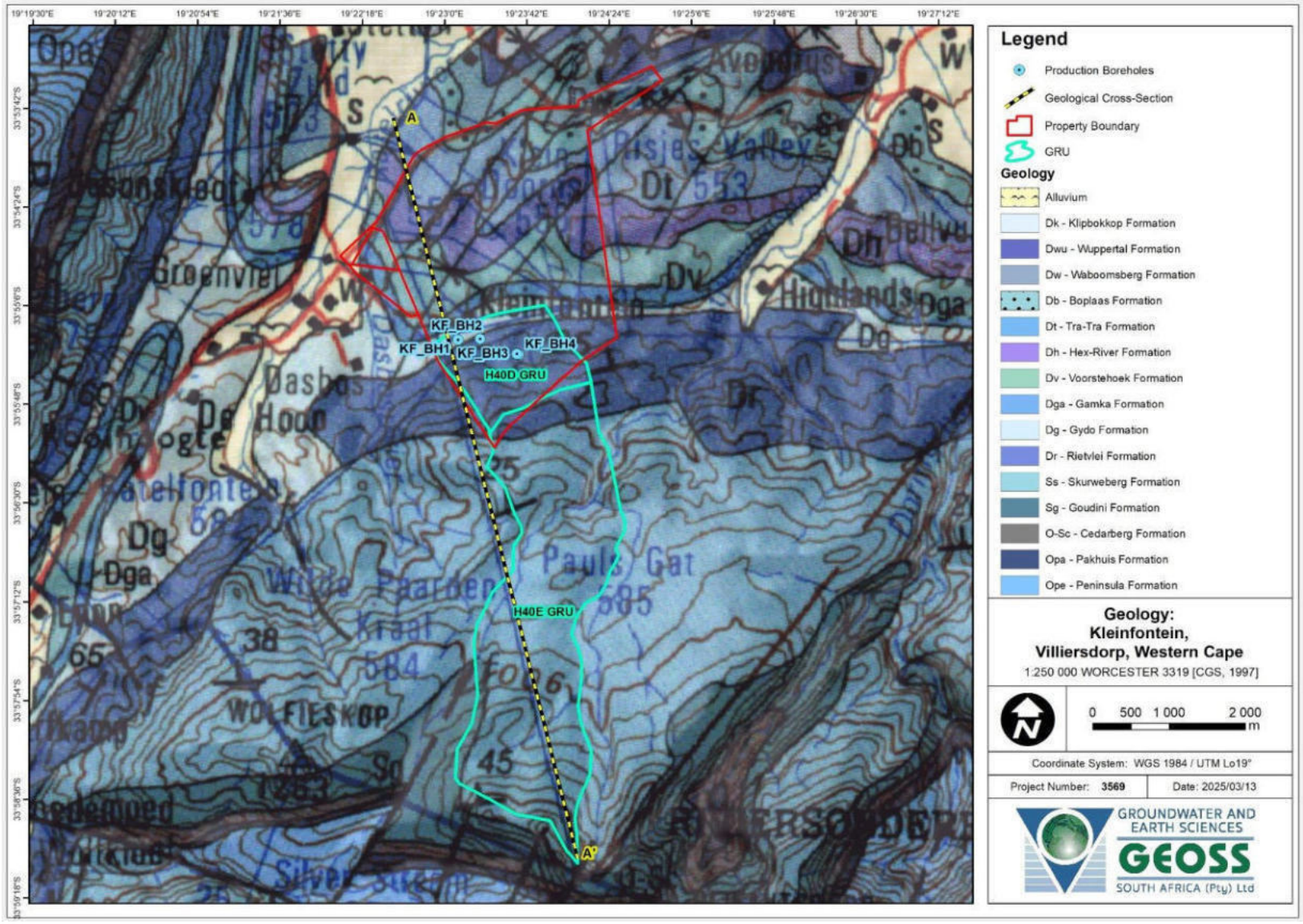
2 Yield Testing

2.1 Methodology

The yield testing was undertaken by under the management and supervision of GEOSS SA from 31 January to 05 February 2025 and carried out according to the National Standard (SANS 10299-4:2003, Part 4 – Test pumping of water boreholes). This included a Step Test, Constant Discharge Test (CDT) and recovery monitoring of the borehole. For the Step Test, a borehole is pumped at a constant rate for one-hour intervals and the flow rates are incrementally increased for each step. This test is followed by a Constant Discharge Test where the boreholes are pumped at a constant rate for an extended period of time, followed by recovery monitoring. The water level drawdown is monitored at pre-determined intervals during these tests (drawdown refers to the difference in water level from the rest water level (RWL) measured before commencement of the yield test). Raw data and measurements taken during the yield tests are presented in **Appendix B.**



Map 1: Borehole Locality Map.



Map 2: Geological Map with Property Boundary and Tested Borehole Positions (1:250 000 Geological Map Series, 3319 Worcester) (CGS, 1997).

The yield test data was analysed using the excel-based FC program, developed by the IGS (Institute for Groundwater Studies) in Bloemfontein. The sustainable yield of the borehole was calculated based upon long-term extrapolations of the CDT data according to (1) the Cooper-Jacob approximation of the Theis solution for confined aquifers, (2) the Barker Generalised Radial Flow Model (GRF) for hydraulic tests in fractured rock and (3) the Flow Characteristic (FC) method(s) using first and second derivative calculations. Boundary conditions are accounted for in multiplication factors to the rate of drawdown (derivatives), according to each of the above three methods. These three methods are briefly described below.

1. The Cooper-Jacob approximation of the Theis solution for confined aquifers was designed for porous media aquifers, where infinite acting radial flow (IARF) was observed during the pumping of a borehole. The application of this method to fractured aquifers was discussed by Meier et al (1998), concluding that T estimates using the Cooper-Jacob analysis gave an effective T for the fracture zone. The Cooper-Jacob analysis (and more accurately the Theis method) is therefore viable for analysing pumping test data for fractured aquifers where IARF is observed. The parameters are then used to predict theoretical long-term drawdowns.
2. The Barker GRF Model (Barker, 1988) uses fracture hydraulic conductivity, fracture storativity and flow domain to predict drawdown due to abstraction in a borehole in a fractured medium. By changing these values, a curve of drawdown predictions can be made to fit real-world data and therefore predict theoretical long-term drawdowns.
3. The FC methods are the Basic FC, the FC Inflection Point and the FC Non-Linear. The Basic FC and the FC Inflection Point methods make use of the derivatives of the drawdown data to predict theoretical long-term drawdowns and the scale-back factors are applied to selected available drawdowns. The FC Non-Linear method uses curve fitting of the Step Test data to predict theoretical long-term drawdowns. Due to the short nature of the Step Test, this method is usually not included if the other methods of analysis differ from it.

In all three methods, the available drawdown (AD) was carefully selected to ensure that the flow regime described by the analytical solution is not extrapolated beyond its applicable depth, which may easily result in an overuse of the resource. For both KF_BH1 and KF_BH2 this was conservatively calculated as the geometric mean of the maximum drawdown reached during the CDT and the drawdown to the pump depth (24.1 m and 92.1 m respectively). A two-year extrapolation time without recharge to the aquifer was selected as per the recommendations within the FC method program.

Water samples were collected at the end of the yield tests and submitted for inorganic chemical analyses.

2.2 Yield Testing at KF_BH1

The yield testing was conducted between the 28th and the 30th of January 2025. The borehole was measured to a depth of 96.94 meters below ground level (mbgl). The test pump was installed at a depth of 90.50 mbgl. The rest water level (RWL) at the start of the test was 22.97 mbgl.

During the Step Test, the water level was drawn down 6.13 meters below the rest water level to 29.10 mbgl during the 3rd step at a rate of 5.11 L/s (18 396 L/hour, pump max due to borehole inner diameter). **Figure 2** shows the time-series drawdown for the Step Test.

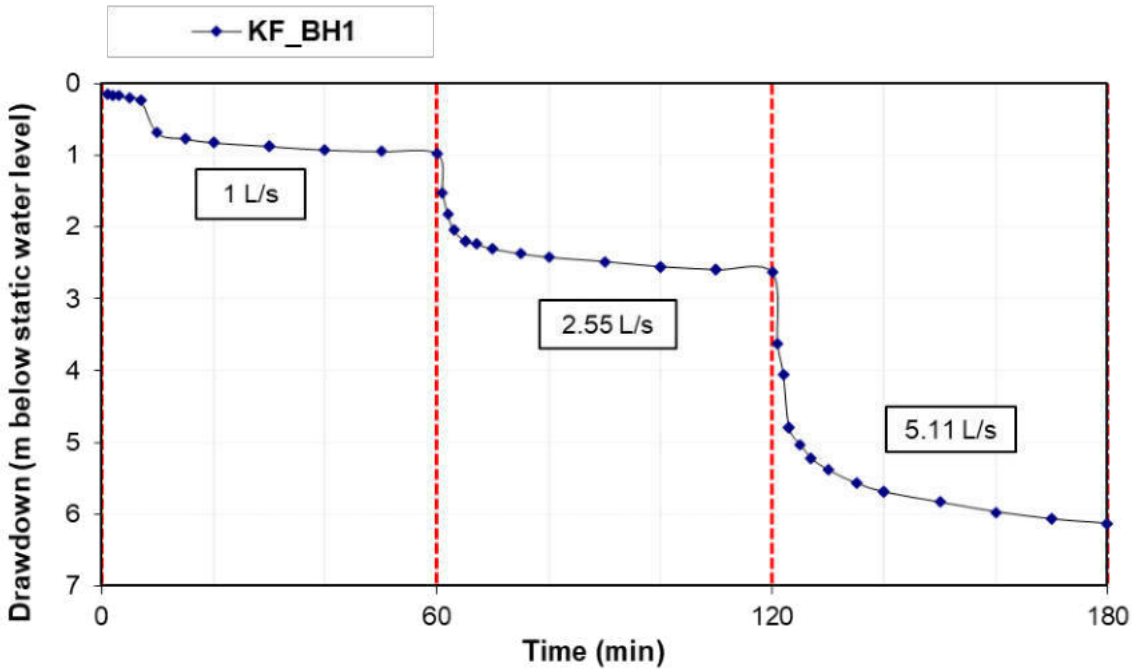


Figure 2: Step Test drawdown data for KF_BH1.

The water level was left to recover overnight. Before starting the CDT, the water level recovered to 23.23 mbgl. Based on the results of the Step Test, the planned 24-hour CDT was conducted at a rate of 5.13 L/s (18 468 L/hour). At the end of the 24-hour period, the water level had drawn down 8.67 meters below the rest water level (31.9 mbgl).

The semi-log plot of the drawdown from the CDT is presented in **Figure 3**. The available drawdown (AD) is indicated with the horizontal red line at 24.1 m.

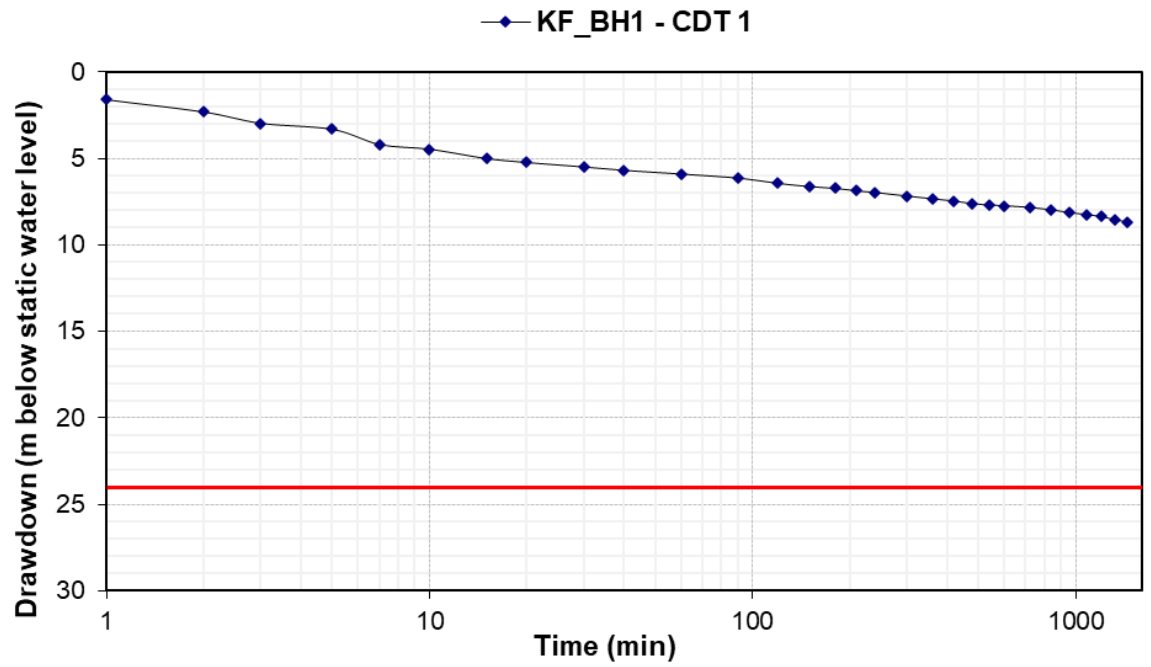


Figure 3: Semi-Log Plot of drawdown during the CDT of KF_BH1 (5.13 L/s).

The recovery of the water level was monitored after the CDT and is presented in **Figure 4.** The recovery was moderate to slow, only reaching 82.7% in 24 hours. Monitoring will be essential to determine the long-term recovery of the borehole.

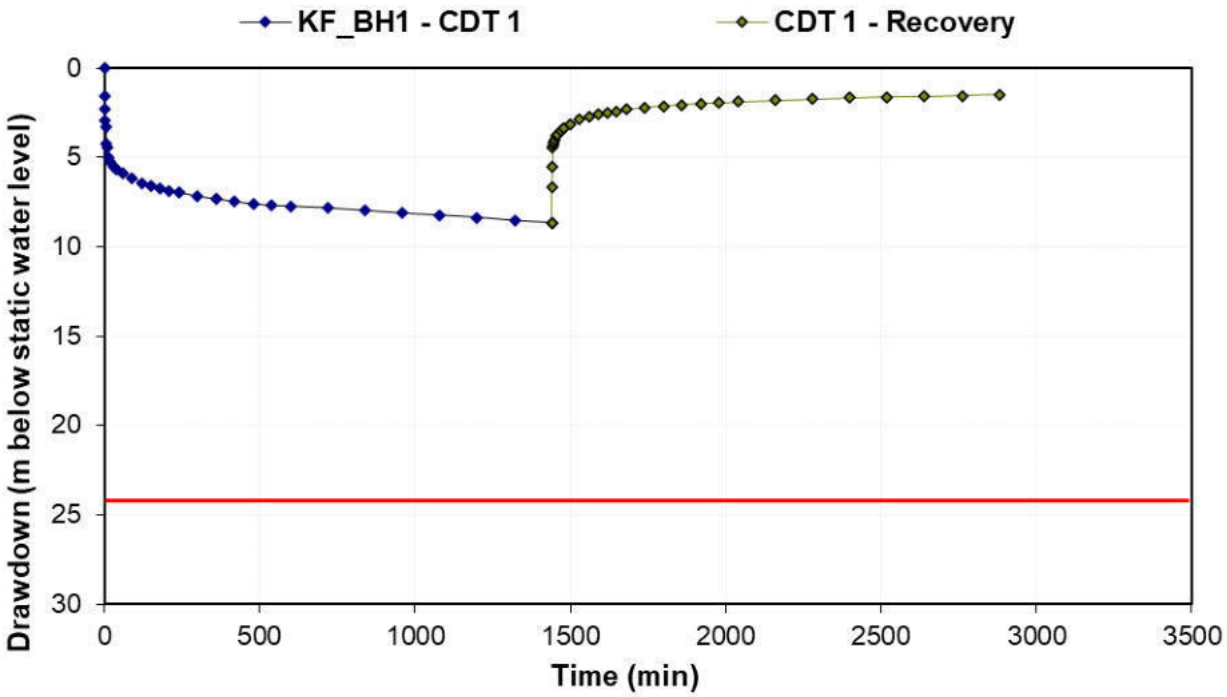


Figure 4: Time-series drawdown and recovery for KF_BH1 (5.13 L/s).

Several methods were used to assess the yield test data as presented in **Table 2.** It is recommended that the borehole can be abstracted from at a rate of up to 3.7 L/s (13 320 L/hour) for up to 24 hours per day. The assessments were based on an available drawdown (AD) of 24.10 meters below the RWL of the CDT, which equates to 47.33 mbgl.

Table 2: Yield Determination - KF_BH1.

KF_BH1			
Method	**Sustainable Yield (L/s)**	**Late *T (m^2/d)**	***AD used (m)**
Basic FC	3.6	29.5	24.1
Cooper-Jacob	4.3	35.5	24.1
Barker	3.1		24.1
Average Q_sust (L/s)	**3.7**		
Recommended Abstraction			
Abstraction Rate (L/s)	**Abstraction Duration (hours)**		**Recovery Duration (hours)**
3.7	24		0

**AD- Available Drawdown

* T – Transmissivity

2.3 Yield Testing at KF_BH2

The yield testing was conducted between 31 January and 05 February 2025. The borehole was measured to a depth of 163 meters below ground level (mbgl. The test pump was installed at a depth of 140.00 mbgl. The rest water level (RWL) at the start of the test was 5.31 mbgl.

During the Step Test, the water level was drawn down 113.32 meters below the rest water level (pump inlet) during the 4th step at a rate of 2.4 L/s (8 640 L/hour). **Figure 5** shows the time-series drawdown for the Step Test.

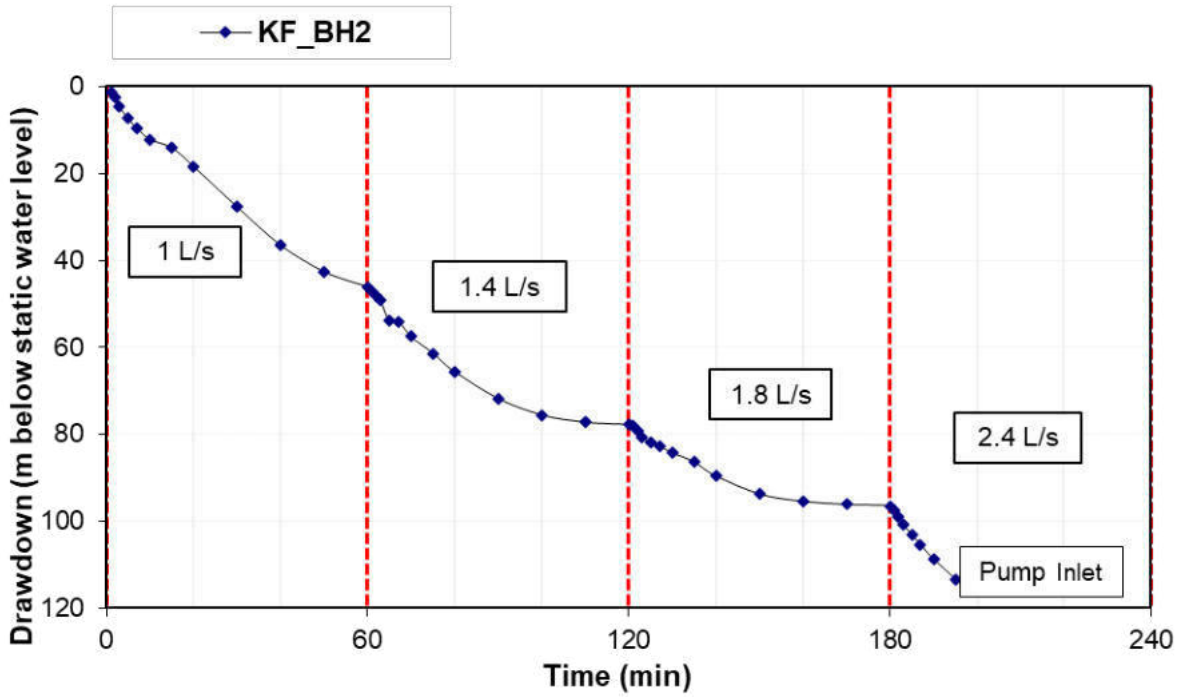


Figure 5: Step Test drawdown data for KF_BH2.

The water level was left to recover overnight. Before starting the CDT, the water level recovered to 18.71 mbgl. Based on the results of the Step Test, the planned 24-hour CDT was conducted at a rate of 1.5 L/s (5 400 L/hour). At the end of the 24-hour period, the water level had drawn down 70.07 meters below the rest water level (88.78 mbgl).

The semi-log plot of the drawdown from the CDT is presented in **Figure 6.** The available drawdown (AD) is indicated with the horizontal red line at 92.10 m

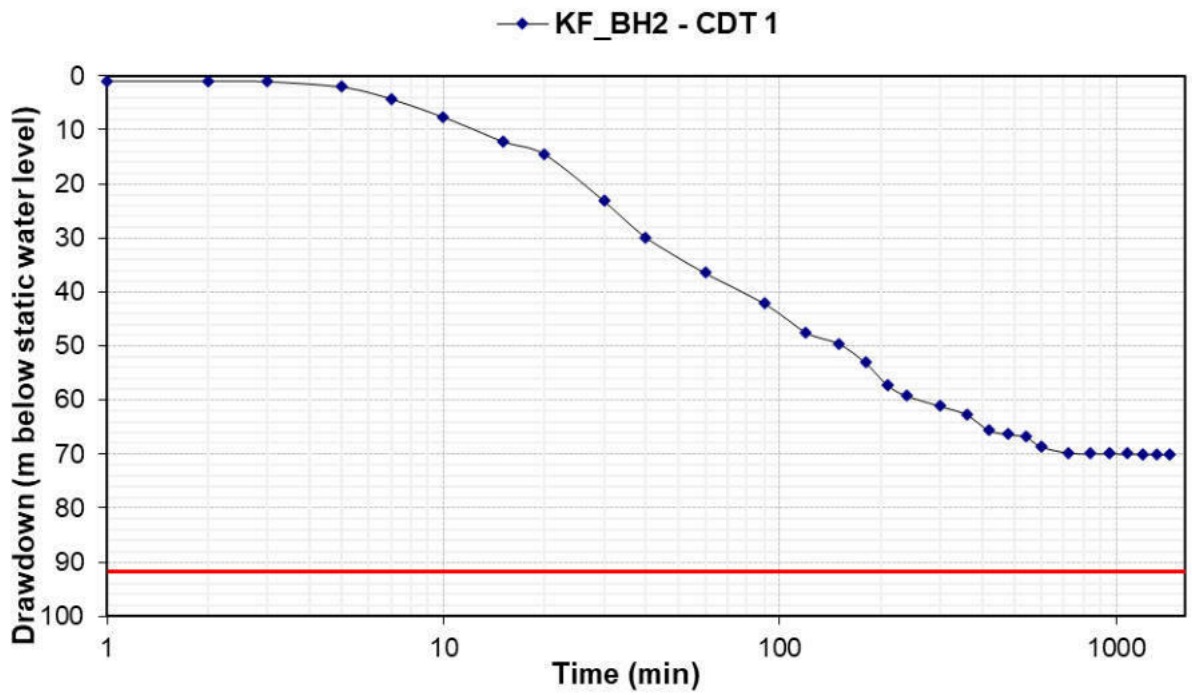


Figure 6: Semi-Log Plot of drawdown during the CDT of KF_BH2 (1.5 L/s).

The recovery of the water level was monitored after the CDT and is presented in **Figure 7.** The recovery was good, reaching 96.2% in 24 hours. Monitoring will be essential to determine the long-term recovery of the borehole.

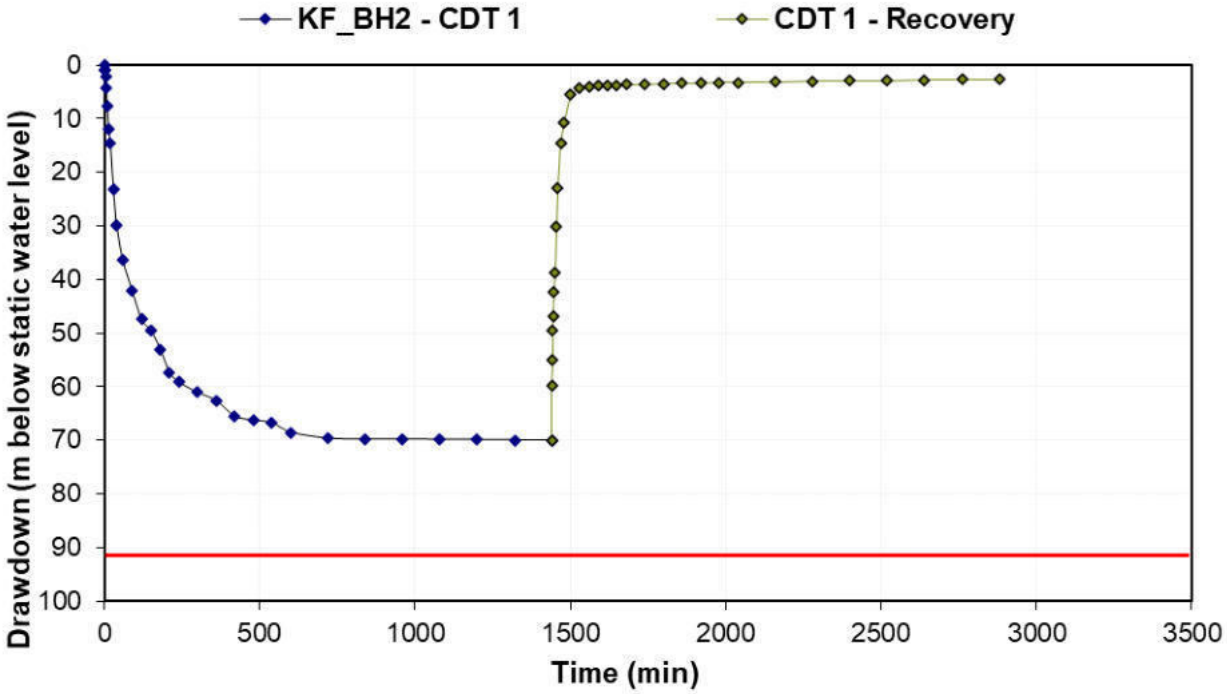


Figure 7: Time-series drawdown and recovery for KF_BH2 (1.5 L/s).

Several methods were used to assess the yield test data as presented in **Table 3.** It is recommended that the borehole can be abstracted from at a rate of up to 1.2 L/s (4 320 L/hour) for up to 24 hours per day. The assessments were based on an available drawdown (AD) of 92.10 meters below the RWL of the CDT, which equates to 110.81 mbgl.

Table 3: Yield Determination – KF_BH2.

KF_BH2			
Method	**Sustainable Yield (L/s)**	**Late *T (m^2/d)**	***AD used (m)**
Basic FC	1.4	6.9	92.1
Cooper-Jacob	1.0	29.6	92.1
Barker	1.2		92.1
Average Q_sust (L/s)	**1.2**		
Recommended Abstraction			
Abstraction Rate (L/s)	**Abstraction Duration (hours)**		**Recovery Duration (hours)**
1.2	24		0

**AD- Available Drawdown

* T – Transmissivity

2.4 Yield Testing at KF_BH3

The yield testing was conducted on 02 February 2025. The borehole was measured to a depth of 206 meters below ground level (mbgl) The test pump was installed at a depth of 149.71 mbgl. The rest water level (RWL) at the start of the test was 48.62 mbgl.

During the Step Test, the water level was drawn down 98.25 meters below the rest water level (Pump inlet) during the 2nd step at a rate of 1.0 L/s (3 600 L/hour). **Figure 8** shows the time-series drawdown for the Step Test.

During the Step Test it was determined that the yield of the borehole is considered insufficient. Accordingly continued monitoring and further CDT testing of the borehole was abandoned. The use of this borehole is not recommended due to insufficient yield.

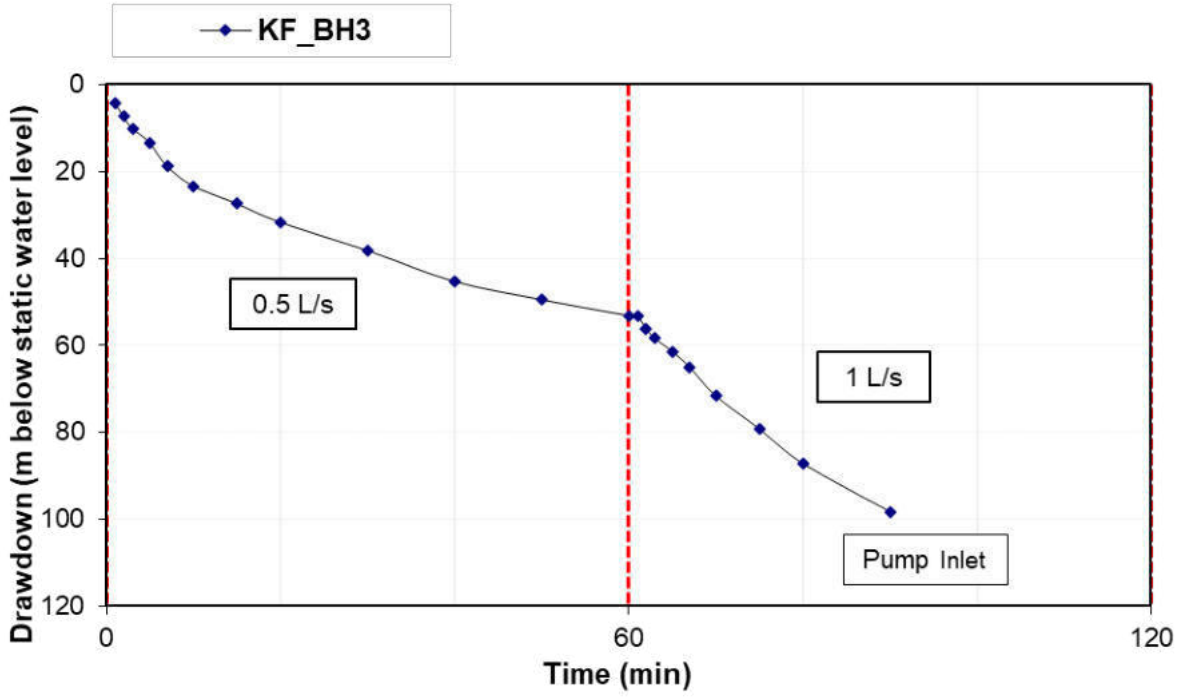


Figure 8: Step Test drawdown data for KF_BH3.

2.5 Yield Testing at KF_BH4

The yield testing was conducted on 31 January 2025. The borehole was measured to a depth of 90.3 meters below ground level (mbgl). The test pump was installed at a depth of 88.60 mbgl. The rest water level (RWL) at the start of the test was 45.14 mbgl.

During the Step Test, the water level was drawn down 42.80 meters below the rest water level (pump inlet) during the 2nd step at a rate of 1.6 L/s (5 760 L/hour). **Figure 8** shows the time-series drawdown for the Step Test.

During the Step Test it was determined that the yield of the borehole is considered insufficient. Accordingly continued monitoring and further CDT testing of the borehole was abandoned. This use of this borehole is not recommended due to insufficient yield.

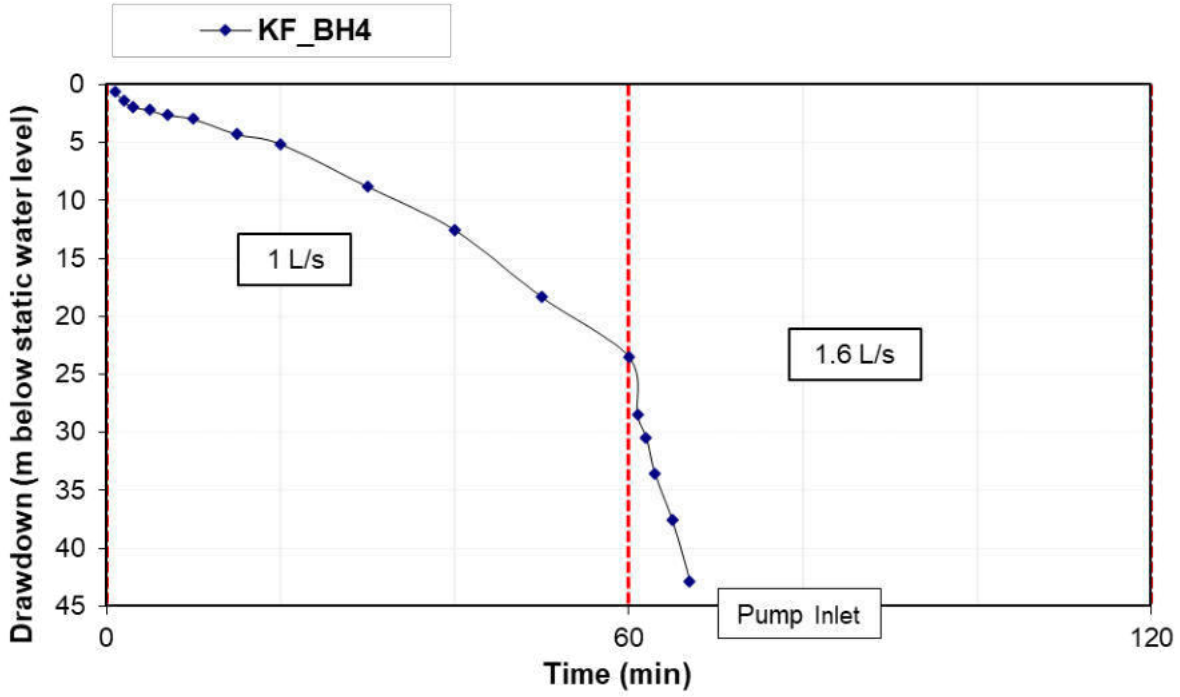


Figure 9: Step Test drawdown data for KF_BH4.

2.6 Radius of influence

No influence was observed between boreholes during the testing process. As such aquifer parameters could not be determined from the monitoring boreholes. Transmissivities were calculated through the Theis method using the drawdown response in the tested boreholes during the CDTs. The transmissivity of KF_BH1 and KF_BH2 were respectively calculated at 35.5 and 29.6 m^2/d. A storativity value of 5x10-4 was used for the radius of influence calculation based on an average expected value for confined aquifers as reported by Todd (1980). Based on the aquifer parameters the radii of influence were calculated for the recommended sustainable yields of the boreholes. A drawdown of up to 3 m and 1.1 m, respectively, can be expected 1 kilometre away from KF_BH1 and KF_BH2 at the recommended sustainable rates (3.7 L/s and 1.2 L/s for 24 hours per day) after 2 years of abstraction without recharge (**Figure 10**).

It must be noted that the Cooper-Jacob modelling of radius of influence is based on a homogenous, confined aquifer and therefore does not account for the heterogeneity associated with secondary aquifers (fractured rock). Thus, the radius of influence solution will only provide an indication of how abstraction at KF_BH1 and KF_BH2 will impact the water level in the fracture network. This suggests that the cone of depression will not expand equivalently in all directions surrounding the borehole, but will rather propagate along the fracture network within the secondary aquifer.

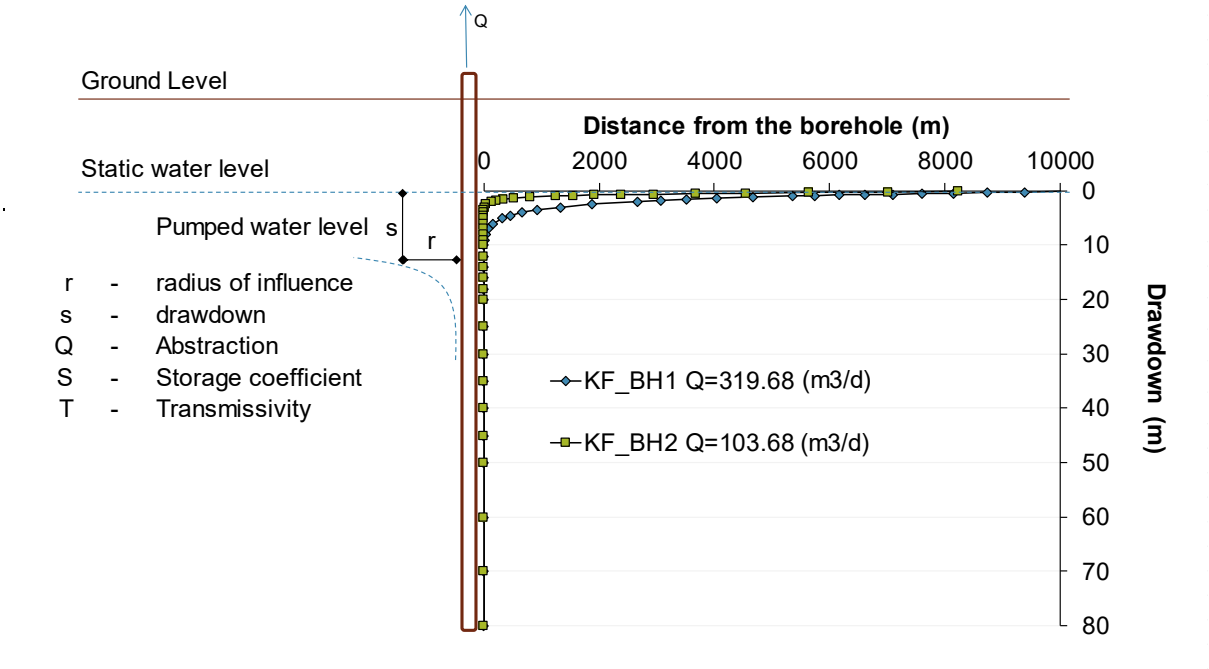


Figure 10: Radii of influence for KF_BH1 and KF_BH2 at the recommended sustainable yields.

3 Water Quality Analysis

Groundwater samples were collected from the boreholes at the end of the yield tests and submitted for inorganic chemical analyses to a SANAS accredited laboratory (Vinlab) in the Western Cape. The certificate of analysis for the samples are presented in **Appendix C**. The chemistry results obtained for the boreholes have been classified according to the SANS241-1: 2015 standards for drinking water (**Table 4**). **Table 6** presents the water chemistry analysis results, colour coded according to the SANS241-1: 2015 drinking water assessment standards.

Table 4: Classification table for the specific limits.

Acute Health	Aesthetic	Chronic Health	Operational	Acceptable

The limits and associated risks for domestic water as determined by the South African National Standard (SANS) 241:2015 are as follows, where:

- Health risks: parameters falling outside these limits may cause acute or chronic health problems in individuals.
- Aesthetic risks: parameters falling outside these limits indicate that water is visually, aromatically or palatably unacceptable.
- Operational risks: parameters falling outside these limits may indicate that operational procedures to ensure water quality standards are met may have failed.

The chemistry results obtained have also been classified according to the DWAF (1998) standards for domestic water. **Table 5** enables an evaluation of the water quality with regards to the various parameters measured (DWAF, 1998). **Table 7** presents the water chemistry analysis results colour coded according to the DWAF domestic water assessment standards.

Table 5: Classification table for the groundwater results (DWAF, 1998).

Class	Water quality	Description
Class 0	Ideal	Suitable for lifetime use.
Class I	Good	Suitable for use, rare instances of negative effects.
Class II	Marginal	Conditionally acceptable. Negative effects may occur.
Class III	Poor	Unsuitable for use without treatment. Chronic effects may occur.
Class IV	Dangerous	Totally unsuitable for use. Acute effects may occur.

Table 6: Production borehole results classified according to SANS241-1:2015.

Analyses	KF_ BH1	KF_ BH2	KF_ BH3	KF_ BH4	SANS 241-1:2015
Date and Time Sampled	29/01/25 14:40	04/02/25 06:30	02/02/25 08:20	31/01/25 14:05	
pH (at 25 °C)	4.2	5.6	6.4	6.4	5.0≤ Operational ≤ 9.7
Conductivity (mS/m) (at 25 °C)	40.8	34.0	61.1	53.8	Aesthetic ≤170
Total Dissolved Solids (mg/L)	276.62	230.52	414.26	364.76	Aesthetic ≤1200
Turbidity (NTU)	4.01	1536.00	543.00	96.00	Operational ≤1 Aesthetic ≤5
Colour (mg/L as Pt)	<15	<15	<15	<15	Aesthetic ≤15
Sodium (mg/L as Na)	54	50	85	85	Aesthetic ≤200
Potassium (mg/L as K)	7	4	8	7	N/A
Magnesium (mg/L as Mg)	7	6	9	7	N/A
Calcium (mg/L as Ca)	<0.20	<0.20	8	7	N/A
Chloride (mg/L as Cl)	96.17	85.15	112.58	113.93	Aesthetic ≤300
Sulphate (mg/L as SO_4)	23.04	14.85	53.10	20.50	Aesthetic ≤250 Acute ≤500
Nitrate & Nitrite Nitrogen (mg/L as N)	0.068	0.068	0.068	0.068	≤1 Acute Health
Nitrate Nitrogen (mg/L as N)	<1.00	<1.00	<1.00	<1.00	Acute Health ≤11
Nitrite Nitrogen (mg/L as N)	<0.05	<0.05	<0.05	<0.05	Acute Health ≤0.9
Ammonia Nitrogen (mg/L as N)	<0.15	<0.15	<0.15	<0.15	Aesthetic ≤1.5
Total Alkalinity (mg/L as $CaCO_3$)	<10.00	10.3	61.7	58.4	N/A
Total Hardness (mg/L as $CaCO_3$)	29.2	25.1	56.9	46.2	N/A
Fluoride (mg/L as F)	<0.15	<0.15	9.15	0.59	Chronic Health ≤1.5
Aluminium (mg/L as Al)	0.972	0.299	4.892	0.238	Operational ≤0.3
Total Chromium (mg/L as Cr)	<0.004	<0.004	0.016	<0.004	Chronic Health ≤0.05
Manganese (mg/L as Mn)	0.054	0.796	1.907	1.734	Aesthetic ≤0.1 Chronic ≤0.4
Iron (mg/L as Fe)	1.146	1.891	56.355	3.494	Aesthetic ≤0.3 Chronic ≤2
Nickel (mg/L as Ni)	0.010	0.016	0.012	<0.008	Chronic Health ≤0.07
Copper (mg/L as Cu)	0.025	0.034	0.015	0.017	Chronic Health ≤2
Zinc (mg/L as Zn)	0.094	0.091	0.061	0.145	Aesthetic ≤5
Arsenic (mg/L as As)	<0.010	<0.010	0.015	<0.010	Chronic Health ≤0.01
Selenium (mg/L as Se)	<0.008	<0.008	<0.008	<0.008	Chronic Health ≤0.04
Cadmium (mg/L as Cd)	0.002	<0.001	0.002	0.002	Chronic Health ≤0.003
Antimony (mg/L as Sb)	<0.013	<0.013	0.014	<0.013	Chronic Health ≤0.02
Mercury (mg/L as Hg)	<0.001	0.001	0.001	0.002	Chronic Health ≤0.006
Lead (mg/L as Pb)	<0.008	0.010	<0.008	<0.008	Chronic Health ≤0.01
Uranium (mg/L as U)	<0.028	<0.028	<0.028	<0.028	Chronic Health ≤0.03
Cyanide (mg/L as CN^-)	<0.01	0.017	0.061	0.010	Acute Health ≤0.2
Total Organic Carbon (mg/L as C)	1.46	7.55	3.73	3.60	N/A
Charge Balance Error %	2.0	2.9	2.9	1.8	≥-5 - ≤5 Acceptable

.

Table 7: Classified production borehole results according to DWAF (1998).

Sample Marked:	KF_BH1	KF_BH2	KF_BH3	KF_BH4	DWAF (1998) Domestic Water Assessment Guide				
					Class 0	Class I	Class II	Class III	Class IV
					Ideal	Good	Marginal	Poor	Dangerous
Date and Time Sampled	29/01/25 14:40	04/02/25 06:30	02/02/25 08:20	31/01/25 14:05					
pH	4.2	5.6	6.4	6.4	5-9.5	4.5-5 & 9.5-10	4-4.5 & 10-10.5	3-4 & 10.5-11	< 3 & >11
Conductivity (mS/m)	40.8	34.0	61.1	53.8	<70	70-150	150-370	370-520	>520
Turbidity (NTU)	4.01	1536.00	543.00	96.00	<0.1	0.1-1	1.0-20	20-50	>50
	mg/L								
Total Dissolved Solids	276.62	230.52	414.26	364.76	<450	450-1000	1000-2400	2400-3400	>3400
Sodium (as Na)	54	50	85	85	<100	100-200	200-400	400-1000	>1000
Potassium (as K)	7	4	8	7	<25	25-50	50-100	100-500	>500
Magnesium (as Mg)	7	6	9	7	<70	70-100	100-200	200-400	>400
Calcium (as Ca)	<0.20	<0.20	8	7	<80	80-150	150-300	>300	
Chloride (as Cl)	96.17	85.15	112.58	113.93	<100	100-200	200-600	600-1200	>1200
Sulphate (as SO_4)	23.04	14.85	53.10	20.50	<200	200-400	400-600	600-1000	>1000
Fluoride (as F)	<0.15	<0.15	9.15	0.59	<0.7	0.7-1.0	1.0-1.5	1.5-3.5	>3.5
Manganese (as Mn)	0.054	0.796	1.907	1.734	<0.1	0.1-0.4	0.4-4	4.0-10.0	>10
Iron (as Fe)	1.146	1.891	56.355	3.494	<0.5	0.5-1.0	1.0-5.0	5.0-10.0	>10
Copper (as Cu)	0.025	0.034	0.015	0.017	<1	1-1.3	1.3-2	2.0-15	>15
Zinc (as Zn)	0.094	0.091	0.061	0.145	<20	>20			
Arsenic (as As)	<0.010	<0.010	0.015	<0.010	<0.010	0.01-0.05	0.05-0.2	0.2-2.0	>2.0
Cadmium (as Cd)	0.002	<0.001	0.002	0.002	<0.003	0.003-0.005	0.005-0.020	0.020-0.050	>0.050
Hardness (as $CaCO_3$)	29.20	25.10	56.90	46.20	<200	200-300	300-600	>600	
Charge Balance Error %	2.0	2.9	2.9	1.8	≥-5 - ≤5 Acceptable				

From the chemical results presented in **Table 6** and **Table 7**, groundwater from the boreholes does not meet the required quality standards for potable use. Iron concentrations are elevated in all four boreholes, with manganese levels also exceeding acceptable limits, except in KF_BH1. Turbidity is significantly elevated across all boreholes, ranging from 4.01 NTU to 1 536 NTU, likely attributed to high iron and manganese concentrations. If not properly managed, iron and manganese biofouling is expected to occur, potentially leading to clogging of both the borehole and abstraction infrastructure.

The pH and electrical conductivity of the boreholes are generally within acceptable limits, with the exception of KF_BH1, which has a pH of 4.1—falling below the operational limit of SANS 241-1:2015. KF_BH3 exhibits an elevated fluoride concentration (9.15 mg/L) above the chronic health limits of SANS 241-1:2015. Additionally, low concentrations of arsenic (0.015 mg/L) and lead (0.010 mg/L) were detected in KF_BH3 and KF_BH2, respectively, both classified as chronic health risks according to SANS 241-1:2015. Continuous groundwater monitoring for arsenic and lead is recommended to assess whether these concentrations persist.

Given the observed water quality, the groundwater from these boreholes is unsuitable for direct potable use and should undergo treatment prior to consumption. However, it remains suitable for irrigation purposes as long as the turbidity and iron concentrations are considered.

A number of chemical diagrams have been plotted for the groundwater sample and these are useful for chemical characterisation of the water and illustrate the similarities and differences in the water types.

The chemistry of the samples has been plotted on a tri-linear diagram known as a Piper diagram. This diagram indicates the distribution of cations and anions in separate triangles and then a combination of the chemistry in the central diamond. **Figure 11**, the tested borehole groundwater samples are classified as potassium/chloride hydrofacies, which is typical of groundwater that is hosted within the rocks of the Table Mountain Group.

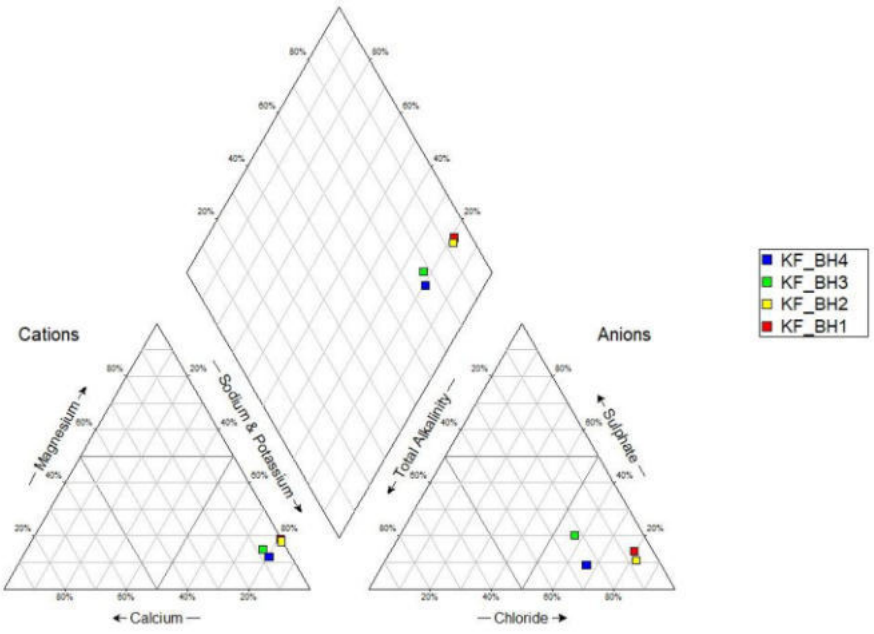


Figure 11: Piper diagram of the groundwater samples.

The Sodium Adsorption Ratio (SAR) of the groundwater is plotted in **Figure 12.** All four boreholes (KF_BH1 – KF_BH4) plots as S1/C2, thus classified as low risk in terms of sodium adsorption and medium risk in terms of salinity hazard. This graph is typically applicable to irrigation, however, is dependent on soil texture and crop type.

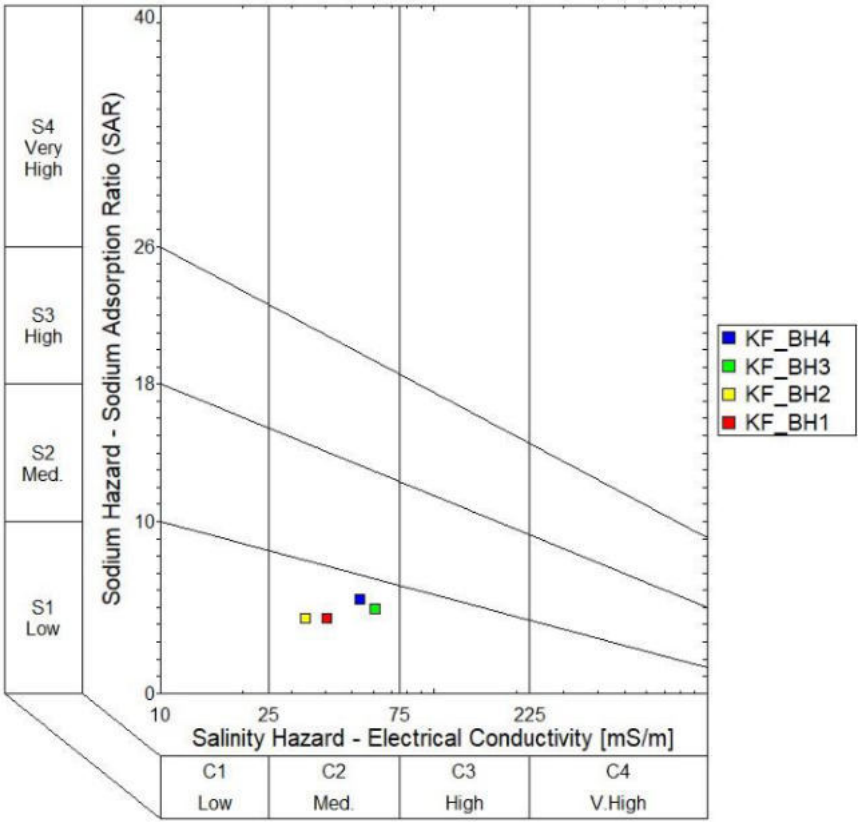


Figure 12*: SAR diagram of the groundwater samples.*

4 Aquifer Firm Yield Model

To evaluate the sustainable volume of groundwater that can be abstracted from the aquifer for the property, the Aquifer Firm Yield Model (AFYM) was utilised (WRC, 2012). The model uses a single-cell "Box Model" approach and makes use of a critical management water level, below which aquifer storage levels cannot be drawn down, to provide estimates of aquifer firm and assured yields.

The "Box Model" approach is schematically presented in **Figure 13.**

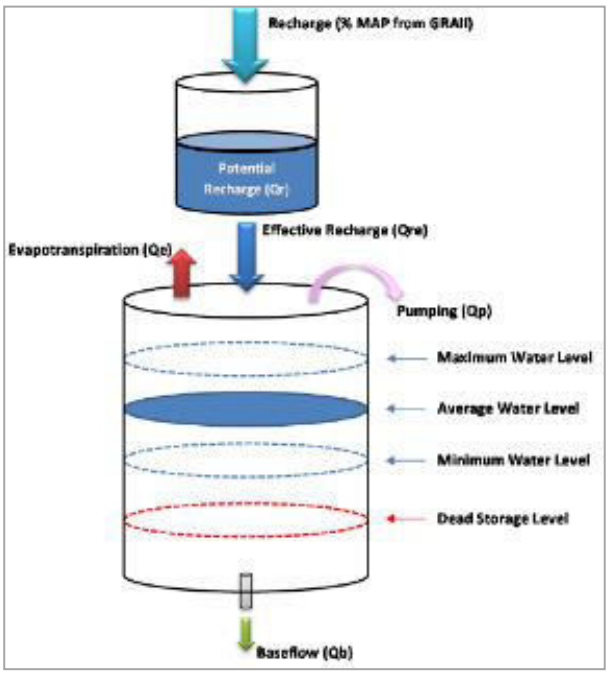


Figure 13: Aquifer Firm Yield lumped box model (WRC, 2012).

An evaluation was completed using the Aquifer Firm Yield model (WRC, 2012). The Input parameters used for the catchment are the default values presented in WRC (2012). These are taken from datasets like WR2005 (e.g., rainfall data) (Middleton and Bailey, 2008) and GRAII (e.g. specific yield and recharge (%MAP)) (DWAF, 2005), and others generated during the WRC (2012) (e.g. recharge threshold and riparian zone (% catchment area)). Although the boreholes are situated in catchment H40E, recharge to the aquifer is likely to extend to catchment H40D. The parameters for quaternary catchments H40D (181.76 km^2) and H40E (285.43 km^2), are presented in **Table 8.**

Table 8: Hydrogeological Parameters for Quaternary catchment H40D and H40E (WRC, 2012).

Parameter	H40D	H40E
Groundwater Level (mbgl)	17.2	13.5
Max Drawdown (m)	5	5
Specific Yield	0.002091	0.002091
Firm Yield (L/s)	75.2	53.3
Firm Yield (L/s/km^2)	0.4136	138.5
Recharge %	3.6	0.4853
Recharge Threshold (mm)	23	22
MAP (mm)	556.7	539.1
Hydrological MAR (mm)	136.3	126.3
Hydrological MAE (mm)	1500	1545
Baseflow: Default (Mm^3/a)	20.15	0
ET Model	Linear	Linear
ET Extinction Depth (m)	4	4
Riparian Zone (%)	3.6	2.6

The Aquifer Firm Yield Model was run for both catchments. For catchment H40D, the Aquifer Firm Yield was determined to be 2 373 131.52 m^3/a (75.20 L/s) with a recharge of 3 642 628.40 m^3/a (**Table 9**). For catchment H40E, the Aquifer Firm Yield was determined to be 4 370 727.60 m^3/a (138.50 L/s) with a recharge of 6 616 522.60 m^3/a (**Table 9**).

Table 9: Results of the Aquifer Firm Yield Model for Quaternary Catchments H40D and H40E.

Name	Q (L/s)	Q (m^3/month)	Q (m^3/a)
H40D	75.20	194 918.40	2 373 131.52
H40E	138.50	358 992.00	4 370 727.60

For this study area there are geological features that enable the definition of a more localised aquifer (i.e., a groundwater resource unit (GRU)).The Kleinfontein farm is located on the South Eastern limb of a North East – South West trending synform hosted in the Cape Supergroup. All the boreholes are drilled intersecting the fractured rock aquifer of the Table Mountain Group. The southern boundary of the GRU was delineated based on the quaternary catchment boundary and the Skurweberg-Goudini contact. The northern boundary of the GRU was delineated based on the Gydo-Gamka contact with the western and southern boundaries delineated as per the topographical lay of the area. The area is highly faulted, with major faults in both NE-SW and NW-SE orientations, creating groundwater flow paths. The GRU has been delineated and is displayed in **Map 3,** and **Figure 14** depicts a schematic cross-section of the geology and the groundwater flow.

On assessment of the geological map, the GRU has an extent of approximately 9.78 km^2, predominantly within catchment H40D and catchment H40E (H40D = 7.85 km^2 + H40E = 1.93 km^2). Using the GRAII recharge values, the combined direct vertical recharge (minimum recharge volume) is calculated to be 202 063.33 m^3/a (H40D = 157 323.42 m^3/a + H40E = 44 739.91 m^3/a). The firm yield of the GRU is calculated to be 132 048.60 m^3/a (H40D = 102 494.4 m^3/a + H40E = 29 554.20 m^3/a), which is estimated to be approximately 65% of groundwater recharge within the GRU.

It is important to note that a conservative approach was used to calculate the recharge and firm yield volumes and that the actual volumes are believed to be higher than the calculated volumes.

The current volume of groundwater abstracted within the GRU, based on the registered WARMS boreholes (database last updated in May 2023), is 45 798.00 m^3/a (**Figure 14**). Note that only registered and active sites were taken into account. Based on these volumes, a volume of 86 250.00 m^3/a is available for abstraction in the GRU. The additional volume of **70 000** m^3/a for which a licence is being applied, is less than the volume of 86 250.00 m^3/a available within the firm yield of the GRU. Because the firm yield of the GRU is in excess of the predicted water demand of the property, the proposed abstraction volume is considered to be within the sustainable supply volume of the local aquifer The proposed additional abstraction is not likely to impact on the regional groundwater flow, however site-specific long-term monitoring is required to ensure the sustainability of the abstraction.

GRU (9.78 km^2)	Total recharge = 202 063.33 m^3/a Total firm yield = 132 048.60 m^3/a Authorised existing abstraction (from WARMS 2023) = 45 798.00 m^3/a Available groundwater = 86 250.60 m^3/a Requested additional groundwater use = **70 000.00** m^3/a Is there sufficient groundwater for the proposed demand? **YES**

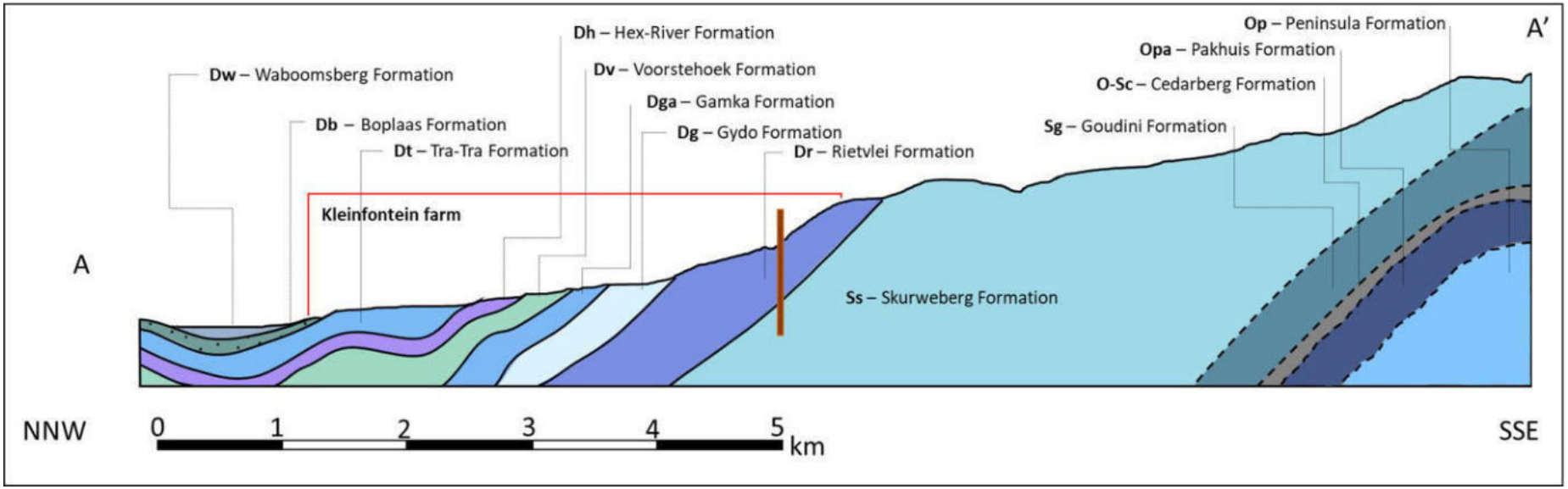
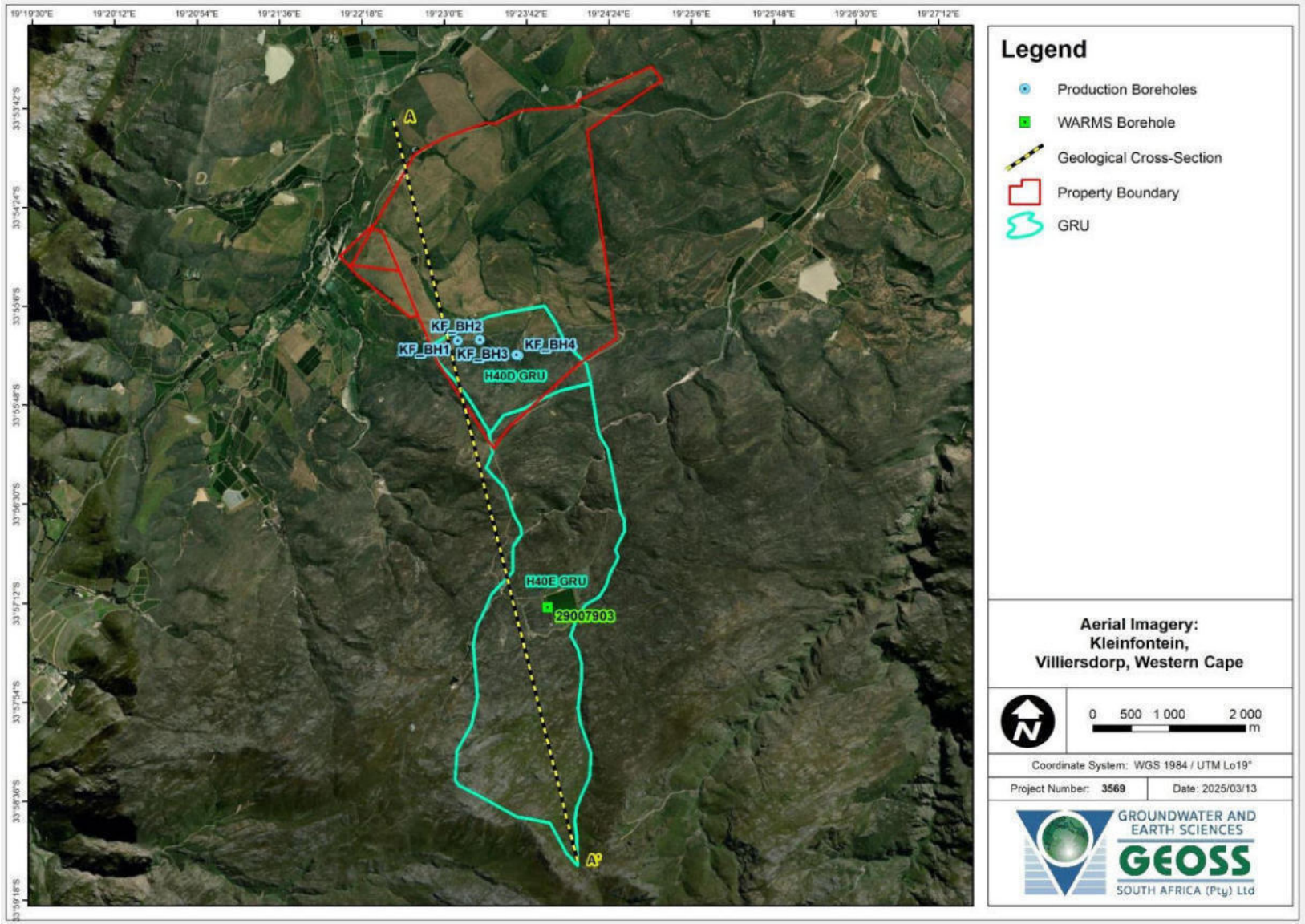


Figure 14: A schematic and conceptual east-west geological cross section.



Map 3: GRU, property boundaries and WARMS boreholes superimposed on a satellite image.

5 Recommendations

Based on the information obtained from the yield test, the abstraction recommendations for the boreholes are presented in **Table 10.** The yield testing was conducted with a Step Test, Constant Discharge Test and Recovery Test and while this data can be analysed to estimate sustainable yields, additional drilling in the area may result in long term cumulative impacts. Optimisation of the resource is also likely through making small changes to the abstraction rates, should the dynamic water level's drawdown be less or more than expected as per **Table 10.** Both of these points are best managed through long term monitoring data.

Table 10: Borehole Abstraction Recommendations.

Borehole Details				
Borehole Name	**Latitude (DD)**	**Longitude (DD)**	**Borehole Depth (m)**	**Inner Diameter (mm)**
KF_BH1	-33.922230°	19.385410°	96.94	150
KF_BH2	-33.922080°	19.388520°	163.00	210
KF_BH3	-33.923882°	19.393724°	206.00	210
KF_BH4	-33.923930°	19.394008°	90.30	210
Abstraction Recommendations				
Borehole Name	Abstraction rate (L/s)	Abstraction Duration (hrs)	Recovery Duration (hrs)	Possible Volume Abstracted (L/d)
KF_BH1	3.7	24	0	319 680
KF_BH2	1.2	24	0	103 680
KF_BH3	*Low yield - testing stopped*			-
KF_BH4	*Low yield - testing stopped*			-
			Total	**423 360**
Pump Installation Details				
Borehole Name	Pump Installation Depth (mbgl)	Critical Water Level (mbgl)	Dynamic Water Level (mbgl)*	Rest Water Level (mbgl)
KF_BH1	55.00	47.33	34.00	22.97
KF_BH2	115.00	110.80	77.00	5.31

* Typical water level expected during long-term production

For borehole KF_BH1 it is recommended that continuous abstraction can occur at a rate of up to 3.7 L/s. A pump suitable to deliver the recommended rate should be installed at a depth of 55.00 mbgl. It is anticipated that abstraction at the recommended rate will cause the water level to drop to a depth of approximately 34.00 mbgl – this is referred to as the dynamic water level. During abstraction, a maximum level cut off switch should be installed to 47.33 mbgl to ensure the groundwater level does not drop to the pump inlet.

For borehole KF_BH2 it is recommended that continuous abstraction can occur at a rate of up to 1.2 L/s. A pump suitable to deliver the recommended rate should be installed at a depth of 115.00 mbgl. It is anticipated that abstraction at the recommended rate will cause the water level to drop to a depth of approximately 77.00 mbgl (dynamic water level). During abstraction, a maximum level cut off switch should be installed to 110.80 mbgl to ensure the groundwater level does not drop to the pump inlet.

For both boreholes KF_BH3 and KF_BH4, yields are considered insufficient for use.

Laboratory results show that groundwater from the boreholes does not meet potable water quality standards due to elevated levels of several parameters, including high iron in all four boreholes and manganese in all except KF_BH1. Turbidity levels are significantly high (4.01–1 536 NTU), likely linked to iron and manganese, increasing the risk of biofouling and clogging of infrastructure. While pH and electrical conductivity are generally acceptable, KF_BH1 has a low pH (4.1), and KF_BH3 shows elevated fluoride (9.15 mg/L) exceeding the chronic health limits. Low levels of arsenic (0.015 mg/L) and lead (0.010 mg/L) were detected in KF_BH3 and KF_BH2, respectively, posing chronic health risks per SANS 241-1:2015. Ongoing monitoring of arsenic and lead is recommended. The groundwater is unsuitable for potable use without treatment but remains viable for irrigation if turbidity and iron concentrations are managed.

To address the potential for iron to clog the borehole and abstraction infrastructure, it is recommended to maintain a constant and continuous pumping schedule as much as possible. Thus, should a daily volume of less than 319 680 L/d for KF_BH1 and 103 680 L/d for KF_BH2 be required, it is recommended to decrease the pumping rate and not the pumping duration. By pumping continuously instead of a stop-start schedule, iron oxidation in the borehole is minimised, decreasing the amount of iron precipitation inside the boreholes and pumps.

Through long term water level monitoring data, the abstraction volumes can be optimised by adjusting the abstraction rate if required. It is recommended that the boreholes are equipped with a variable frequency drive. This enables adjustments to the flow rate to be made if required, as determined by the hydrogeological analysis of water level and flow rate monitoring data.

The proposed groundwater consumption from the boreholes is 70 000 m^3/annum. With regards to the regional groundwater availability within the local aquifer, a more localised aquifer (i.e., a groundwater resource unit (GRU)) was defined. The GRU encompassed an area of 9.78 km^2. Using the GRAII recharge values, the combined direct vertical recharge was calculated to be 202 063.33 m^3/a, with a firm yield of 132 048.60 m^3/a. The current volume of groundwater abstracted within the GRU, based on the registered WARMS boreholes (database last updated in May 2023), is 45 798.00 m^3/a. Based on these volumes, a volume of 86 250.60 m^3/a is available within the GRU.

As the proposed application volume is within the sustainable yield of the borehole and can be supported by the Firm Yield calculated for that GRU, the abstraction of the total volume of 70 000 m^3/a can be considered within the local aquifer`s capacity and sustainable. The proposed additional abstraction is not likely to impact on the regional groundwater flow, however site-specific long-term monitoring is required to ensure the sustainability of the abstraction.

As of January 2018 the Department of Water and Sanitation released a Government Gazette stating that: "All water use sector groups and individuals taking water from any water resource (surface or groundwater) regardless of the authorisation type, in the Berg, Olifants and Breede Gouritz Water Management Area, shall install electronic water recording, monitoring or measuring devices to enable monitoring of abstractions, storage and use of water by existing lawful users and establish links with any monitoring or management system as well as keep records of the water used."

Therefore, to facilitate monitoring and informed management of the boreholes, it is highly recommended that the boreholes be equipped with the following monitoring infrastructure and equipment (diagram included in **Appendix D**):

- Installation of a 32 mm (inner diameter, class 10) observation pipe from the pump depth to the surface, closed at the bottom and slotted for the bottom 5 – 10 m.
- Installation of an electronic water level logger (for automated water level monitoring).
- Installation of a sampling tap (to monitor water quality).
- Installation of a flow volume meter (to monitor abstraction rates and volumes).

This report is an important document for obtaining legal authorisation with the Department of Water and Sanitation with regard to the use of the groundwater. However, it does not serve as a Geohydrological Assessment Report in support of a Water Use Licence Application. Such a report would need to incorporate and expand upon the information provided here. GEOSS SA cannot guarantee that there is sufficient water in the aquifer to support the intended usage, or that the Department of Water and Sanitation will authorise the desired abstraction from this aquifer.

6 References

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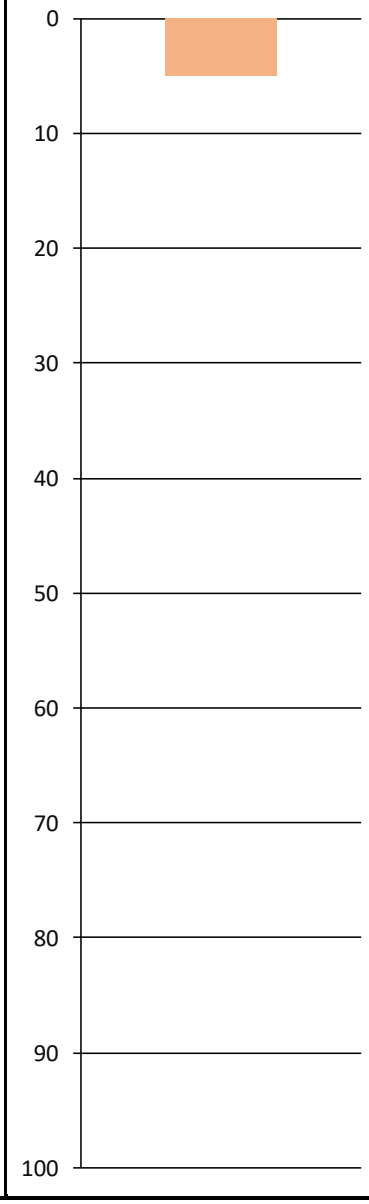
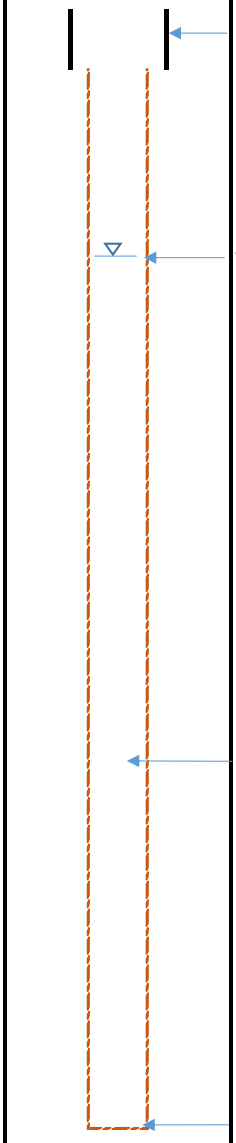
7 Appendix A: Estimated Borehole Logs

Log of Borehole No.: KF_BH1

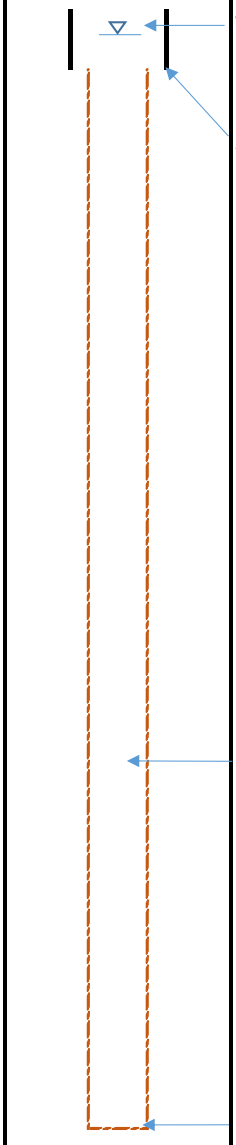
Location:	Villiersdorp	**Latitude:**	-33.92223
Date:	19/02/2025	**Longitude:**	19.38541
Client:	EFRC	**Ground Elevation:**	372 mamsl

Lithological Description	Lithology Symbol & Depth (m)	Borehole Construction	Description & water strike
Expected: Overburden **Unknow Geology** Expected: Gydo Fm. Black to dark-grey shale, siltstone and thin sandstone Expected: Rietvlei Fm. Light-grey feldspathic sandstone and micaceous shale bands			150 mm (ID) Steel casing (to unknown depth) Water level (22.97 mbgl) Open hole EOH (96.94 mbgl)

Drilled By:	Unknown	**Remarks:**	None of the estimated information included here is collected from the drilling records, but comes from the published 1:250 000 Geological Map of the area and measurements made during testing.
Drill Method:	Unknown		
Logged By:	Not logged, estimated from available data		

Log of Borehole No.: KF_BH2

Location:	Villiersdorp	**Latitude:**	-33.92208
Date:	19/02/2025	**Longitude:**	19.38852
Client:	EFRC	**Ground Elevation:**	379 mamsl

Lithological Description	Lithology Symbol & Depth (m)	Borehole Construction	Description & water strike
Expected: Overburden **Unknow Geology** Expected: Rietvlei Fm. Light-grey feldspathic sandstone and micaceous shale bands	0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150 160 170		Water level (5.31 mbgl) 210 mm (ID) Steel casing (to unknown depth) Open hole EOH (163 mbgl)

Drilled By:	Unknown	**Remarks:**	None of the estimated information included here is collected from the drilling records, but comes from the published 1:250 000 Geological Map of the area and measurements made during testing.
Drill Method:	Unknown		
Logged By:	Not logged, estimated from available data		

Log of Borehole No.: KF_BH3

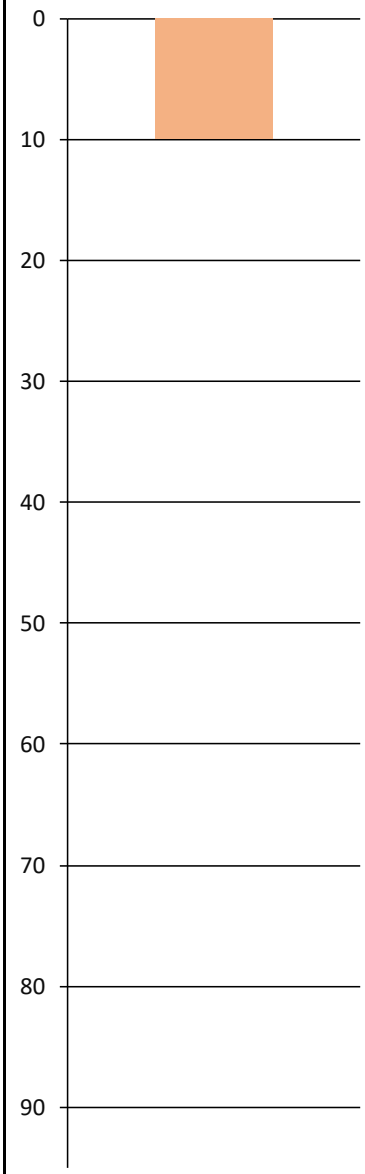
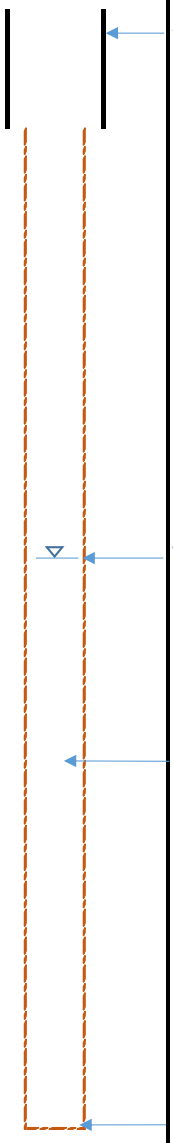
Location:	Villiersdorp	**Latitude:**	-33.923882
Date:	19/02/2025	**Longitude:**	19.393724
Client:	EFRC	**Ground Elevation:**	415 mamsl

Lithological Description	Lithology Symbol & Depth (m)	Borehole Construction	Description & water strike
Expected: Overburden **Unknow Geology** Expected: Rietvlei Fm. Light-grey feldspathic sandstone and micaceous shale bands	0, 10, 20, 30, 40, 50, 60, 70, 80, 90, 100, 110, 120, 130, 140, 150, 160, 170, 180, 190, 200, 210	210 mm (ID) Steel casing (to unknown depth) Water level (48.62 mbgl) Open hole EOH (206 mbgl)	

Drilled By:	Unknown	**Remarks:**	None of the estimated information included here is collected from the drilling records, but comes from the published 1:250 000 Geological Map of the area and measurements made during testing.
Drill Method:	Unknown		
Logged By:	Not logged, estimated from available data		

Log of Borehole No.: KF_BH4

Location:	Villiersdorp	**Latitude:**	-33.92393
Date:	19/02/2025	**Longitude:**	19.394008
Client:	EFRC	**Ground Elevation:**	413 mamsl

Lithological Description	Lithology Symbol & Depth (m)	Borehole Construction	Description & water strike
Expected: Overburden **Unknow Geology** Expected: Rietvlei Fm. Light-grey feldspathic sandstone and micaceous shale bands			210 mm (ID) Steel casing (to unknown depth) Water level (45.14 mbgl) Open hole EOH (90.3 mbgl)

Drilled By:	Unknown	**Remarks:**	None of the estimated information included here is collected from the drilling records, but comes from the published 1:250 000 Geological Map of the area and measurements made during testing.
Drill Method:	Unknown		
Logged By:	Not logged, estimated from available data		

8 Appendix B:Yield Test Data

Abbreviations	
EC	Electrical conductivity
mbgl	Meters below ground level
mbch	Meters below casing height
mbdl	Meters below datum level
magl	Meters above ground level
L/S	Litres per second
RPM	Rates per minute
SWL	Static water level
µS/cm	Microsiemens per centimeter

BOREHOLE TEST RECORD

PR0JECT #	P3056
TEAM MEMBERS	

CONSULTANT: GEOSS
DISTRICT: BREEDE VALLEY
PROVINCE: WESTERN CAPE
FARM / VILLAGE NAME : ELGIN VILLIERSDORP
DATE TESTED: 28-01-2025

BOREHOLE LOCATION & ACCESS INFORMATION:

BOREHOLE COORDINATES		COMMENTS ON ACCESS IF ANY:
LATITUDE (SOUTH):	S33.92223	
LONGITUDE (EAST):	E19.38541	

BOREHOLE NO:	BH01
TRANSMISSIVITY VALUE:	
TYPE INSTALLATION:	SUBMERSIBLE PUMP
BOREHOLE DEPTH: (mbg	96.94

MAINTENANCE RECORD:		REHABILITATION RECORD:		DIGITAL CAMERA LOGGING:		EQUIPMENT FISHING RECORD	
Labour hours:		Jetting hours:		Camera logged once:		Hours spent:	
Cost of material:		Brushing hours:		Camera logged twice:			
Travelling (km):		Airlifting hours:		Camera logged three times:		OTHER COSTS ON PROJECT:	
		Sulphamic Acid KG's		Camera work sent to client:		Courier of samples:	
		Boresaver KG's				Km's for delivery:	
		Soda Ash KG's				Cost of packaging:	

COMMENTS:	RECOMMENDATIONS / CORRECTIVE ACTIONS:

SAMPLE INSTRUCTIONS :

Water sample taken	Yes	No	If consultant took sample, give name:		DATA CAPTURED BY	AH
Date sample taken	29-01-2025		If sample courier, to where:		DATA CHECKED BY:	AH
Time sample taken	14H40					

DESCRIPTION:	UNIT	QTY		UNIT	QTY
STRAIGHTNESS TEST:	NO	0	BOREHOLE DEPTH AFTER TEST:	M	96.90
VERTICALLY TEST:	NO	0	BOREHOLE WATER LEVEL AFTER TEST: (mbch)	M	24.35
CASING DETECTION:	NO	1	SAND/GRAVEL/SILT PUMPED?	YES/NO	0
SUPPLIED NEW STEEL BOREHOLE COVER:	NO	0	DATA REPORTING AND RECORDING	NO	1
BOREHOLE MARKING	NO	0	SLUG TEST:	NO	0
SITE CLEANING & FINISHING	NO	1	LAYFLAT (M):	M	100
LOGGERS FOR WATERLEVEL MONITORING	NO	0	LOGGERS FOR pH AND EC:	NO	0

It is hereby acknowledged that upon leaving the site, all existing equipment is in an acceptable condition.

NAME: _____ **SIGNATURE:** _____

DESIGNATION: _____ **DATE:** _____

FORM 5 E

STEPPED DISCHARGE TEST & RECOVERY

BOREHOLE TEST RECORD SHEET

PROJ NO :	P3056	Coordinates:	SOUTH: S33.92223	PROVINCE:	WESTERN CAPE
BOREHOLE NO:	BH01		EAST: E19.38541	DISTRICT:	BREEDE VALLEY
ALT BH NO:	0			SITE NAME:	ELGIN VILLIERSDORP
ALT BH NO:	0				
BOREHOLE DEPTH (m)	96.94	DATUM LEVEL ABOVE CASING (m):	0.64	EXISTING PUMP:	SUBMERSIBLE
WATER LEVEL (mbdl):	23.61	CASING HEIGHT: (magl):	0.00	CONTRACTOR:	ATS
DEPTH OF PUMP (m):	90-50	DIAM PUMP INLET (mm):	150.00	PUMP TYPE:	WA30-2

STEPPED DISCHARGE TEST & RECOVERY

DISCHARGE RATE 1			RPM 408		DISCHARGE RATE 2			RPM 610		DISCHARGE RATE 3			RPM 1110	
DATE: 28-01-2025		TIME: 07H00			DATE: 28-01-202		TIME: 08H00			DATE: 28-01-202		TIME: 09H00		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1	0.15		**1**		**1**	1.52		**1**		**1**	3.62		**1**	4.86
2	0.16		**2**		**2**	1.82	1.97	**2**		**2**	4.05		**2**	3.02
3	0.17		**3**		**3**	2.04	2.54	**3**		**3**	4.80	5.13	**3**	2.55
5	0.20	0.87	**5**		**5**	2.19		**5**		**5**	5.03	5.13	**5**	1.61
7	0.23	1.01	**7**		**7**	2.23	2.55	**7**		**7**	5.22		**7**	1.54
10	0.69		**10**		**10**	2.30		**10**		**10**	5.38	5.11	**10**	1.38
15	0.77	1.03	**15**		**15**	2.37	2.53	**15**		**15**	5.57		**15**	1.19
20	0.82		**20**		**20**	2.42		**20**		**20**	5.69	5.12	**20**	1.07
30	0.87	1.02	**30**		**30**	2.48	2.54	**30**		**30**	5.83		**30**	0.92
40	0.92		**40**		**40**	2.55		**40**		**40**	5.97	5.10	**40**	0.80
50	0.94	1.01	**50**		**50**	2.59	2.55	**50**		**50**	6.07		**50**	0.73
60	0.97		**60**		**60**	2.63		**60**		**60**	6.13	5.13	**60**	0.69
70			**70**		**70**			**70**		**70**			**70**	0.64
80			**80**		**80**			**80**		**80**			**80**	0.59
90			**90**		**90**			**90**		**90**			**90**	0.57
100			**100**		**100**			**100**		**100**			**100**	0.54
110			**110**		**110**			**110**		**110**			**110**	0.51
120			**120**		**120**			**120**		**120**			**120**	0.48
pH			**150**		**pH**			**150**		**pH**			**150**	0.41
TEMP	11.90	°C	**180**		**TEMP**	11.40	°C	**180**		**TEMP**	11.70	°C	**180**	0.37
EC	1023	µS/cm	**210**		**EC**	534	µS/cm	**210**		**EC**	525	µS/cm	**210**	

DISCHARGE RATE 4			RPM		DISCHARGE RATE 5			RPM		DISCHARGE RATE 6			RPM	
DATE:		TIME:			DATE:		TIME:			DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1			**1**		**1**			**1**		**1**			**1**	
2			**2**		**2**			**2**		**2**			**2**	
3			**3**		**3**			**3**		**3**			**3**	
5			**5**		**5**			**5**		**5**			**5**	
7			**7**		**7**			**7**		**7**			**7**	
10			**10**		**10**			**10**		**10**			**10**	
15			**15**		**15**			**15**		**15**			**15**	
20			**20**		**20**			**20**		**20**			**20**	
30			**30**		**30**			**30**		**30**			**30**	
40			**40**		**40**			**40**		**40**			**40**	
50			**50**		**50**			**50**		**50**			**50**	
60			**60**		**60**			**60**		**60**			**60**	
70			**70**		**70**			**70**		**70**			**70**	
80			**80**		**80**			**80**		**80**			**80**	
90			**90**		**90**			**90**		**90**			**90**	
100			**100**		**100**			**100**		**100**			**100**	
110			**110**		**110**			**110**		**110**			**110**	
120			**120**		**120**			**120**		**120**			**120**	
pH			**150**		**pH**			**150**		**pH**			**150**	
TEMP		°C	**180**		**TEMP**		°C	**180**		**TEMP**		°C	**180**	
EC		µS/cm	**210**		**EC**		µS/cm	**210**		**EC**		µS/cm	**210**	
			240					**240**					**240**	
			300					**300**					**300**	
			360					**360**					**360**	

S/W/L:(mbch) 22.97

FORM 5 F

CONSTANT DISCHARGE TEST & RECOVERY

BOREHOLE TEST RECORD SHEET

PROJ NO :	P3056	Coordinates: SOUTH:	S33.92223	PROVINCE:	WESTERN CAPE
BOREHOLE NO:	BH01	EAST:	E19.38541	DISTRICT:	BREEDE VALLEY
ALT BH NO:	0			SITE NAME:	ELGIN VILLIERSDORP
ALT BH NO:	0				
BOREHOLE DEPTH:	96.94	DATUM LEVEL ABOVE CASING (m):	0.64	EXISTING PUMP:	SUBMERSIBLE
WATER LEVEL (mbdl):	23.87	CASING HEIGHT: (magl):	0.00	CONTRACTOR:	ATS
DEPTH OF PUMP (m):	90-50	DIAM PUMP INLET(mm):	150	PUMP TYPE:	WA30-2

CONSTANT DISCHARGE TEST & RECOVERY

TEST STARTED				**TEST COMPLETED**					
DATE:	28-01-2025	TIME:	15H00	DATE:		TIME:		TYPE OF PUMP:	WA30-2

					OBSERVATION HOLE 1			OBSERVATION HOLE 2			OBSERVATION HOLE 3	
					NR: **BH02**			NR:			NR:	
DISCHARGE BOREHOLE					Distance(m);		290	Distance(m);			Distance(m);	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME:	Drawdown	Recovery	TIME:	Drawdown	Recovery	TIME:	Drawdown
(MIN)	DOWN (M)	(L/S)	MIN	(M)	(min)	m	(m)	(min)	(m)		(min)	(m)
1	1.61		**1**	6.66	**1**			**1**			**1**	
2	2.32		**2**	5.50	**2**			**2**			**2**	
3	2.97	4.77	**3**	4.48	**3**			**3**			**3**	
5	3.32	5.14	**5**	4.34	**5**			**5**			**5**	
7	4.20		**7**	4.17	**7**			**7**			**7**	
10	4.47	5.15	**10**	4.03	**10**			**10**			**10**	
15	5.01		**15**	3.82	**15**			**15**			**15**	
20	5.24	5.13	**20**	3.70	**20**			**20**			**20**	
30	5.50		**30**	3.50	**30**	0.00		**30**			**30**	
40	5.69	5.12	**40**	3.35	**40**			**40**			**40**	
60	5.91		**60**	3.13	**60**	0.00		**60**			**60**	
90	6.14	5.10	**90**	2.90	**90**	0.00		**90**			**90**	
120	6.45		**120**	2.73	**120**	0.00		**120**			**120**	
150	6.63	5.15	**150**	2.60	**150**	0.00		**150**			**150**	
180	6.74		**180**	2.50	**180**	0.00		**180**			**180**	
210	6.88	5.13	**210**	2.41	**210**	0.00		**210**			**210**	
240	6.98		**240**	2.33	**240**	0.00		**240**			**240**	
300	7.18	5.14	**300**	2.21	**300**	0.00		**300**			**300**	
360	7.34		**360**	2.12	**360**	0.00		**360**			**360**	
420	7.47	5.12	**420**	2.06	**420**	0.00		**420**			**420**	
480	7.62		**480**	2.01	**480**	0.00		**480**			**480**	
540	7.70	5.13	**540**	1.96	**540**	0.00		**540**			**540**	
600	7.74		**600**	1.90	**600**	0.00		**600**			**600**	
720	7.87	5.15	**720**	1.82	**720**	0.00		**720**			**720**	
840	7.98		**840**	1.73	**840**	0.00		**840**			**840**	
960	8.14	5.14	**960**	1.67	**960**	0.00		**960**			**960**	
1080	8.25		**1080**	1.63	**1080**	0.00		**1080**			**1080**	
1200	8.37	5.11	**1200**	1.59	**1200**	0.00		**1200**			**1200**	
1320	8.55		**1320**	1.55	**1320**	0.00		**1320**			**1320**	
1440	8.67	5.12	**1440**	1.50	**1440**	0.00		**1440**			**1440**	
1560			**1560**		**1560**			**1560**			**1560**	
1680			**1680**		**1680**			**1680**			**1680**	
1800			**1800**		**1800**			**1800**			**1800**	
1920			**1920**		**1920**			**1920**			**1920**	
2040			**2040**		**2040**			**2040**			**2040**	
2160			**2160**		**2160**			**2160**			**2160**	
2280			**2280**		**2280**			**2280**			**2280**	
2400			**2400**		**2400**			**2400**			**2400**	
2520			**2520**		**2520**			**2520**			**2520**	
2640			**2640**		**2640**			**2640**			**2640**	
2760			**2760**		**2760**			**2760**			**2760**	
2880			**2880**		**2880**			**2880**			**2880**	
3000			**3000**		**3000**			**3000**			**3000**	
3120			**3120**		**3120**			**3120**			**3120**	
3240			**3240**		**3240**			**3240**			**3240**	
3360			**3360**		**3360**			**3360**			**3360**	
3480			**3480**		**3480**			**3480**			**3480**	
3600			**3600**		**3600**			**3600**			**3600**	
3720			**3720**		**3720**			**3720**			**3720**	
3840			**3840**		**3840**			**3840**			**3840**	
3960			**3960**		**3960**			**3960**			**3960**	
4080			**4080**		**4080**			**4080**			**4080**	
4200			**4200**		**4200**			**4200**			**4200**	
4320			**4320**		**4320**			**4320**			**4320**	
Total time pumped(min):				1440		**W/L**	**5.44**		**W/L**			**W/L**
Average yield (l/s):				5.12								

Abbreviations	
EC	Electrical conductivity
mbgl	Meters below ground level
mbch	Meters below casing height
mbdl	Meters below datum level
magl	Meters above ground level
L/S	Litres per second
RPM	Rates per minute
S/WL	Static water level
µS/cm	Microsiemens per centimeter

BOREHOLE TEST RECORD

CONSULTANT:	GEOSS
DISTRICT:	BREEDE VALLEY
PROVINCE:	WESTERN CAPE
FARM / VILLAGE NAME :	ELGIN VILLIERS DORP
DATE TESTED:	31/01/2025

PR0JECT #	P3056
TEAM MEMBERS	PIETER
	KOLEN
	LUKHANYO

BOREHOLE LOCATION & ACCESS INFORMATION:

BOREHOLE COORDINATES		**COMMENTS ON ACCESS IF ANY:**
LATITUDE (SOUTH):	33.92208	
LONGITUDE (EAST):	19.38852	

BOREHOLE NO:	**BH 2**
TRANSMISSIVITY VALUE:	
TYPE INSTALLATION:	**NEW**
BOREHOLE DEPTH: (mbg	**163**

MAINTENANCE RECORD:		**REHABILITATION RECORD:**		**DIGITAL CAMERA LOGGING:**		**EQUIPMENT FISHING RECORD**	
Labour hours:		**Jetting hours:**		**Camera logged once:**		**Hours spent:**	
Cost of material:		**Brushing hours:**		**Camera logged twice:**			
Travelling (km):		**Airlifting hours:**		**Camera logged three times:**		**OTHER COSTS ON PROJECT:**	
		Sulphamic Acid KG's		**Camera work sent to client:**		**Courier of samples:**	
		Boresaver KG's				**Km's for delivery:**	
		Soda Ash KG's				**Cost of packaging:**	

COMMENTS:	**RECOMMENDATIONS / CORRECTIVE ACTIONS:**
DID STEPS AT 121M, AS PER INSTRUCTION WE NEED TO LOWER THE PUMP TO 150M.RODS STRIPPED AT 150MIN INTO THE CDT. RE-INSTALLED A SMALL PUMP AND RE-STARTED THE CDT	

SAMPLE INSTRUCTIONS :

Water sample taken	**Yes**	No	If consultant took sample, give name:		**DATA CAPTURED BY**	EC
Date sample taken	04/02/2025		If sample courier, to where:		**DATA CHECKED BY:**	AH
Time sample taken	06H30					

DESCRIPTION:	**UNIT**	**QTY**		**UNIT**	**QTY**
STRAIGHTNESS TEST:	**NO**	0	BOREHOLE DEPTH AFTER TEST:	**M**	163.00
VERTICALLY TEST:	**NO**	0	BOREHOLE WATER LEVEL AFTER TEST: (mbch)	**M**	21.71
CASING DETECTION:	**NO**	1	SAND/GRAVEL/SILT PUMPED?	**YES/NO**	**0**
SUPPLIED NEW STEEL BOREHOLE COVER:	**NO**	0	DATA REPORTING AND RECORDING	**NO**	1
BOREHOLE MARKING	**NO**	0	SLUG TEST:	**NO**	0
SITE CLEANING & FINISHING	**NO**	1	LAYFLAT (M):	**M**	100
LOGGERS FOR WATERLEVEL MONITORING	**NO**	0	LOGGERS FOR pH AND EC:	**NO**	0

It is hereby acknowledged that upon leaving the site, all existing equipment is in an acceptable condition.

NAME: _____ **SIGNATURE:** _____

DESIGNATION: _____ **DATE:** _____

FORM 5 E

STEPPED DISCHARGE TEST & RECOVERY

BOREHOLE TEST RECORD SHEET

PROJ NO :	P3056	Coordinates:	SOUTH: 33.92208	PROVINCE:	WESTERN CAPE
BOREHOLE NO:	BH 2		EAST: 19.38852	DISTRICT:	BREEDE VALLEY
ALT BH NO:	0			SITE NAME:	ELGIN VILLIERS DORP
ALT BH NO:	0				

BOREHOLE DEPTH (m)	163.00	DATUM LEVEL ABOVE CASING (m):	0.80	EXISTING PUMP:	0
WATER LEVEL (mbdl):	6.24	CASING HEIGHT: (magl):	0.13	CONTRACTOR:	ATS
DEPTH OF PUMP (m):	121.50	DIAM PUMP INLET (mm):	210.00	PUMP TYPE:	WA 50-2

STEPPED DISCHARGE TEST & RECOVERY

DISCHARGE RATE 1			RPM 121		DISCHARGE RATE 2			RPM 229		DISCHARGE RATE 3			RPM 314	
DATE:	31/01/2025	TIME:	12H10		DATE:	31/01/2025	TIME:	13H00		DATE:	31/01/2025	TIME:	14H10	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1	1.25		**1**		**1**	46.95		**1**		**1**	78.10		**1**	
2	2.67		**2**		**2**	48.15	1.27	**2**		**2**	79.34	1.62	**2**	
3	4.71	0.68	**3**		**3**	49.50	1.44	**3**		**3**	80.54	1.84	**3**	
5	7.33		**5**		**5**	53.98		**5**		**5**	81.95		**5**	
7	9.65	1.05	**7**		**7**	54.04	1.42	**7**		**7**	82.70	1.81	**7**	
10	12.21		**10**		**10**	57.52		**10**		**10**	84.29		**10**	
15	14.05	1.03	**15**		**15**	61.38	1.41	**15**		**15**	86.38	1.82	**15**	
20	18.40		**20**		**20**	65.60		**20**		**20**	89.59		**20**	
30	27.69	1.04	**30**		**30**	71.78	1.43	**30**		**30**	93.73	1.84	**30**	
40	33.50		**40**		**40**	75.58		**40**		**40**	95.47		**40**	
50	42.62	1.02	**50**		**50**	77.26	1.45	**50**		**50**	96.15	1.81	**50**	
60	46.75		**60**		**60**	77.88		**60**		**60**	96.45		**60**	
70			**70**		**70**			**70**		**70**			**70**	
80			**80**		**80**			**80**		**80**			**80**	
90			**90**		**90**			**90**		**90**			**90**	
100			**100**		**100**			**100**		**100**			**100**	
110			**110**		**110**			**110**		**110**			**110**	
120			**120**		**120**			**120**		**120**			**120**	
pH			**150**		**pH**			**150**		**pH**			**150**	
TEMP	16.10	°C	**180**		**TEMP**	16.10	°C	**180**		**TEMP**	16.10	°C	**180**	
EC	274	µS/cm	**210**		**EC**	309	µS/cm	**210**		**EC**	336	µS/cm	**210**	

DISCHARGE RATE 4			RPM 387		DISCHARGE RATE 5			RPM		DISCHARGE RATE 6			RPM	
DATE:	31/01/2025	TIME:	15H10		DATE:		TIME:			DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1	97.49		**1**	110.25	**1**			**1**		**1**			**1**	
2	98.98	1.98	**2**	98.95	**2**			**2**		**2**			**2**	
3	100.63	2.42	**3**	94.87	**3**			**3**		**3**			**3**	
5	103.06		**5**	89.63	**5**			**5**		**5**			**5**	
7	105.38	2.41	**7**	83.83	**7**			**7**		**7**			**7**	
10	108.64		**10**	76.65	**10**			**10**		**10**			**10**	
15	113.32		**15**	65.36	**15**			**15**		**15**			**15**	
	113.32	1.68	**20**	55.15	**20**			**20**		**20**			**20**	
	113.32	1.62	**30**	38.87	**30**			**30**		**30**			**30**	
	113.32	1.60	**40**	28.08	**40**			**40**		**40**			**40**	
			50	23.01	**50**			**50**		**50**			**50**	
			60	19.39	**60**			**60**		**60**			**60**	
			70	17.97	**70**			**70**		**70**			**70**	
			80	17.27	**80**			**80**		**80**			**80**	
			90	16.90	**90**			**90**		**90**			**90**	
			100	16.65	**100**			**100**		**100**			**100**	
			110	16.48	**110**			**110**		**110**			**110**	
			120	16.17	**120**			**120**		**120**			**120**	
pH			**150**	15.97	**pH**			**150**		**pH**			**150**	
TEMP		°C	**180**	15.59	**TEMP**		°C	**180**		**TEMP**		°C	**180**	
EC		µS/cm	**210**	15.18	**EC**		µS/cm	**210**		**EC**		µS/cm	**210**	
			240					**240**					**240**	
			300					**300**					**300**	
			360					**360**					**360**	

S/W/L:(mbch) 5.4

FORM 5 F

CONSTANT DISCHARGE TEST & RECOVERY

BOREHOLE TEST RECORD SHEET

PROJ NO :	P3056	Coordinates: SOUTH:	33.92208	PROVINCE:	WESTERN CAPE
BOREHOLE NO:	BH 2	EAST:	19.38852	DISTRICT:	BREEDE VALLEY
ALT BH NO:	0			SITE NAME:	ELGIN VILLIERS DORP
ALT BH NO:	0				
BOREHOLE DEPTH:	163.00	DATUM LEVEL ABOVE CASING (m):	0.80	EXISTING PUMP:	0
WATER LEVEL (mbdl):	20.70	CASING HEIGHT: (magl):	0.13	CONTRACTOR:	ATS
DEPTH OF PUMP (m):	151.50	DIAM PUMP INLET(mm):	210	PUMP TYPE:	WA 50-2

CONSTANT DISCHARGE TEST & RECOVERY

TEST STARTED				**TEST COMPLETED**					
DATE:	03/02/2025	TIME:	07H00	DATE:		TIME:		TYPE OF PUMP:	WA 50-2

					OBSERVATION HOLE 1			OBSERVATION HOLE 2			OBSERVATION HOLE 3	
					NR: **BH 1**			NR:			NR:	
DISCHARGE BOREHOLE					Distance(m);	270		Distance(m);			Distance(m);	
TIME	DRAW	YIELD	TIME	RECOVERY	TIME:	Drawdown	Recovery	TIME:	Drawdown	Recovery	TIME:	Drawdown
(MIN)	DOWN (M)	(L/S)	MIN	(M)	(min)	m	(m)	(min)	(m)		(min)	(m)
1	0.90		**1**	59.72	**1**			**1**			**1**	
2	0.92		**2**	55.02	**2**			**2**			**2**	
3	1.00		**3**	49.49	**3**			**3**			**3**	
5	2.05		**5**	47.00	**5**			**5**			**5**	
7	4.26	1.18	**7**	42.41	**7**			**7**			**7**	
10	7.61	1.31	**10**	38.67	**10**			**10**			**10**	
15	12.05	1.51	**15**	30.02	**15**			**15**			**15**	
20	14.52		**20**	23.02	**20**			**20**			**20**	
30	23.12	1.53	**30**	14.60	**30**	0.00		**30**			**30**	
40	29.85		**40**	10.65	**40**			**40**			**40**	
60	36.44	1.52	**60**	5.38	**60**	0.00		**60**			**60**	
90	42.09		**90**	4.39	**90**	0.00		**90**			**90**	
120	47.45	1.50	**120**	4.04	**120**	0.00		**120**			**120**	
150	49.55		**150**	3.93	**150**	0.00		**150**			**150**	
180	53.03	1.53	**180**	3.86	**180**	0.00		**180**			**180**	
210	57.30		**210**	3.80	**210**	0.00		**210**			**210**	
240	59.19	1.53	**240**	3.69	**240**	0.00		**240**			**240**	
300	61.09	1.50	**300**	3.60	**300**	0.00		**300**			**300**	
360	62.67		**360**	3.49	**360**	0.00		**360**			**360**	
420	65.57	1.53	**420**	3.45	**420**	0.00		**420**			**420**	
480	66.28		**480**	3.40	**480**	0.00		**480**			**480**	
540	66.79	1.50	**540**	3.34	**540**	0.00		**540**			**540**	
600	68.58		**600**	3.28	**600**	0.00		**600**			**600**	
720	69.70	1.51	**720**	3.15	**720**	0.00		**720**			**720**	
840	69.84	1.52	**840**	3.08	**840**	0.00		**840**			**840**	
960	69.86	1.53	**960**	2.98	**960**	0.00		**960**			**960**	
1080	69.90		**1080**	2.87	**1080**	0.00		**1080**			**1080**	
1200	69.95	1.50	**1200**	2.79	**1200**	0.00		**1200**			**1200**	
1320	70.01		**1320**	2.70	**1320**	0.00		**1320**			**1320**	
1440	70.07	1.52	**1440**	2.64	**1440**	0.00		**1440**			**1440**	
1560			**1560**		**1560**			**1560**			**1560**	
1680			**1680**		**1680**			**1680**			**1680**	
1800			**1800**		**1800**			**1800**			**1800**	
1920			**1920**		**1920**			**1920**			**1920**	
2040			**2040**		**2040**			**2040**			**2040**	
2160			**2160**		**2160**			**2160**			**2160**	
2280			**2280**		**2280**			**2280**			**2280**	
2400			**2400**		**2400**			**2400**			**2400**	
2520			**2520**		**2520**			**2520**			**2520**	
2640			**2640**		**2640**			**2640**			**2640**	
2760			**2760**		**2760**			**2760**			**2760**	
2880			**2880**		**2880**			**2880**			**2880**	
3000			**3000**		**3000**			**3000**			**3000**	
3120			**3120**		**3120**			**3120**			**3120**	
3240			**3240**		**3240**			**3240**			**3240**	
3360			**3360**		**3360**			**3360**			**3360**	
3480			**3480**		**3480**			**3480**			**3480**	
3600			**3600**		**3600**			**3600**			**3600**	
3720			**3720**		**3720**			**3720**			**3720**	
3840			**3840**		**3840**			**3840**			**3840**	
3960			**3960**		**3960**			**3960**			**3960**	
4080			**4080**		**4080**			**4080**			**4080**	
4200			**4200**		**4200**			**4200**			**4200**	
4320			**4320**		**4320**			**4320**			**4320**	
Total time pumped(min):				1440		**W/L**	**23.81**		**W/L**			**W/L**
Average yield (l/s):				1.50								

Abbreviations	
EC	Electrical conductivity
mbgl	Meters below ground level
mbch	Meters below casing height
mbdl	Meters below datum level
magl	Meters above ground level
L/S	Litres per second
RPM	Rates per minute
S/WL	Static water level
uS/cm	Microsiemens per centimeter

BOREHOLE TEST RECORD

CONSULTANT:	GEOSS
DISTRICT:	VILLIERSDORP
PROVINCE:	WESTERN CAPE
FARM / VILLAGE NAME :	ELGIN
DATE TESTED:	01-02-2025

PR0JECT #	P3056
TEAM MEMBERS	TAFARA
	LUTHANDO
	TSHIFIWA
	COLLEN

BOREHOLE LOCATION & ACCESS INFORMATION:

BOREHOLE COORDINATES		**COMMENTS ON ACCESS IF ANY:**
LATITUDE (SOUTH):	33.923914	
LONGITUDE (EAST):	19.89369	

BOREHOLE NO:	**BH 03**
TRANSMISSIVITY VALUE:	
TYPE INSTALLATION:	**OPEN BOREHOLE**
BOREHOLE DEPTH: (mbg	**206**

MAINTENANCE RECORD:		**REHABILITATION RECORD:**		**DIGITAL CAMERA LOGGING:**		**EQUIPMENT FISHING RECORD**	
Labour hours:		**Jetting hours:**		**Camera logged once:**		**Hours spent:**	
Cost of material:		**Brushing hours:**		**Camera logged twice:**			
Travelling (km):		**Airlifting hours:**		**Camera logged three times:**		**OTHER COSTS ON PROJECT:**	
		Sulphamic Acid KG's		**Camera work sent to client:**		**Courier of samples:**	
		Boresaver KG's				**Km's for delivery:**	
		Soda Ash KG's				**Cost of packaging:**	

COMMENTS:	**RECOMMENDATIONS / CORRECTIVE ACTIONS:**

SAMPLE INSTRUCTIONS :

Water sample taken	**Yes**	No	If consultant took sample, give name:		**DATA CAPTURED BY**	EC
Date sample taken	02/02/2025		If sample courier, to where:		**DATA CHECKED BY:**	AH
Time sample taken	08H20					

DESCRIPTION:	**UNIT**	**QTY**		**UNIT**	**QTY**
STRAIGHTNESS TEST:	**NO**	0	BOREHOLE DEPTH AFTER TEST:	**M**	206.15
VERTICALLY TEST:	**NO**	0	BOREHOLE WATER LEVEL AFTER TEST: (mbch)	**M**	55.62
CASING DETECTION:	**NO**	6.1	SAND/GRAVEL/SILT PUMPED?	**YES/NO**	**0**
SUPPLIED NEW STEEL BOREHOLE COVER:	**NO**	0	DATA REPORTING AND RECORDING	**NO**	1
BOREHOLE MARKING	**NO**	0	SLUG TEST:	**NO**	0
SITE CLEANING & FINISHING	**NO**	1	LAYFLAT (M):	**M**	50
LOGGERS FOR WATERLEVEL MONITORING	**NO**	0	LOGGERS FOR pH AND EC:	**NO**	0

It is hereby acknowledged that upon leaving the site, all existing equipment is in an acceptable condition.

NAME: _____ **SIGNATURE:** _____

DESIGNATION: _____ **DATE:** _____

FORM 5 E

STEPPED DISCHARGE TEST & RECOVERY

BOREHOLE TEST RECORD SHEET

PROJ NO :	P3056	Coordinates: SOUTH:	33.92391	PROVINCE:	WESTERN CAPE
BOREHOLE NO:	BH 03	EAST:	19.89369	DISTRICT:	VILLIERSDORP
ALT BH NO:	0			SITE NAME:	ELGIN
ALT BH NO:	0				

BOREHOLE DEPTH (m)	206.00	DATUM LEVEL ABOVE CASING (m):	0.39	EXISTING PUMP:	0
WATER LEVEL (mbdl):	49.41	CASING HEIGHT: (magl):	0.40	CONTRACTOR:	ATS
DEPTH OF PUMP (m):	150.50	DIAM PUMP INLET (mm):	210.00	PUMP TYPE:	WA 30-2

STEPPED DISCHARGE TEST & RECOVERY

DISCHARGE RATE 1			RPM 180		DISCHARGE RATE 2			RPM 278		DISCHARGE RATE 3			RPM	
DATE:	02/02/2025	TIME:	07H00		DATE:	02/02/2025	TIME:	08H00		DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1	4.19		**1**		**1**	53.21		**1**	97.10	**1**			**1**	
2	7.31		**2**		**2**	56.11		**2**	96.39	**2**			**2**	
3	10.15		**3**		**3**	58.40	0.79	**3**	94.20	**3**			**3**	
5	13.40	0.61	**5**		**5**	61.39	0.99	**5**	91.00	**5**			**5**	
7	18.77	0.55	**7**		**7**	65.02	1.02	**7**	83.61	**7**			**7**	
10	23.36		**10**		**10**	71.60	1.04	**10**	75.30	**10**			**10**	
15	27.40	0.50	**15**		**15**	79.22		**15**	62.19	**15**			**15**	
20	31.72		**20**		**20**	87.15	1.06	**20**	50.51	**20**			**20**	
30	38.20	0.50	**30**		**30**	98.25	1.05	**30**	37.20	**30**			**30**	
40	45.31		**40**		**40**		0.77	**40**	33.75	**40**			**40**	
50	49.50	0.51	**50**		**50**		0.62	**50**	28.95	**50**			**50**	
60	53.17		**60**		**60**		0.59	**60**	22.32	**60**			**60**	
70			**70**		**70**			**70**	18.07	**70**			**70**	
80			**80**		**80**			**80**	12.55	**80**			**80**	
90			**90**		**90**			**90**	8.01	**90**			**90**	
100			**100**		**100**			**100**		**100**			**100**	
110			**110**		**110**			**110**		**110**			**110**	
120			**120**		**120**			**120**		**120**			**120**	
pH			**150**		**pH**			**150**		**pH**			**150**	
TEMP	22.20	°C	**180**		**TEMP**	30.10	°C	**180**		**TEMP**		°C	**180**	
EC	709	µS/cm	**210**		**EC**	505	µS/cm	**210**		**EC**		µS/cm	**210**	

DISCHARGE RATE 4			RPM		DISCHARGE RATE 5			RPM		DISCHARGE RATE 6			RPM	
DATE:		TIME:			DATE:		TIME:			DATE:		TIME:		
TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY	TIME	DRAW	YIELD	TIME	RECOVERY
(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)	(MIN)	DOWN (M)	(L/S)	(MIN)	(M)
1			**1**		**1**			**1**		**1**			**1**	
2			**2**		**2**			**2**		**2**			**2**	
3			**3**		**3**			**3**		**3**			**3**	
5			**5**		**5**			**5**		**5**			**5**	
7			**7**		**7**			**7**		**7**			**7**	
10			**10**		**10**			**10**		**10**			**10**	
15			**15**		**15**			**15**		**15**			**15**	
20			**20**		**20**			**20**		**20**			**20**	
30			**30**		**30**			**30**		**30**			**30**	
40			**40**		**40**			**40**		**40**			**40**	
50			**50**		**50**			**50**		**50**			**50**	
60			**60**		**60**			**60**		**60**			**60**	
70			**70**		**70**			**70**		**70**			**70**	
80			**80**		**80**			**80**		**80**			**80**	
90			**90**		**90**			**90**		**90**			**90**	
100			**100**		**100**			**100**		**100**			**100**	
110			**110**		**110**			**110**		**110**			**110**	
120			**120**		**120**			**120**		**120**			**120**	
pH			**150**		**pH**			**150**		**pH**			**150**	
TEMP		°C	**180**		**TEMP**		°C	**180**		**TEMP**		°C	**180**	
EC		µS/cm	**210**		**EC**		µS/cm	**210**		**EC**		µS/cm	**210**	
			240					**240**					**240**	
			300					**300**					**300**	
			360					**360**					**360**	

S/W/L:(mbch) 49.05

Abbreviations	
EC	Electrical conductivity
mbgl	Meters below ground level
mbch	Meters below casing height
mbdl	Meters below datum level
magl	Meters above ground level
L/S	Litres per second
RPM	Rates per minute
S/WL	Static water level
µS/cm	Microsiemens per centimeter

BOREHOLE TEST RECORD

CONSULTANT:	GEOSS
DISTRICT:	VILLIERSDORP
PROVINCE:	WESTERN CAPE
FARM / VILLAGE NAME :	ELGIN
DATE TESTED:	31/01/2025

PR0JECT #	P3056
TEAM MEMBERS	JOHANNES
	LUTHANDO
	TAFARA
	TSHIFIWA

BOREHOLE LOCATION & ACCESS INFORMATION:

BOREHOLE COORDINATES		**COMMENTS ON ACCESS IF ANY:**
LATITUDE (SOUTH):	31.67636	
LONGITUDE (EAST):	18.91052	

BOREHOLE NO:	**BH 4**
TRANSMISSIVITY VALUE:	
TYPE INSTALLATION:	**NEW BOREHOLE**
BOREHOLE DEPTH: (mbg	**90.3**

MAINTENANCE RECORD:		**REHABILITATION RECORD:**		**DIGITAL CAMERA LOGGING:**		**EQUIPMENT FISHING RECORD**	
Labour hours:		**Jetting hours:**		**Camera logged once:**		**Hours spent:**	
Cost of material:		**Brushing hours:**		**Camera logged twice:**			
Travelling (km):		**Airlifting hours:**		**Camera logged three times:**		**OTHER COSTS ON PROJECT:**	
		Sulphamic Acid KG's		**Camera work sent to client:**		**Courier of samples:**	
		Boresaver KG's				**Km's for delivery:**	
		Soda Ash KG's				**Cost of packaging:**	

COMMENTS:	**RECOMMENDATIONS / CORRECTIVE ACTIONS:**

SAMPLE INSTRUCTIONS :

Water sample taken	**Yes**	No	If consultant took sample, give name:		**DATA CAPTURED BY**	EC
Date sample taken	31/01/2025		If sample courier, to where:		**DATA CHECKED BY:**	AH
Time sample taken	14H05					

DESCRIPTION:	**UNIT**	**QTY**		**UNIT**	**QTY**
STRAIGHTNESS TEST:	**NO**	0	BOREHOLE DEPTH AFTER TEST:	**M**	90.30
VERTICALLY TEST:	**NO**	0	BOREHOLE WATER LEVEL AFTER TEST: (mbch)	**M**	65
CASING DETECTION:	**NO**	1	SAND/GRAVEL/SILT PUMPED?	**YES/NO**	**0**
SUPPLIED NEW STEEL BOREHOLE COVER:	**NO**	0	DATA REPORTING AND RECORDING	**NO**	1
BOREHOLE MARKING	**NO**	0	SLUG TEST:	**NO**	0
SITE CLEANING & FINISHING	**NO**	1	LAYFLAT (M):	**M**	50
LOGGERS FOR WATERLEVEL MONITORING	**NO**	0	LOGGERS FOR pH AND EC:	**NO**	0

It is hereby acknowledged that upon leaving the site, all existing equipment is in an acceptable condition.

NAME: _____ **SIGNATURE:** _____

DESIGNATION: _____ **DATE:** _____

FORM 5 E

STEPPED DISCHARGE TEST & RECOVERY

BOREHOLE TEST RECORD SHEET

PROJ NO :	P3056	Coordinates:	SOUTH:	31.67636	PROVINCE: WESTERN CAPE
BOREHOLE NO:	BH 4		EAST:	18.91052	DISTRICT: VILLIERSDORP
ALT BH NO:	0				SITE NAME: ELGIN
ALT BH NO:	0				

BOREHOLE DEPTH (m)	90.30	DATUM LEVEL ABOVE CASING (m):	0.51	EXISTING PUMP:	0
WATER LEVEL (mbdl):	45.80	CASING HEIGHT: (magl):	0.15	CONTRACTOR:	ATS
DEPTH OF PUMP (m):	88.60	DIAM PUMP INLET (mm):	210.00	PUMP TYPE:	WA 50-2

STEPPED DISCHARGE TEST & RECOVERY

DISCHARGE RATE 1			RPM 508		DISCHARGE RATE 2			RPM 621		DISCHARGE RATE 3			RPM	
DATE: 31/01/2025		TIME: 13H00			DATE: 31/01/2025		TIME: 14H00			DATE:		TIME:		
TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)
1	0.66		**1**		**1**	28.50		**1**	31.82	**1**			**1**	
2	1.40		**2**		**2**	30.42		**2**	30.61	**2**			**2**	
3	1.91		**3**		**3**	33.60	1.21	**3**	29.98	**3**			**3**	
5	2.22		**5**		**5**	37.58	1.58	**5**	29.76	**5**			**5**	
7	2.64		**7**		**7**	42.80		**7**	29.60	**7**			**7**	
10	2.98	1.05	**10**			42.80	0.49	**10**	29.56	**10**			**10**	
15	4.30		**15**			42.80	0.42	**15**	29.50	**15**			**15**	
20	5.12	1.03	**20**			42.80	0.39	**20**	29.43	**20**			**20**	
30	8.80		**30**					**30**	29.37	**30**			**30**	
40	12.54	1.05	**40**					**40**	29.18	**40**			**40**	
50	18.33		**50**					**50**	29.00	**50**			**50**	
60	23.50		**60**					**60**	28.88	**60**			**60**	
70			**70**					**70**	28.70	**70**			**70**	
80			**80**					**80**		**80**			**80**	
90			**90**					**90**		**90**			**90**	
100			**100**					**100**		**100**			**100**	
110			**110**					**110**		**110**			**110**	
120			**120**					**120**		**120**			**120**	
pH	24.40		**150**		**pH**			**150**		**pH**			**150**	
TEMP	664.00	°C	**180**		**TEMP**		°C	**180**		**TEMP**		°C	**180**	
EC		µS/cm	**210**		**EC**		µS/cm	**210**		**EC**		µS/cm	**210**	

DISCHARGE RATE 4			RPM		DISCHARGE RATE 5			RPM		DISCHARGE RATE 6			RPM	
DATE:		TIME:			DATE:		TIME:			DATE:		TIME:		
TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)	TIME (MIN)	DRAW DOWN (M)	YIELD (L/S)	TIME (MIN)	RECOVERY (M)
1			**1**		**1**			**1**		**1**			**1**	
2			**2**		**2**			**2**		**2**			**2**	
3			**3**		**3**			**3**		**3**			**3**	
5			**5**		**5**			**5**		**5**			**5**	
7			**7**		**7**			**7**		**7**			**7**	
10			**10**		**10**			**10**		**10**			**10**	
15			**15**		**15**			**15**		**15**			**15**	
20			**20**		**20**			**20**		**20**			**20**	
30			**30**		**30**			**30**		**30**			**30**	
40			**40**		**40**			**40**		**40**			**40**	
50			**50**		**50**			**50**		**50**			**50**	
60			**60**		**60**			**60**		**60**			**60**	
70			**70**		**70**			**70**		**70**			**70**	
80			**80**		**80**			**80**		**80**			**80**	
90			**90**		**90**			**90**		**90**			**90**	
100			**100**		**100**			**100**		**100**			**100**	
110			**110**		**110**			**110**		**110**			**110**	
120			**120**		**120**			**120**		**120**			**120**	
pH			**150**		**pH**			**150**		**pH**			**150**	
TEMP		°C	**180**		**TEMP**		°C	**180**		**TEMP**		°C	**180**	
EC		µS/cm	**210**		**EC**		µS/cm	**210**		**EC**		µS/cm	**210**	
			240					**240**					**240**	
			300					**300**					**300**	
			360					**360**					**360**	

S/W/L:(mbch) 47.46

9 Appendix C: Water Quality

vinlab H2O
Your partner in quality water analysis

Distillery Road
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Tel 021-8828866/7
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www.vinlab.com
2025-02-07

TEST REPORT

Water

Geoss South Africa (Pty) Ltd

Attn: Alison McDuling

P.O.Box 12412
Die Boord, Stellenbosch
7613
+27218801079

@VinlabSA

Sample Details					
SampleID	W59949	W59950	W59951		
Water Type	Drinking Water	Drinking Water	Drinking Water		
Water Source	Borehole	Not Indicated	Not Indicated		
Sample Temperature					
Description	KF_BH1	KF_BH3	KF_BH4		
Batch Number	KF_BH1	KF_BH3	KF_BH4		
PO Number	3569_M	3569_M	3569_M		
Date Received	2025-02-04	2025-02-04	2025-02-04		
Condition	Good	Good	Good		

Water - Routine									
	Unit	Method	Uncertainty	Limit	Results	Results	Results	Results	Results
pH@25C (Water)		VIN-05-MW01	^^^	>= 5 to <= 9.7	4.20	6.39	6.42		
Conductivity@25C (Water)	mS/m	VIN-05-MW02	^	<= 170	40.8	61.1	53.8		
Turbidity (Water)*	ntu			<= 5	4.01	543.00	96.0		
Total dissolved solids (Water)*	mg/L			<= 1200	276.62	414.26	364.76		
Free Chlorine (Water)*	mg/L			<= 5	0.02	<0.02	0.02		
Ammonia (NH4) as N (Water)	mg/L	VIN-05-MW08	8.90%	<= 1.5	<0.15	<0.15	<0.15		
Nitrate as N (Water)	mg/L	VIN-05-MW08	11.00%	<= 11	<1.00	<1.00	<1.00		
Nitrite as N (Water)	mg/L	VIN-05-MW08	4.50%	<= 0.9	<0.05	<0.05	<0.05		
Chloride (Cl-) - Water	mg/L	VIN-05-MW08	10.12%	<= 300	96.17	112.58	113.93		
Sulphates (SO4) - Water	mg/L	VIN-05-MW08	7.56%	<= 500	23.04	53.10	20.50		
Fluoride (F) - Water	mg/L	VIN-05-MW08	12.30%	<= 1.5	<0.15	9.15	0.59		
Alkalinity as CaCO3 (Water)*	mg/L				<10.00	61.70	58.40		
Colour (Water)*	mg/L Pt-Co			<= 15	<15	<15	<15		
Total Organic Carbon (Water)*	mg/L			<=10	1.46	3.73	3.60		
Date Tested					2025-02-04	2025-02-04	2025-02-04		

Water - Metals									
	Unit	Method	Uncertainty	Limit	Results	Results	Results	Results	Results
Calcium (Ca) - Water	mg/L	VIN-05-MW43	14.60%		<0.20	8	7		
Magnesium (Mg) - Water	mg/L	VIN-05-MW43	8.49%		7	9	7		
Sodium (Na) - Water	mg/L	VIN-05-MW43	11.45%	<= 200	54	85	85		
Potassium (K) - Water	mg/L	VIN-05-MW43	9.42%		7	8	7		

Please click here for SANS241-1:2015 drinking water limits

^ - Conductivity <1000mS/m = ±1mS/m , >1000mS/m = ±9mS/m
^^ - COD, LR = ±16mg/L, MR = ±48mg/L, HR = ±477mg/L
^^^ - pH ± 0.1

sanas Testing Laboratory T1131

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2025-02-07

TEST REPORT

Water

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Zinc (Zn) - Water	mg/L	VIN-05-MW43	19.40%	<= 5	0.094	0.061	0.145		
Antimony (Sb) - Water*	µg/L			<-20	<13.0	14	<13.0		
Arsenic (As) - Water*	µg/L			<= 10	<10.0	15	<10.0		
Boron (B) Water	µg/L	VIN-05-MW43	11.79%	<= 2400	9	27	19		
Cadmium (Cd) Water	µg/L	VIN-05-MW43	12.26%	<= 3	2	2	2		
Chromium (Cr) - Water	µg/L	VIN-05-MW43	13.03%	<= 50	<4	16	<4		
Copper (Cu) - Water	µg/L	VIN-05-MW43	11.57%	<= 2000	25	15	17		
Iron (Fe) - Water	µg/L	VIN-05-MW43	12.49%	<= 2000	1146	56355	3494		
Lead (Pb) - Water	µg/L	VIN-05-MW43	16.32%	<= 10	<8	<8	<8		
Manganese (Mn) - Water	µg/L	VIN-05-MW43	12.44%	<= 400	54	1907	1734		
Nickel (Ni) - Water	µg/L	VIN-05-MW43	17.38%	<= 70	10	12	<8		
Selenium (Se) - Water*	µg/L			<= 40	<10.0	<10.0	<10.0		
Aluminium (Al) - Water	µg/L	VIN-05-MW43	13.49%	<= 300	972	4892	238		
Cyanide (CN) - Water*	µg/L			<= 200	<10.0	61.0	10.0		
Mercury (Hg) - Water*	µg/L			<= 6	<1.0	1	2		
Barium (Ba) Water	µg/L	VIN-05-MW43	14.09%	<= 700	254	135	74		
Uranium (U) - Water*	µg/L			<= 30	<28	<28	<28		
Date Tested					2025-02-04	2025-02-04	2025-02-04		

Comments
W59949 Two Samples received, Ion balance = 2.0%
W59950 Two Samples received, Ion balance = 2.9% Recheck: Arsenic(As) = 17.0 µg/l
W59951 Two Samples received, Ion balance = 1.8%

Please click here for SANS241-1:2015 drinking water limits

^ - Conductivity <1000mS/m = ±1mS/m , >1000mS/m = ±9mS/m
^^ - COD, LR = ±16mg/L, MR = ±48mg/L, HR = ±477mg/L
^^^ - pH ± 0.1

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www.vinlab.com
2025-02-07

TEST REPORT

Water

Geoss South Africa (Pty) Ltd

Attn: Alison McDuling

P.O.Box 12412
Die Boord, Stellenbosch
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@VinlabSA

AEFourie

Adelize Fourie
Laboratory Manager (Waterlab)
VIN-05-
M01,M02,M03,M04,M05,M08,M10,M28,
M43, MW01, MW02, MW03, MW04,
MW05, MW06, MW07, MW08/9/10,
MW12, MW13, MW14

Please click here for SANS241-1:2015 drinking water limits

Test results relate only to the items tested as received. This Document shall not be reproduced without the written approval of Vinlab (Pty) Ltd.Opinions and interpretations expressed herein are outside the scope of SANAS accreditation. Results for methods VIN-05-MW12, 13 and 14, are based on Cq values, a positive result (detected) indicates a Cq value <35 and a negative result (non-detected) indicates a Cq value of >35.

*** Not SANAS Accredited. Results marked "Not SANAS Accredited" in this report are not included in the SANAS Scope of Accreditation for Vinlab.**

Vinlab is not liable to any client for any loss or damages suffered which could, directly or remotely, be linked to our services Alcohol results are obtained using the most appropriate or a combination of one of the following methods: Py= pycnometer; W=winescan; Alm=alcolyzer. W = Winescan. Micro results: Enumeration of yeast: WL nutrient, 3 days unless otherwise specified, 30°C. Samples that have had prior microbiological spoilage or treatment for spoilage should always be sterile filtered at bottling. SO2 additions less than 10 days may depress the growth of microbes in culture although they are viable/active in the wine. Some microbes, especially lactobacilli, may not grow in culture even where viable/potentially active in the wine.

^ - Conductivity <1000mS/m = ±1mS/m , >1000mS/m = ±9mS/m
^^ - COD; LR = ±16mg/L, MR = ±48mg/L, HR = ±477mg/L
^^^ - pH ± 0.1

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Doc No V59329 | VIN 09-01 07-05-2024 | Page: 3 of 3 | Visit Vinlab H20

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2025-02-18

TEST REPORT

Water

Geoss South Africa (Pty) Ltd

Attn: Alison McDuling

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Die Boord, Stellenbosch
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Sample Details					
SampleID	W60071				
Water Type	Drinking Water				
Water Source	Not Indicated				
Sample Temperature					
Description	KF_BH2				
Batch Number	KF_BH2				
PO Number	3569_M				
Date Received	2025-02-06				
Condition	Good				

Water - Routine									
	Unit	Method	Uncertainty	Limit	Results	Results	Results	Results	Results
pH@25C (Water)		VIN-05-MW01	^^^	>= 5 to <= 9.7	5.62				
Conductivity@25C (Water)	mS/m	VIN-05-MW02	^	<= 170	34				
Turbidity (Water)*	ntu			<= 5	1536				
Total dissolved solids (Water)*	mg/L			<= 1200	230.52				
Free Chlorine (Water)*	mg/L			<= 5	0.05				
Ammonia (NH4) as N (Water)	mg/L	VIN-05-MW08	8.90%	<= 1.5	<0.15				
Nitrate as N (Water)	mg/L	VIN-05-MW08	11.00%	<= 11	<1.00				
Nitrite as N (Water)	mg/L	VIN-05-MW08	4.50%	<= 0.9	<0.05				
Chloride (Cl-) - Water	mg/L	VIN-05-MW08	10.12%	<= 300	85.15				
Sulphates (SO4) - Water	mg/L	VIN-05-MW08	7.56%	<= 500	14.85				
Fluoride (F) - Water	mg/L	VIN-05-MW08	12.30%	<= 1.5	<0.15				
Alkalinity as CaCO3 (Water)*	mg/L				10.30				
Colour (Water)*	mg/L Pt-Co			<= 15	<15				
Total Organic Carbon (Water)*	mg/L			<=10	7.55				
Date Tested					2025-02-06				

Water - Metals									
	Unit	Method	Uncertainty	Limit	Results	Results	Results	Results	Results
Calcium (Ca) - Water	mg/L	VIN-05-MW43	14.60%		<0.20				
Magnesium (Mg) - Water	mg/L	VIN-05-MW43	8.49%		6				
Sodium (Na) - Water	mg/L	VIN-05-MW43	11.45%	<= 200	50				
Potassium (K) - Water	mg/L	VIN-05-MW43	9.42%		4				

Please click here for SANS241-1:2015 drinking water limits

^ - Conductivity <1000mS/m = ±1mS/m , >1000mS/m = ±9mS/m
^^ - COD, LR = ±16mg/L, MR = ±48mg/L, HR = ±477mg/L
^^^ - pH ± 0.1

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2025-02-18

TEST REPORT

Water

Geoss South Africa (Pty) Ltd

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@VinlabSA

Zinc (Zn) - Water	mg/L	VIN-05-MW43	19.40%	<= 5	0.091				
Antimony (Sb) - Water*	µg/L			<-20	<13.0				
Arsenic (As) - Water*	µg/L			<= 10	<10.0				
Boron (B) Water	µg/L	VIN-05-MW43	11.79%	<= 2400	26				
Cadmium (Cd) Water	µg/L	VIN-05-MW43	12.26%	<= 3	<1				
Chromium (Cr) - Water	µg/L	VIN-05-MW43	13.03%	<= 50	<4				
Copper (Cu) - Water	µg/L	VIN-05-MW43	11.57%	<= 2000	34				
Iron (Fe) - Water	µg/L	VIN-05-MW43	12.49%	<= 2000	1891				
Lead (Pb) - Water	µg/L	VIN-05-MW43	16.32%	<= 10	10				
Manganese (Mn) - Water	µg/L	VIN-05-MW43	12.44%	<= 400	796				
Nickel (Ni) - Water	µg/L	VIN-05-MW43	17.38%	<= 70	16				
Selenium (Se) - Water*	µg/L			<= 40	<10.0				
Aluminium (Al) - Water	µg/L	VIN-05-MW43	13.49%	<= 300	299				
Cyanide (CN) - Water*	µg/L			<= 200	17.0				
Mercury (Hg) - Water*	µg/L			<= 6	1				
Barium (Ba) Water	µg/L	VIN-05-MW43	14.09%	<= 700	250				
Uranium (U) - Water*	µg/L			<= 30	<28				
Date Tested					2025-02-06				

Comments

W60071
Two Samples received,

Metal analysis - sample centrifuged prior to analysis

Memo
Ion balance = 2.9%

AEFourie

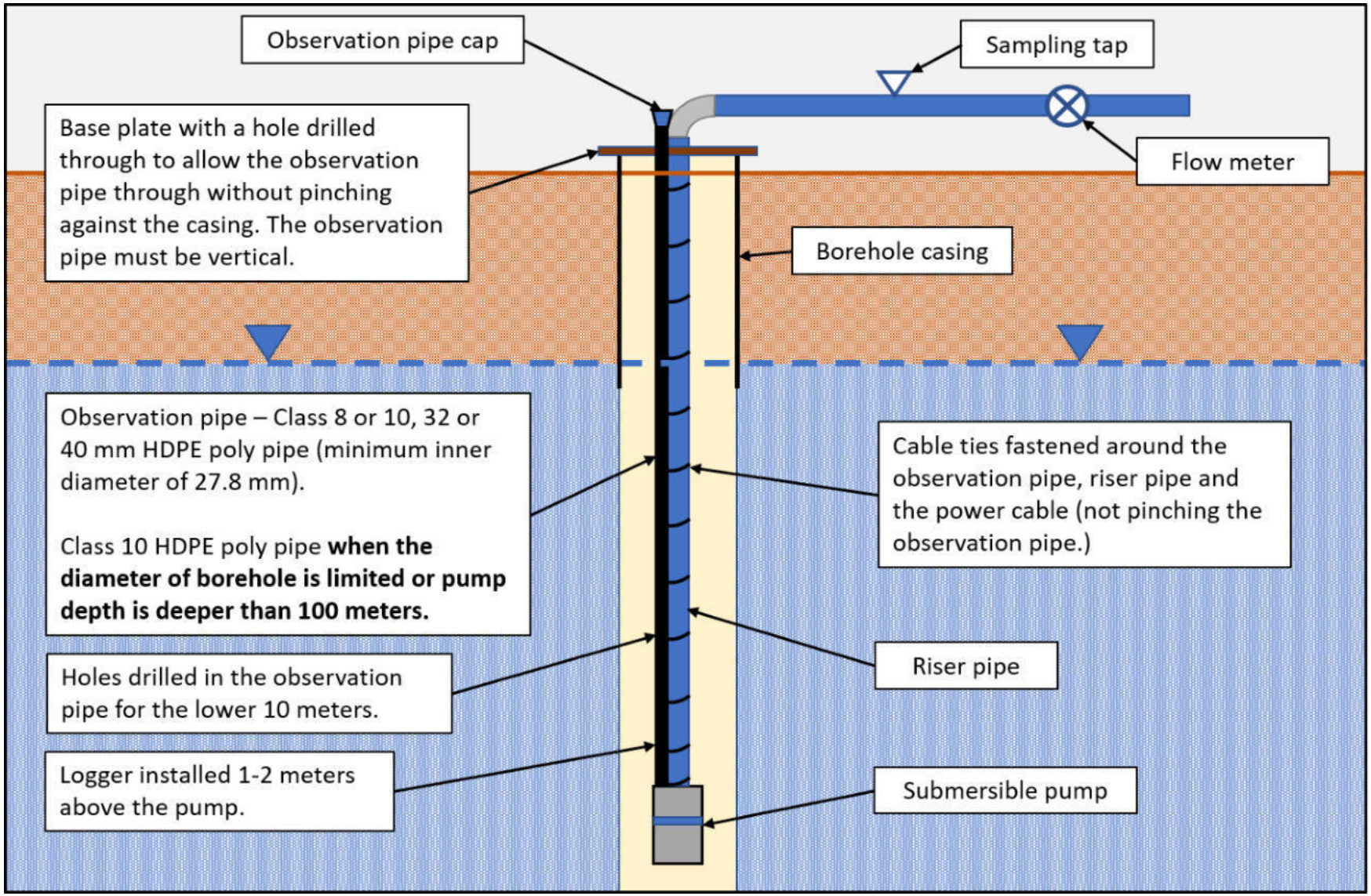
Adelize Fourie
Laboratory Manager (Waterlab)
VIN-05-
M01,M02,M03,M04,M05,M08,M10,M28,
M43, MW01, MW02, MW03, MW04,
MW05, MW06, MW07, MW08/9/10,
MW12, MW13, MW14

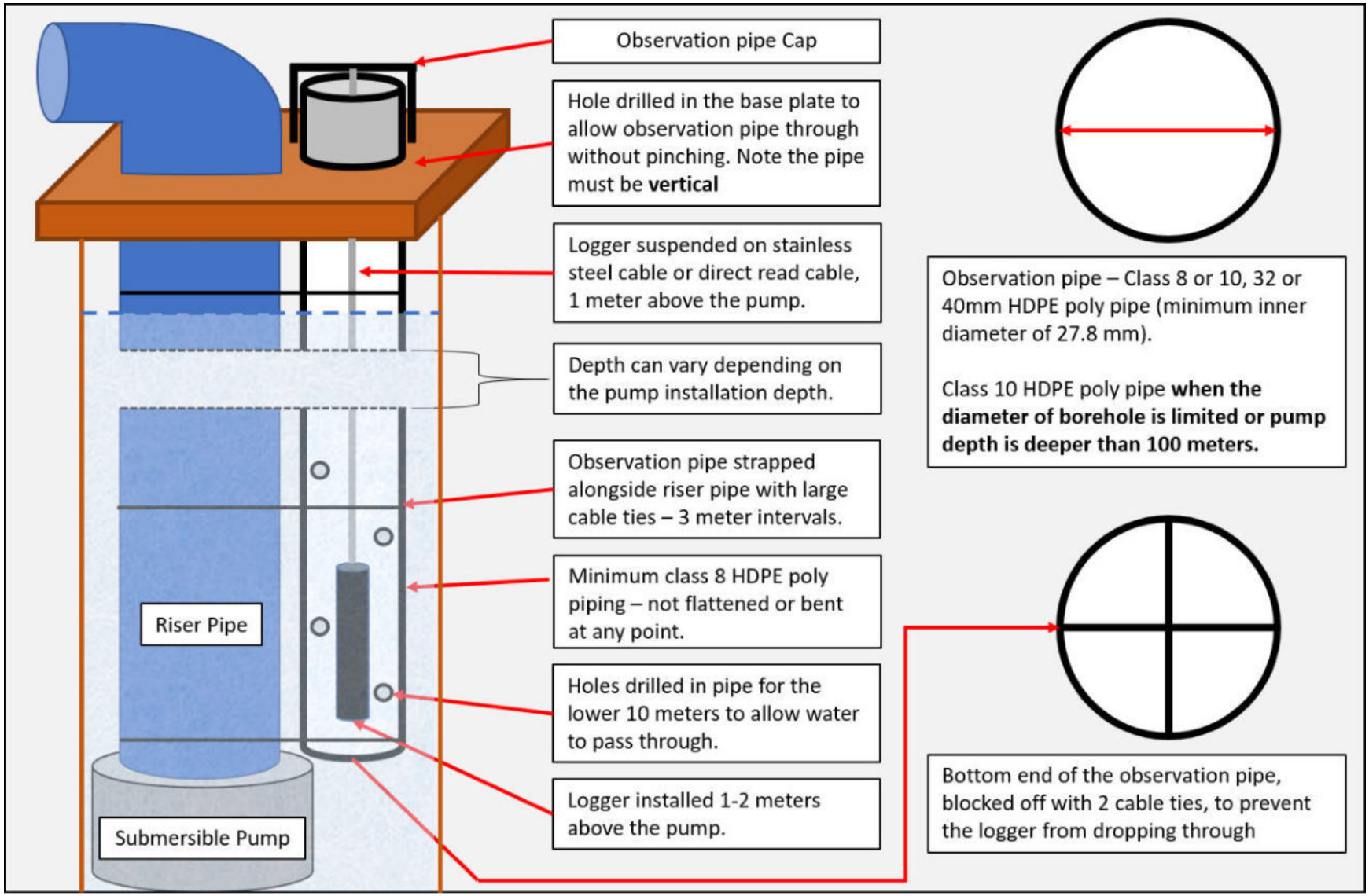
Please click here for SANS241-1:2015 drinking water limits

^ - Conductivity <1000mS/m = ±1mS/m , >1000mS/m = ±9mS/m
^^ - COD; LR = ±16mg/L, MR = ±48mg/L, HR = ±477mg/L
^^^ - pH ± 0.1

sanas Testing Laboratory T1131

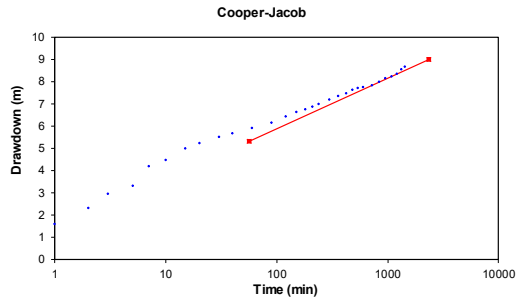
10 Appendix D: Monitoring Infrastructure Diagram


Observation pipe cap
Sampling tap
Base plate with a hole drilled through to allow the observation pipe through without pinching against the casing. The observation pipe must be vertical.
Flow meter
Borehole casing
Observation pipe – Class 8 or 10, 32 or 40 mm HDPE poly pipe (minimum inner diameter of 27.8 mm).
Class 10 HDPE poly pipe **when the diameter of borehole is limited or pump depth is deeper than 100 meters.**
Cable ties fastened around the observation pipe, riser pipe and the power cable (not pinching the observation pipe.)
Holes drilled in the observation pipe for the lower 10 meters.
Riser pipe
Logger installed 1-2 meters above the pump.
Submersible pump


Observation pipe Cap
Hole drilled in the base plate to allow observation pipe through without pinching. Note the pipe must be **vertical**
Logger suspended on stainless steel cable or direct read cable, 1 meter above the pump.
Depth can vary depending on the pump installation depth.
Observation pipe strapped alongside riser pipe with large cable ties – 3 meter intervals.
Minimum class 8 HDPE poly piping – not flattened or bent at any point.
Holes drilled in pipe for the lower 10 meters to allow water to pass through.
Logger installed 1-2 meters above the pump.
Riser Pipe
Submersible Pump
Observation pipe – Class 8 or 10, 32 or 40mm HDPE poly pipe (minimum inner diameter of 27.8 mm).
Class 10 HDPE poly pipe **when the diameter of borehole is limited or pump depth is deeper than 100 meters.**
Bottom end of the observation pipe, blocked off with 2 cable ties, to prevent the logger from dropping through

11 Appendix E: Yield Test Data Analysis

KF_BH1

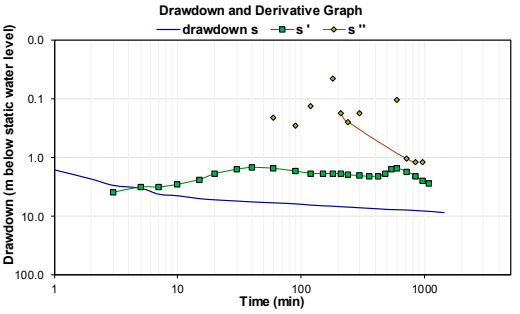


Cooper-Jacob method

T(m²/d) =	35.5	r_e (m)=	0.1
S =	1.49E+00	Q (l/s) =	5.13

	No boundaries	1 no-flow	2 no-flow	Closed
Q_sust	8.21	4.10	2.71	2.05
Avg. Q_sust =		4.27	std. dev =	2.76

Boundaries selected	0 - closed

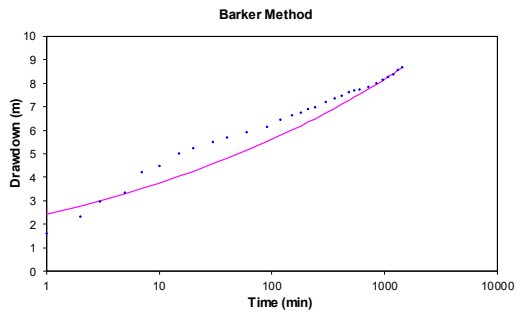


FC method

Extrapolation time in years	2	1051200	Extrapol.time in minutes	
Effective borehole radius (r_e)	49.2430621	49.24306206	Est. r_e	From r(e) sheet
Q (l/s) from pumping test	5.13	4.22885E-05	S-late	Change r_e
s_a (available drawdown), sigma_s	**24.1**	0	Sigma_s from risk	
Annual effective recharge (mm)	0	24.1	s_available w orking draw dow n(m)	
t(end) and s(end) of pumping test	1440	8.67	End time and draw dow n of test	
Average maximum derivative	**2.75**	2.759103159	Estimate of average of max deriv	
Average second derivative	**1.15**	0.025377577	Estimate of average second deriv	
Derivative at radial flow period	2.26586781	2.265867805	Read from derivative graph	
T-early[m²/d]		35.79708217	Aqui. thick (m)	60
T and S estimates	**T-late [m²/d]**	**29.49507491**	Est. S-late	0.0033
	S-late	0.0033		

BASIC SOLUTION

	No boundaries	1 no-flow	2 no-flow	Closed no-flow
sWell (Extrapol.time) =	21.26	29.13	37.01	60.63
Q_sust (l/s) =	5.82	4.24	3.34	2.04
Average Q_sust (l/s) =	**3.60**			
w ith standard deviation=	1.59			
Boundaries selected	0 - closed			

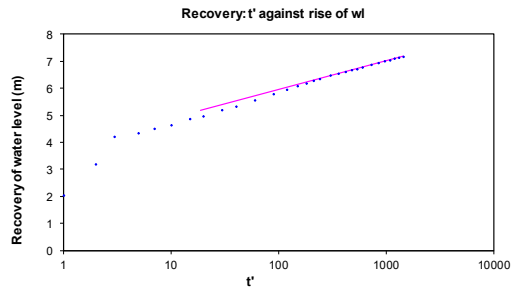


Barker method

	K_f [m/d]	S_f [1/m]	b	n	N
Fit Parameters	54.00	2.00E-03	2.26	1.72	0.1400

	No boundaries	1 no-flow	2 no-flow	Closed
sWell(Extrapol.time)	23.49	39.23	47.11	54.98
Q_sust	5.26	3.15	2.62	2.25

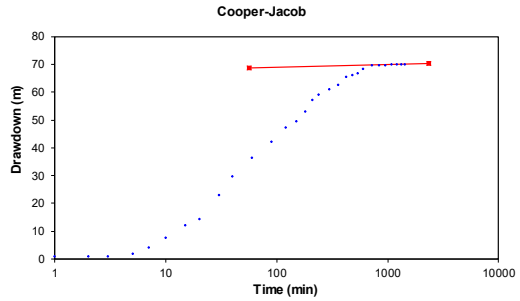
Fractal n = 1.72	Average Q-sust (l/s)=	3.15	std. dev =	1.35
	Boundaries selected	0 - closed		



Recovery

T [m2/d]	76.61
CDT Duration	1440
Recovery Duration	1440
Max % Recovery	82.70

KF_BH2

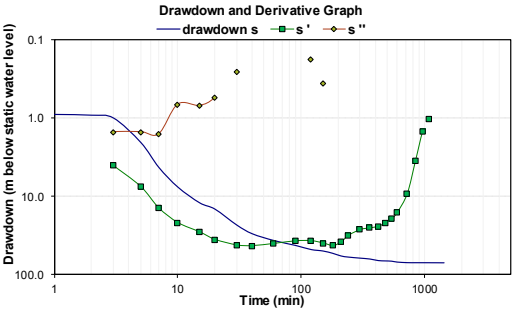


Cooper-Jacob method

$T(m^2/d)$ =	29.6	r_e (m)=	0.1
S =	3.97E-84	Q (l/s) =	1.50

	No boundaries	1 no-flow	2 no-flow	Closed
Q_sust	1.91	0.95	0.63	0.48
Avg. Q_sust =		0.99	std. dev =	0.64

Boundaries selected: 0 - closed



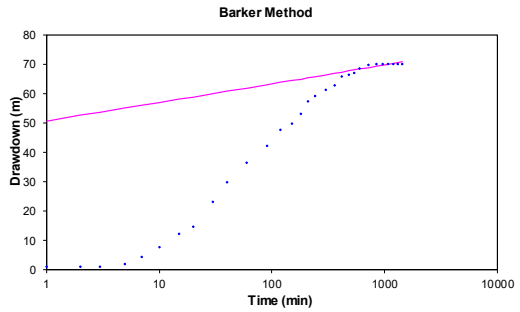
FC method

Extrapolation time in years	2	1051200	Extrapol.time in minutes	
Effective borehole radius (r_e)	26.4068394	26.40683937	Est. r_e	From r(e) sheet
Q (l/s) from pumping test	1.5	1.32932E-05	S-late	Change r_e
s_a (available drawdown), sigma_s	**92.1**	0	Sigma_s from risk	
Annual effective recharge (mm)	0	92.1	s_available w orking draw dow n(m)	
t(end) and s(end) of pumping test	1440	70.07	End time and draw dow n of test	
Average maximum derivative	**3.45**	42.24083805	Estimate of average of max deriv	
Average second derivative	**0**	-0.300237	Estimate of average second deriv	
Derivative at radial flow period	20.3943513	20.39435133	Read from derivative graph	
T-early[m^2/d]		1.16291024	Aqui. thick (m)	60
T and S estimates	**T-late [m^2/d]**	**6.874434783**	Est. S-late	0.0033
	S-late	0.0033		

BASIC SOLUTION

	No boundaries	1 no-flow	2 no-flow	Closed no-flow
sWell (Extrapol.time) =	79.95	89.83	99.71	129.34
Q_sust (l/s) =	1.73	1.54	1.39	1.07
Average Q_sust (l/s) =	**1.41**			
with standard deviation=	0.28			

Boundaries selected: 0 - closed



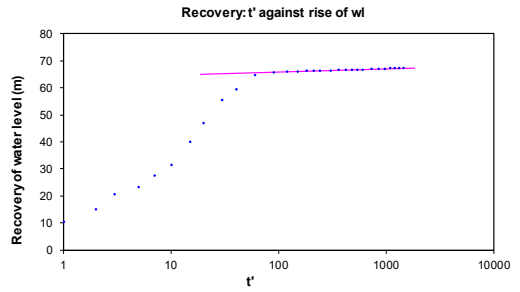
Barker method

	K_f [m/d]	S_f [1/m]	b	n	N
Fit Parameters	215.20	1.00E-07	0.02	1.99	0.0050

	No boundaries	1 no-flow	2 no-flow	Closed
sWell(Extrapol.time)	89.60	109.36	119.23	129.11
Q_sust	1.54	1.26	1.16	1.07

Fractal n = 1.99 | Average Q-sust (l/s)= 1.25 | std. dev = 0.20

Boundaries selected: 0 - closed



Recovery

T [m2/d]	21.51
CDT Duration	1440
Recovery Duration	1440
Max % Recovery	96.23

(LAST PAGE)

Appendix 3

Freshwater Ecological report and RAM

FRESHWATER ASSESSMENT FOR THE PROPOSED DEVELOPMENT OF A FREE-RANGE POULTRY BROILER FACILITY ON THE FARM NUMBERS 563, 564, 565 AND FARM KLEINFONTEIN NUMBER 954, WORCESTER, WESTERN CAPE

JUNE 2025

(Updated October 2025)

Compiled by: Ms. Jeanne Snyman (M.Sc. Env Water Sciences, Pr. Sci. Nat)

EXECUTIVE SUMMARY

The client, Elgin Free Range Chickens (EFRC Agri Operations (Pty) Ltd.), proposes the development of a Free-Range Poultry Broiler Facility on the Remainder of Farm numbers 563, 564, 565, and Farm Kleinfontein number 954, Worcester, Western Cape (hereafter referred to as the project site). This freshwater report was commissioned for input into both the Environmental process and the Water Use Licence Application (WULA). The aim of this report is to describe the previous and present ecological state of the freshwater features surrounding the proposed development area, as well as assess the impacts of the proposed activities on all freshwater features affected.

The study site is located just off Koppies Road, which extends from the R43, approximately 12 km northeast of Villiersdorp. The project area falls within the larger Hoeks River Catchment, specifically within Quaternary Catchment H40F, which forms part of the Breede-Gouritz Water Management Area (WMA). The landscape is generally characterised by undulating hills and valleys, predominantly used for agricultural purposes, and includes several small tributaries of the Ratel River. Other larger landscape features surrounding the property include the Stettyns mountains located to the far west.

The site contains four primarily seasonal streams (Streams A to D), which originate in the southeastern hills and flow north-northwest, eventually converging into two tributaries before joining the Ratel River. While their upper reaches remain natural, the streams become modified to varying degrees in farmed areas due to vegetation clearance, agricultural encroachment, instream dams, and canalisation, especially in Streams A and B. Both tributaries terminate in large farm dams near the Ratel River.

Due to their similar condition and geomorphological characteristics, as well as the fact that they form two distinct tributaries, Streams A and B were assessed as a single unit, as were Streams C and D. The freshwater assessment result can be summarised as follows:

	Stream A and B	Streams D and E
DWA catchment	H40F	
Vegetation type	Breede Shale Renosterveld (Critically Endangered)	
Rainfall region	Winter	
System	Inland System	
Regional Setting	Western Folded Mountains	
Landscape unit	Slope to Valley Floor	
Hydrogeomorphic Unit	Stream (Seasonal)	
Longitudinal zonation/Landform/ Outflow drainage	Foothill - Sand Bed	
Landform/Inflow drainage	Active Channel	
Substratum type	Loam and Clay	
Special conservational features (from desktop study)	**WCSBP (2017)**	Based on the 2023 WCBSP map (Figure 6), terrestrial Critical Biodiversity Areas (CBA's) were found around the remaining natural areas on the property

		Furthermore, aquatic Ecological Support Areas (ESA1: Ground Water Source) were also indicated specifically towards the south and east of the property.	
	NFEPA	According to the National Freshwater Ecosystem Priority Areas (NFEPA) dataset and the National Wetlands Map (NWM5) (refer to Figure 10), the broader catchment in which the project site is located is classified as a FishFEPA (Fish support area). In addition to the above, the National Wetlands Map classifies the Ratel River and its larger associated floodplain as East Coast Shale Renosterveld_Floodplain wetland, currently in a C condition (FEPA rank 5).	
PES	D/E: Largely to Seriously modified		A/B: Natural to Largely Natural
EIS	Low to Moderate		High
RMO and REC	RMO – D: Maintain; REC – D		RMO – A: Maintain; REC – A/B
Proposed Buffer Zone	**Road Crossings:** As the proposed work will occur within the stream channels, the implementation of a buffer zone is not considered feasible. **Other Activities:** All other activities should be located outside a 30-meter buffer zone measured from the edge of the streams' riparian areas.		

Of the proposed project components, only the new stream crossings will directly impact the freshwater features on site. Additionally, the nature of the development (a chicken broiler facility), together with some management activities, could potentially pose a risk of indirect impacts on water quality and hydrology.

These activities might have an impact on the following:

- Loss of biodiversity, aquatic habitat and ecological structure;
- Potential hydrology modification and change in sediment balance;
- Potential Water Quality impacts.

In order to mitigate the above, several mitigation measures have been included and would be applicable to all affected freshwater features/stream crossings along the road.

CONCLUSION

With the implementation of appropriate mitigation measures, the proposed activities with their expected operational phase, are expected to result in a general short-term **low negative impact** on the site's freshwater features.

Following the assessment of the characteristics of the identified aquatic habitats, the DWS Risk Assessment Matrix (which is specified in the Government Notice R509 of 2016 for section 21 (c) and (i) water uses as defined under the NWA (1998)), was conducted to ascertain the significance of perceived impacts of the proposal on the key drivers and response processes (hydrology, water quality, geomorphology, habitat and biota) of the aquatic habitats. During both the construction and operational phases of the development, impacts on the freshwater features resulted in a **Low-risk score**.

As all the indicated freshwater features found within the project site would be defined as a watercourse, any activities that are to take place within 32 meters thereof could require authorisation in terms of the relevant regulations of NEMA. In addition, Section 21 of the National Water Act and Regulation 1199 of 2009, as it relates to the NWA, will also apply, and therefore, a Water Use License will usually be required for the proposed development unless a General Authorisation is granted.

DOCUMENT GUIDE

The table below provides the specialist report requirements for the assessment and reporting of impacts on aquatic biodiversity in terms of Government Notice 320 as promulgated in Government Gazette 43110 of 20 March 2020 in line with the Department of Environmental Affairs screening tool requirements, as it relates to the National Environmental Management Act, 1998 (Act No. 107 of 1998).

No.	Requirements	Section in report/Notes
2.1	Assessment must be undertaken by a suitably qualified SACNASP registered specialist	Declaration Of Independence – pg iii and Annexure E.
2.3.1	Description of the preferred development site, including the following aspects-	
	a. Aquatic ecosystem type b. Presence of aquatic species and composition of aquatic species communities, their habitat, distribution and movement patterns	Flora and Fauna: pg. 8 Aquatic Assessment: pg. 12-13 & Annexure B
2.3.2	Threat status, according to the national web-based environmental screening tool of the species and ecosystems, including listed ecosystems as well as locally important habitat types identified	Conservation value: pg.10-11
2.3.3	National and Provincial priority status of the aquatic ecosystem (i.e. is this a wetland or river Freshwater Ecosystem Priority Area (FEPA), a FEPA sub-catchment, a Strategic Water Source Area (SWSA), a priority estuary, whether or not they are free-flowing rivers, wetland clusters, etc., a CBA or an ESA; including for all a description of the criteria for their given status	Conservation value: pg.10-11
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.); b. The historic ecological condition (reference) as well as Present Ecological State (PES) of rivers (in-stream, riparian and floodplain habitat), wetlands and/or estuaries in terms of possible changes to the channel, flow regime (surface and groundwater)	Conservation value: pg.10-11; Aquatic Assessment: pg. 12-13 & Annexure B
2.4	Identify any alternative development footprints within the preferred development site which would be of a "low" sensitivity as identified by the national web-based environmental screening tool and verified through the Initial Site Sensitivity Verification	Activities have already been moved to fall within areas with low sensitivity.
2.5	Assessment of impacts – a detailed assessment of the potential impact(s) of the proposed development on the following very high sensitivity areas/ features:	Impact Assessment: pg. 14-18

2.5.1	Is the development consistent with maintaining the priority aquatic ecosystem in its current state and according to the stated goal?	Yes, if all mitigation measures are implemented all the RMO's (pg. 37) and the RQO's as stated in Table 1 (pg. 3) will be met.
2.5.2	Is the development consistent with maintaining the Resource Quality Objectives for the aquatic ecosystems present?	
2.5.3	How will the development impact on fixed and dynamic ecological processes that operate within or across the site, including: a. Impacts on hydrological functioning at a landscape level and across the site which can arise from changes to flood regime (e.g. suppression of floods, loss of flood attenuation capacity, unseasonal flooding or destruction of floodplain processes); b. 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; c. 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.) and d. Assessment of the risks associated with water use/s and related activities.	Impact Assessment: pg. 14-18
2.5.4	How will the development impact on the functionality of the aquatic feature including: a. Base flows (e.g. too little/too much water in terms of characteristics and requirements of 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 channelled 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. 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 soil, etc).	Impact Assessment: pg. 14-18
2.5.5	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.	Impact Assessment: pg. 14-18
2.5.6	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?	Impact Assessment: pg. 14-18

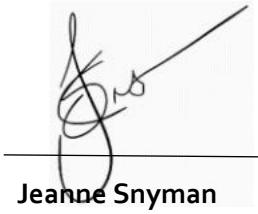
2.6	In addition to the above, where applicable, impacts to the frequency of estuary mouth closure should be considered, in relation to: size of the estuary; availability of sediment; wave action in the mouth; protection of the mouth; beach slope; volume of mean annual runoff; and extent of saline intrusion (especially relevant to permanently open systems).	N/A
2.7	The report must contain as a minimum the following information:	
2.7.1	Contact detail of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae.	Annexure E
2.7.2	A signed statement of independence by the specialist.	Declaration Of Independence – pg.xii
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.	Aquatic Assessment: pg. 12-13 & Annexure B
2.7.4	The methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant.	Annexure A
2.7.5	A description of the assumptions made, any uncertainties or gaps in knowledge or data.	Pg. 1
2.7.6	The location of areas not suitable for development, which are to be avoided during construction and operation, where relevant.	Impact Assessment: pg. 14-18
2.7.7	Additional environmental impacts are expected from the proposed development.	Impact Assessment: pg. 14-18
2.7.8	Any direct, indirect and cumulative impacts of the proposed development on site.	Summary of the expected impacts: pg. 19
2.7.9	The degree to which impacts and risks can be mitigated.	Summary of the expected impacts: pg. 19
2.7.10	The degree to which impacts and risks can be reversed.	Summary of the expected impacts: pg. 19
2.7.11	The degree to which the impacts and risks can cause loss of irreplaceable resources.	Summary of the expected impacts: pg. 19
2.7.12	A suitable construction and operational buffer for the aquatic ecosystem, using the accepted methodologies.	Aquatic Assessment: pg. 12-13 & Annexure B
2.7.13	Proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr).	Impact Assessment: pg. 14-18
2.7.14	A motivation must be provided if there were development footprints identified as per paragraph 2.3 for reporting in terms of Section 24(5)(a) and (h) of the National Environmental Management Act, 1998 (Act No. 107 of 1998) that were identified as having a "low" aquatic biodiversity and sensitivity and that were not considered appropriate.	Described and motivated under Aquatic Assessment: pg. 12-13 & Annexure B, and Impact Assessment: pg. 14-18
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.	Conclusion – pg.22
2.7.16	Any conditions to which this statement is subjected.	Included in mitigation measures set out under the Impact Assessment: pg. 14-18, and Risk Matrix – Annexure D.

Table of Contents

DECLARATION OF INDEPENDENCE

I, **Jeanne Snyman,** declare that -

- I am subcontracted as specialist consultant by PHS Consulting, for input on the freshwater impacts related to activities associated with the proposed development of a free-range poultry broiler facility on the Remainder of Farm numbers 563, 564, 565 and Farm Kleinfontein number 954, Worcester, Western Cape.
- I will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- I declare that there are no circumstances that may compromise my objectivity in performing such work;
- I have expertise in conducting the specialist report relevant to this application, including knowledge of the National Environmental Management Act, 1998 (Act No. 107 of 1998), regulations and any guidelines that have relevance to the proposed activity;
- I will comply with the Act, regulations and all other applicable legislation;
- I will take into account, to the extent possible, the matters listed in Regulation 8;
- I have no, and will not engage in, conflicting interests in the undertaking of the activity;
- I undertake to disclose to the applicant and the competent authority 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 the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- All the particulars furnished by me in this form are true and correct; and
- I realise that a false declaration is an offence in terms of Regulation 71 and is punishable in terms of section 24F of the Act.



Jeanne Snyman

SACNASP Reg. No: 400091/17

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Glossary of Terms

Alluvial Material / deposits Sedimentary deposits resulting from the action of rivers, including those deposited within river channels, floodplains, etc.

Baseflow The component of river flow that is sustained from groundwater sources rather than from surface water runoff

Facultative Occurring optionally in response to circumstances rather than by nature; applied to wetland plants in this context – a facultative species is a species usually found in wetlands, but occasionally found in non-wetland areas

Herb A small non-woody plant in which the aerial parts die back at the end of every growing season

Herbaceous A plant having little or no woody tissue and persisting usually for a single growing season

Hydrology The scientific study of the distribution and properties of water on the earth's surface

Hydrogeomorphological zone An area defined by the interaction and linkage of hydrologic processes with landforms or earth materials and the interaction of geomorphic processes with surface and subsurface water in temporal and spatial dimensions

Hydrophyte A plant that grows in water or in conditions that are at least periodically deficient in oxygen as a result of saturation by water – these are typically wetland plants

Macrophyte An aquatic plant that grows in or near water. Macrophytic plants can be emergent, submerged, or floating

Marginal Plants and habitat on the edge of waterbodies

Obligate Hydrophyte A plant species that almost always occurs in wetlands (>99% of the time)

Pediment(ation) A gentle slope, cut into bedrock, occurring below a much steeper slope, extending at a flatter gradient down to a valley bottom.

Reach/ section A portion/stretch of a river

Riparian Zone The physical structure and associated vegetation of the areas associated with a watercourse which are commonly characterised by alluvial soils, and which are inundated or flooded to an extent and with a frequency sufficient to support vegetation of species with a composition and physical structure distinct from those of adjacent land areas

Abbreviations

CBA –Critical biodiversity areas

DSP – Decision Support Protocol

DWAF - Department of Water and Forestry

EIS – Ecological Importance and Sensitivity

ELU – Existing Lawful Use

ESA – Ecological Support Areas

HGM (zone) – Hydrogeomorphological zone

NAEHMP – National Aquatic Ecosystem Health Monitoring Programme

NEMA – National Environmental Management Act

NFEPA – National Freshwater Ecosystem Priority Area

NWA – National Water Act

PES – Present Ecological State

REC – Recommended Ecological Class

RHP – River Health Programme

RMO – Recommended Management Objective

WCBSP – Western Cape Biodiversity Spatial Plan

WMA – Water Management Area

Introduction

The client, Elgin Free Range Chickens (EFRC Agri Operations (Pty) Ltd.), proposes the development of a Free-Range Poultry Broiler Facility on the Remainder of Farm numbers 563, 564, 565, and Farm Kleinfontein number 954, Worcester, Western Cape (hereafter referred to as the project site). This freshwater report was commissioned for input into both the Environmental process and the Water Use Licence Application (WULA). The aim of this report is to describe the previous and present ecological state of the freshwater features surrounding the proposed development area, as well as assess the impacts of the proposed activities on all freshwater features affected.

Assumptions, Limitations, and Indemnity

Limitations and uncertainties often exist within the various techniques adopted to assess the condition of ecosystems. The following limitations apply to the techniques and methodology utilised to undertake this study:

- The purpose of this report is to comment on the Present Ecological State (PES), Ecological Importance and Sensitivity (EIS), Ecoservices, Recommended Management Objectives (RMO's) and Recommended Ecological Class (REC's) of the freshwater features found within the project area, as well as determine the impact of the proposed activities on such freshwater features.

- The determination of the watercourse boundaries and the assessment thereof is confined to the watercourses within the defined investigation area. Only the affected areas of the watercourses identified were delineated based on the findings of the field assessment undertaken by EverWater Freshwater Consulting on 13 November 2024, and in fulfilment of Government Notice 509 of 2016 as it relates to activities as stipulated in Section 21(c) and (i) of the National Water Act, 1998 (Act No. 36 of 1998) (NWA). The larger surrounding freshwater system was delineated on a desktop level.

- The WET-health assessment was carried out using the South African Department of Water and Sanitation's developed methodologies. These assessments were carried out to provide information on the ecological condition and ecological importance, and sensitivity of the river systems impacted.

- Watercourses and terrestrial areas create transitional zones, or ecotones, where vegetation gradually shifts from terrestrial species to facultative and obligate freshwater species. Within these transition zones, there may be some variation in the opinion of the exact watercourse boundary. However, by applying the DWAF (2008) method, assessors should generally arrive at consistent and comparable results.

- The project deliverables, including the reported results, comments, recommendations and conclusions, are based on the author's professional knowledge as well as available

information. Even though every care was taken to ensure the accuracy of this report, environmental assessment studies are limited in scope, time, and budget. Discussions and proposed mitigations are, to some extent, made on reasonable and informed assumptions built on *bona fide* information sources, as well as deductive reasoning. No biomonitoring or physical-chemical aspects of the water found in the study were done.

- The author reserves the right to modify aspects of the report, including the recommendations, if and when new information becomes available from ongoing research or further work in this field or pertaining to this investigation.

- The author has exercised reasonable skill, care and diligence in the provision of services; however, accepts no liability or consequential liability for the use of the supplied project deliverables and any information or material contained therein. The client, including their agents, by receiving these deliverables indemnifies EverWater Freshwater Consulting (including its members, employees and sub-consultants) against any actions, claims, demands, losses, liabilities, costs, damages and expenses arising directly or indirectly from or in connection with services rendered, directly or indirectly by EverWater Freshwater Consulting.

Key Legislative Requirements

National Water Act (Act No. 36 of 1998)

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. The National Water Act (NWA) (Act No. 36 of 1998) allows for the protection of water resources, which includes:

- The maintenance of the quality of the water resource to the extent that the water resources may be used in an ecologically sustainable way;
- The prevention of the degradation of the water resource; and
- The rehabilitation of the water resource.

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 a watercourse, and a reference to a watercourse includes, where relevant, its bed and banks.

The NWA recognises that the entire ecosystem, and not just the water itself, and any given water resource constitutes the resource and as such needs to be conserved. No activity may therefore take

place within a watercourse unless it is authorised by the DWS. For the purposes of this project, 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 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).

Proposed Classes of Water Resource and Resource Quality Objectives for the Breede-Gouritz Catchment

In addition to the above legislation, the Department of Water and Sanitation has released the proposed classes of water resources and Resource Quality Objectives (RQOs) for the Breede-Gouritz Water Management Area, as published in Government Notice 1298 of Gazette 42053 on 23 November 2018, in terms of Section 13(4) of the National Water Act (1998).

For the H40E Catchment, which falls within the A3 Middle Breede Renosterveld zone, only general RQOs are applicable. These, along with RQOs specific to rivers within this quaternary catchment, have been set out for the section of the Breede River that runs through this area (and is not specifically applicable to the tributaries located on the property or the Ratel and Hoeks Rivers running through the catchment area).

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TABLE 1: SUMMARY OF WATER RESOURCE CLASSES PER INTEGRATED UNIT OF ANALYSIS AND ECOLOGICAL CATEGORIES

Integrated Unit of Analysis (IUA)	Water Resource Class for IUA	Quaternary Catchment	RU	Resource Name	Biophysical Node Name	TEC	Natural MAR (million m^3/a)
A3 Middle Breede Renosterveld	III	H40D		Doring River	Niv13	E	47.50
		H40F	A3-R04	Breede River	Nvii8	C/D	1042.80
		H40F		Breede River	Ni1	A/B	1043.40
		H40G		Poesjenels River	Nvii11	D	16.10
		H40H		Vink River	Niv15	D/E	15.60
		H40J		Willem Nels River	Nviii2	D/E	5.20
		H40J		Breede River	Nvii19	A/B	1081.90
		H40K		Keisers River	Nvii12	D	7.10
		H40K		Keisers River	Niv14	D	12.60
		H40L		Breede River	Nvi1	D	1099.90
		H30E		Kogmanskloof River	Nii2	D	52.00
		H50A		Breede River	Niii3	D	1153.40
		H50B	A3-R05	Breede River	Ni2	D	1170.10

National Environmental Management Act (Act No. 107 of 1998)

The National Environmental Management Act (NEMA) (Act 107 of 1998) and the associated Regulations, as amended in April 2017, state that prior to any development taking place within a wetland or riparian area, an environmental authorisation process needs to be followed. This could follow either the Basic Assessment Report (BAR) process or the Environmental Impact Assessment (EIA) process, depending on the scale of the impact.

Background

Site location and regional description

The study site is located just off Koppies Road, which extends from the R43, approximately 12 km northeast of Villiersdorp. The project area falls within the larger Hoeks River Catchment, specifically within Quaternary Catchment H40F, which forms part of the Breede-Gouritz Water Management Area (WMA). The landscape is generally characterised by undulating hills and valleys, predominantly used for agricultural purposes, and includes several small tributaries of the Ratel River. Other larger landscape features surrounding the property include the Stettyns mountains located to the far west.

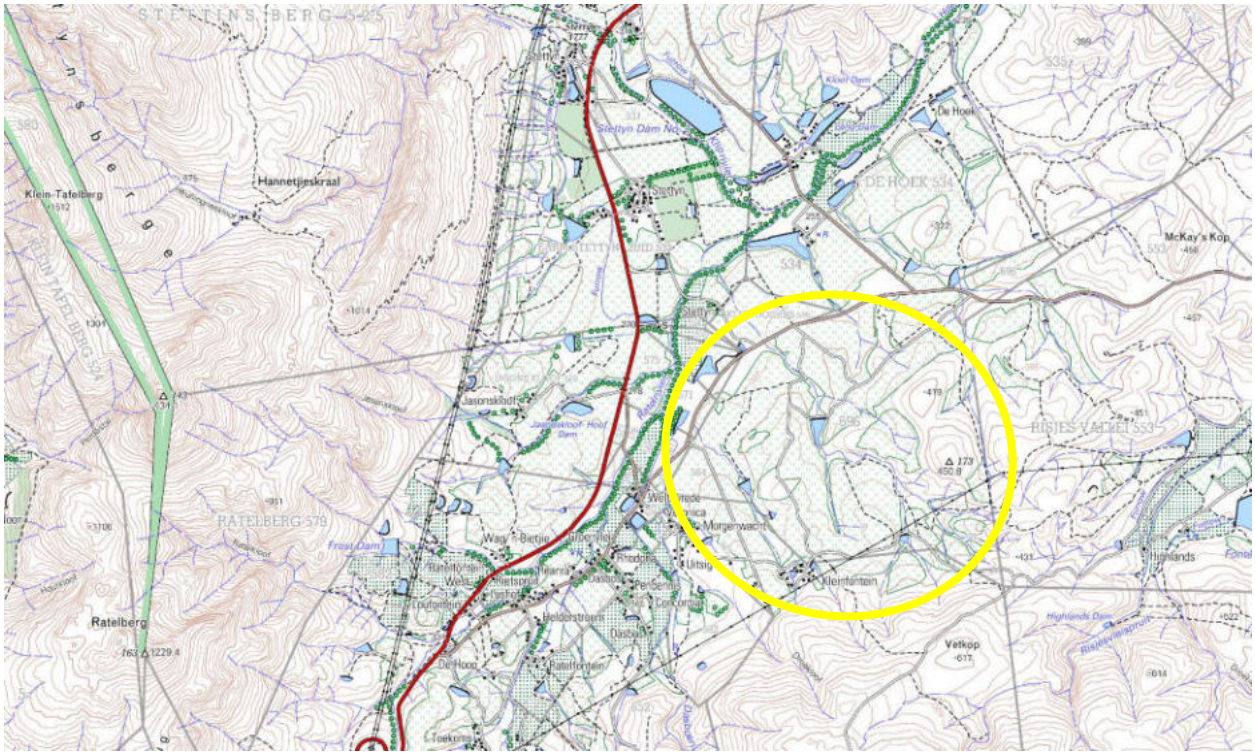

Figure 1: 1:50 000 Topographical map of the area with the project location (3319CD)

Proposed Activity

The client proposes the development of a Free-Range Poultry Broiler Facility. The Broiler Facility will involve the establishment of 20 Broiler Houses (approx. 1044m² per facility [87m x 12m]). Each facility will house approximately 17,000 birds. An Ablution facility, Guard House, Spray Race and Refrigerated Container will be located at the entrance to the site. Furthermore, an additional Ablution Facility and Residential Dwelling will be located at the broiler facilities. Numerous internal roads will be upgraded and realigned where applicable for biosecurity reasons, to improve traffic flow and safety, and to improve river crossings.

In addition to the above, the following services will also be included in the project:

Water:

A Water Treatment Plant is proposed to treat the water from the existing Boreholes (BH1 & BH2), which will be fed via a pipeline from the boreholes to the Water Treatment Plant. Thereafter, treated water will be sent to two proposed reservoirs (300kl each) on site. Water will be sent from the main reservoir directly to the broiler houses. Water storage tanks will be located at each chicken house (1 x 5000 L and 1 x 1000 L). All water pipelines will run, as far as possible, on the side of existing and the new roads. The HT power distribution lines will be located within the same trench.

Waste:

- Domestic Sewerage - underground collection/treatment tanks will be located at all ablution and domestic houses.
- Chicken Manure will be collected by surrounding farmers for fertilisation. Cold storage will be utilised as temporary storage for mortalities, which will then be disposed of at a bio-approved landfill site.

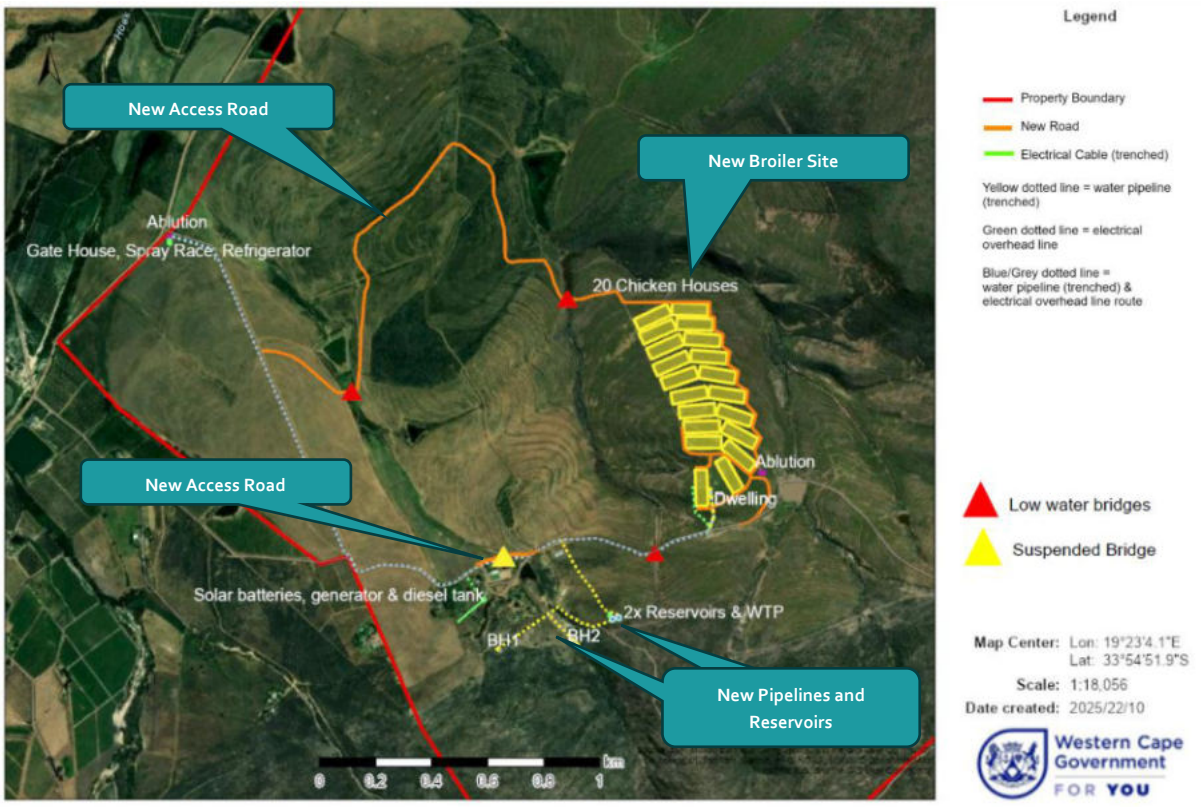

Figure 2: Proposed activities in relation to the affected freshwater features (Google Earth, 2025).

Historical and current land use

The project site is generally surrounded by a mix of agricultural land, natural areas, and a few small watercourses. According to the National Land Cover Map (Figure 3), the new development will largely fall over areas classified as Cultivated – commercial annual crops rain-fed / dryland (Temporary crops) (dark brown), Cultivated - fallow land & old fields (grass) (Pink) and Shrubland – Low Shrubland Fynbos (light green).

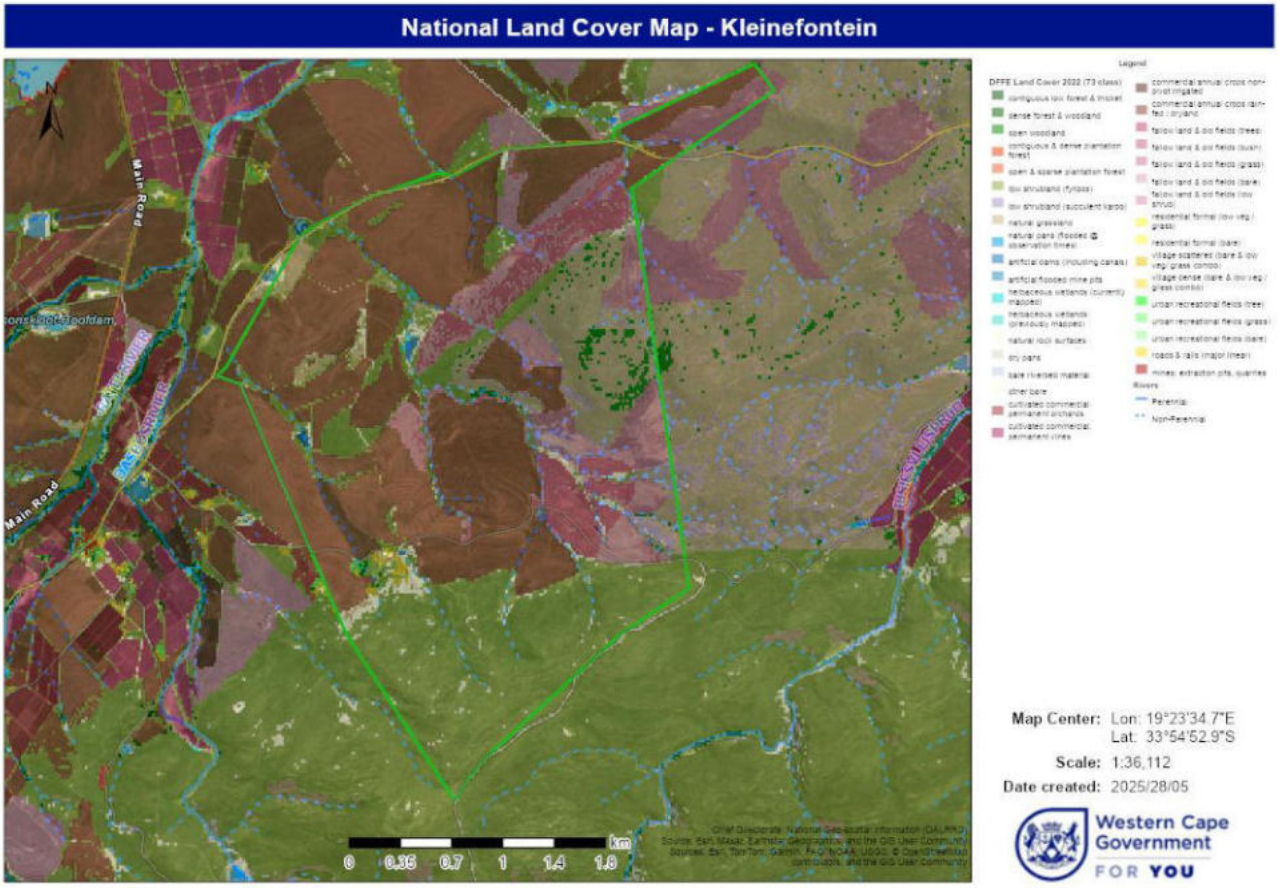

Figure 3: National land cover map (2014) covering the proposed development area (CFM, 2025)

Climatic conditions of the site

Villiersdorp's climate was used as a benchmark for the site and can be classified as a Mediterranean climate, which is generally characterised by warm, dry summers and cool, wet winters. The surrounding mountains and Theewaterskloof Dam influence the local microclimate, with slightly cooler and wetter conditions compared to more inland or low-lying parts of the Breede Valley. The project area receives about 519mm of rain annually (CFM, 2025). The chart below shows the average rainfall values for Villiersdorp per month. In the last year, it received the lowest rainfall (9,9mm) in February and the highest (155.5mm) in June. The monthly distribution of average daily maximum temperatures shows that the average midday temperatures for Villiersdorp range from 16°C in July to 30°C in February. The region is the coldest during July, when the mercury drops to 6°C on average during the night.

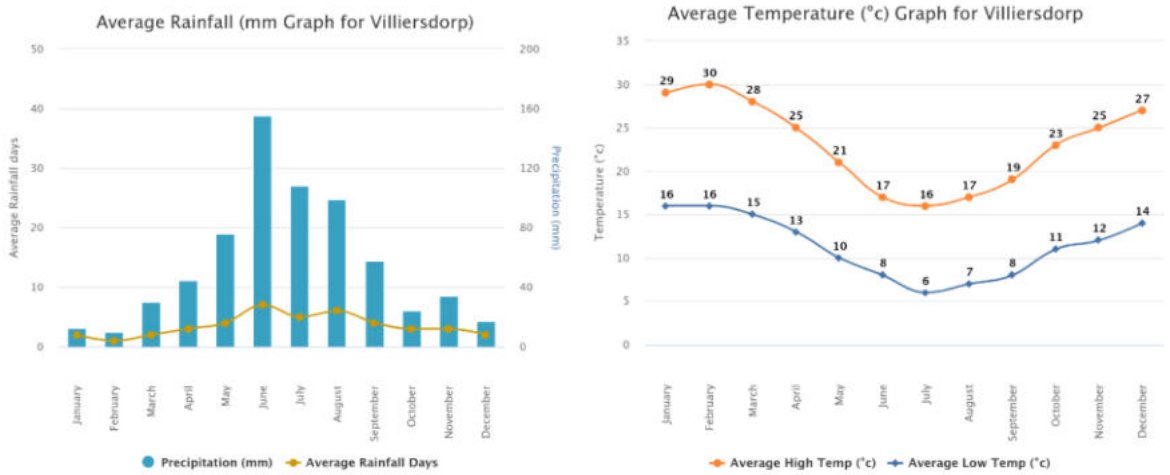

Figure 4: Climate graphs for the Villiersdorp area (World Weather Online, 2025)

Flora and Fauna

Flora

Vegetation associated with the project site is largely classified as the Endangered Breede Shale Renosterveld (FRs8), represented by the blue area in Figure 5. Smaller patches of North Sonderend Sandstone Fynbos (purple area) and Robertson Karoo (yellow area) are also present.

Breede Shale Renosterveld typically occurs in patches throughout the Breede River Valley, from Tulbagh to Swellendam. More specifically, it is found on most of the valley floor between Tulbagh and Wolseley, in isolated small patches near Worcester, in diverse patches between Stettyn and McGregor (south of the Breede River), and as a near-continuous but irregular band on the southern foothills of the Langeberg Mountains from Philipsdale (near Worcester) to Ashton. The most extensive areas occur near Ashton, McGregor, and at the confluence of the Riviersonderend and Breede Rivers west of Swellendam.

The vegetation and landscape features generally associated with this type include low hills, slightly undulating to undulating plains, and lower mountain slopes. In the eastern regions, open, tall shrublands—possibly closely affiliated with FRs12 Central Rûens Shale Renosterveld—are found, where microphyllous shrubs form the dominant layer. Breede Shale Renosterveld transitions into Robertson Karoo in the central valley. Karoo shrublands typically occur on the northern aspects, while renosterveld is found on the southern aspects, with a decline in karoo shrubland extent to the south. Heuweltjies (mound-like features) are prominent, often supporting bush clumps in moister areas and succulent shrubs in drier habitats (Mucina & Rutherford, 2006).

Vegetation found within the affected freshwater features ranged from being in a largely natural state to being largely to seriously modified condition at places. Terrestrial riparian vegetation generally found within the healthier riparian areas included

Sandolien (*Dodonaea viscosa* var. *angustifolia*), Taaibos (*Rhus undulata*), Bittergombos (*Lycium ferocissimum*), Kraalbos (Aizoon africanum L.), Renosterbos (*Elytropappus rhinocerotis*), *Pteronia sp.* and Cotton Milkweed (*Gomphocarpus fruticosus*). Vegetation marking wetter areas included *Ischyrolepis gaudichaudiana*, *Platycaulos major*, *Cyperus congestus*, *Merxmuellera stricta*, *Juncus sp*. and the common reed (*Phragmites australis*).

Fauna

No aquatic-dependent fauna of special concern was observed during the field survey; however, several bird species were noted in the wetter areas. As the site borders a protected area to the southeast, the stream corridors are also expected to serve as migration routes for surrounding wildlife.

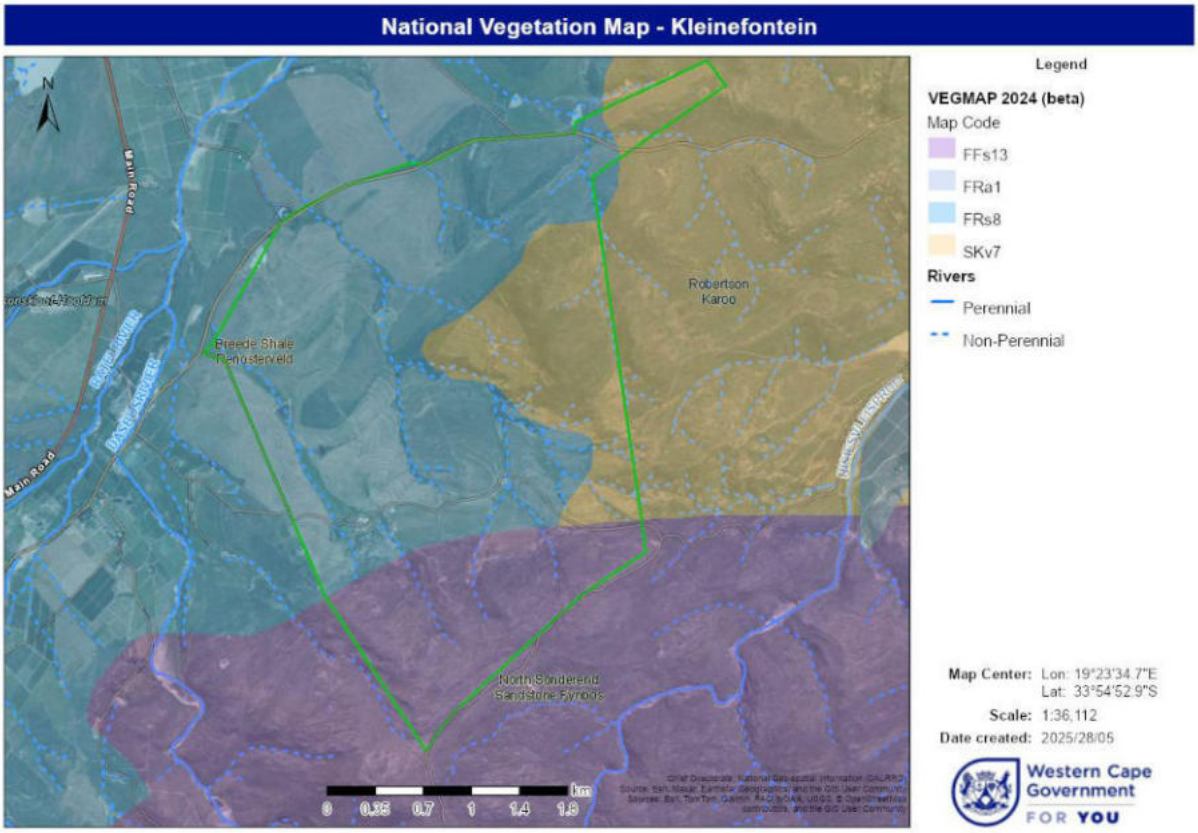

Figure 5: National vegetation map for the project site (green polygon) (CFM, 2025).

Conservation Value

The 2023 Western Cape Biodiversity Spatial Plan Map and the National Freshwater Ecosystem Priority Areas Map provide information regarding the conservation value and ecological importance of the freshwater features studied.

2023 Western Cape Biodiversity Spatial Plan

The 2023 Western Cape Biodiversity Spatial Plan (WCBSP) was formally adopted into law on 13 December 2024 (Gazette Extraordinary No. 9017), in terms of the Western Cape Biodiversity Act (Act No. 6 of 2021). This plan supersedes the 2017 WCBSP and now serves as the official spatial framework for biodiversity conservation and land-use decision-making in the province.

Based on the 2023 WCBSP map (Figure 6), several terrestrial Critical Biodiversity Areas (CBA's) were found along the remaining natural areas on the property. These areas are areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure, and such areas are to be maintained 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.

Furthermore, aquatic Ecological Support Areas (ESA1: Ground Water Source) were also indicated specifically towards the south and east of the property. These areas play a vital role in helping to sustain the baseflow of surrounding rivers, wetlands, and streams during dry periods.

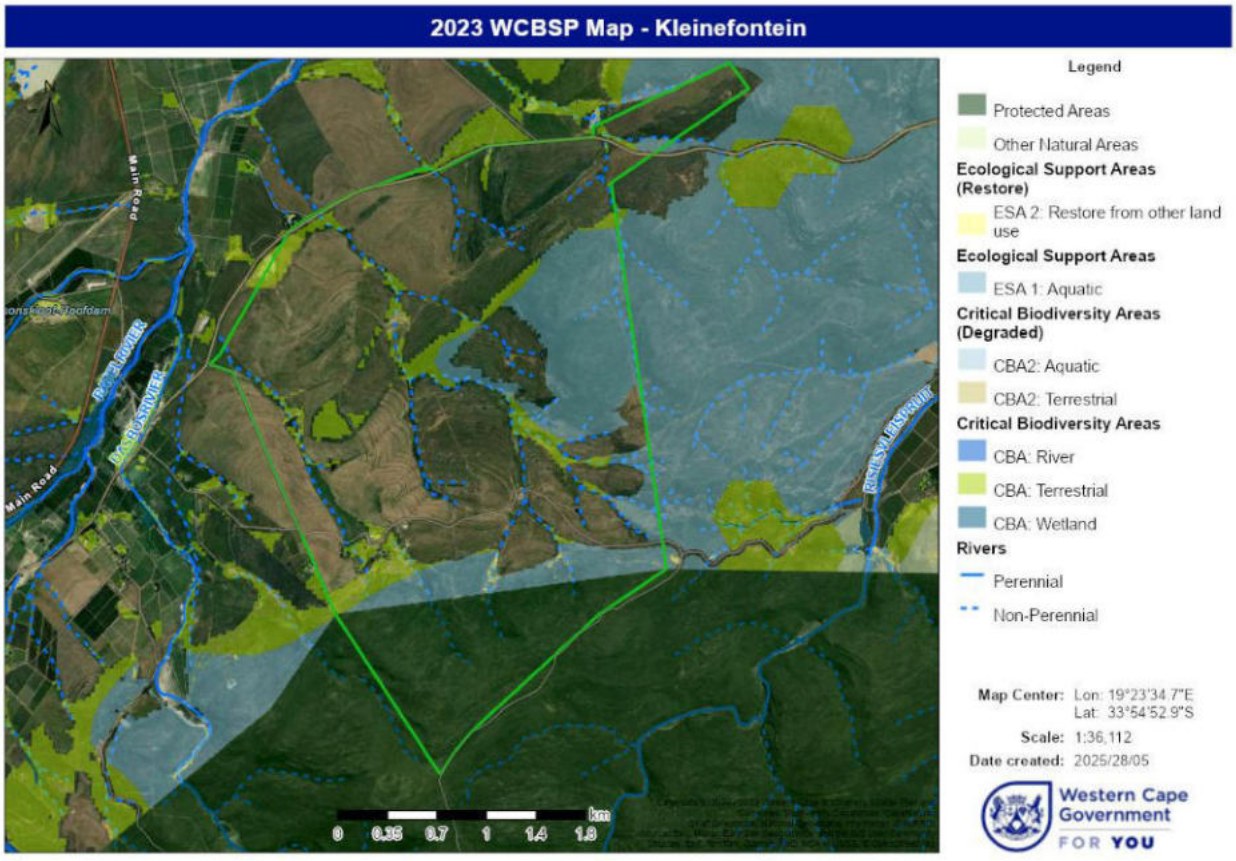

Figure 6: 2025 Western Cape Biodiversity Spatial Plan for the project site (green polygon) (CFM, 2025).

NFEPA map

Freshwater Ecosystem Priority Areas (FEPAs) are strategic spatial priorities identified to support the long-term conservation of freshwater ecosystems and the sustainable use of water resources. According to the National Freshwater Ecosystem Priority Areas (NFEPA) dataset and the National Wetlands Map (NWM5) (refer to Figure 10), the broader catchment in which the project site is located is classified as a FishFEPA (Fish support area).

FishFEPAs, or fish sanctuaries, are sub-quaternary catchments that are critical for the protection of threatened and near-threatened freshwater fish species indigenous to South Africa. These catchments are denoted by either a red or black fish symbol on the map. The sub-quaternary catchment associated with the project area is marked with a black fish, indicating the presence of at least one population of vulnerable or near-threatened fish species, or a population of special concern. The primary objective of FishFEPAs is to prevent further decline in the condition of aquatic ecosystems, particularly those supporting sensitive fish species. As such, no further deterioration in river condition should occur within fish sanctuaries, and no new permits should be issued for the introduction or stocking of invasive alien fish species in these catchments.

In addition to the above, the National Wetlands Map classifies the Ratel River and its larger associated floodplain as East Coast Shale Renosterveld_Floodplain wetland, currently in a C condition (FEPA rank 5). These wetlands are marked as being critically endangered – both from a vegetation and wetland ecosystem perspective.

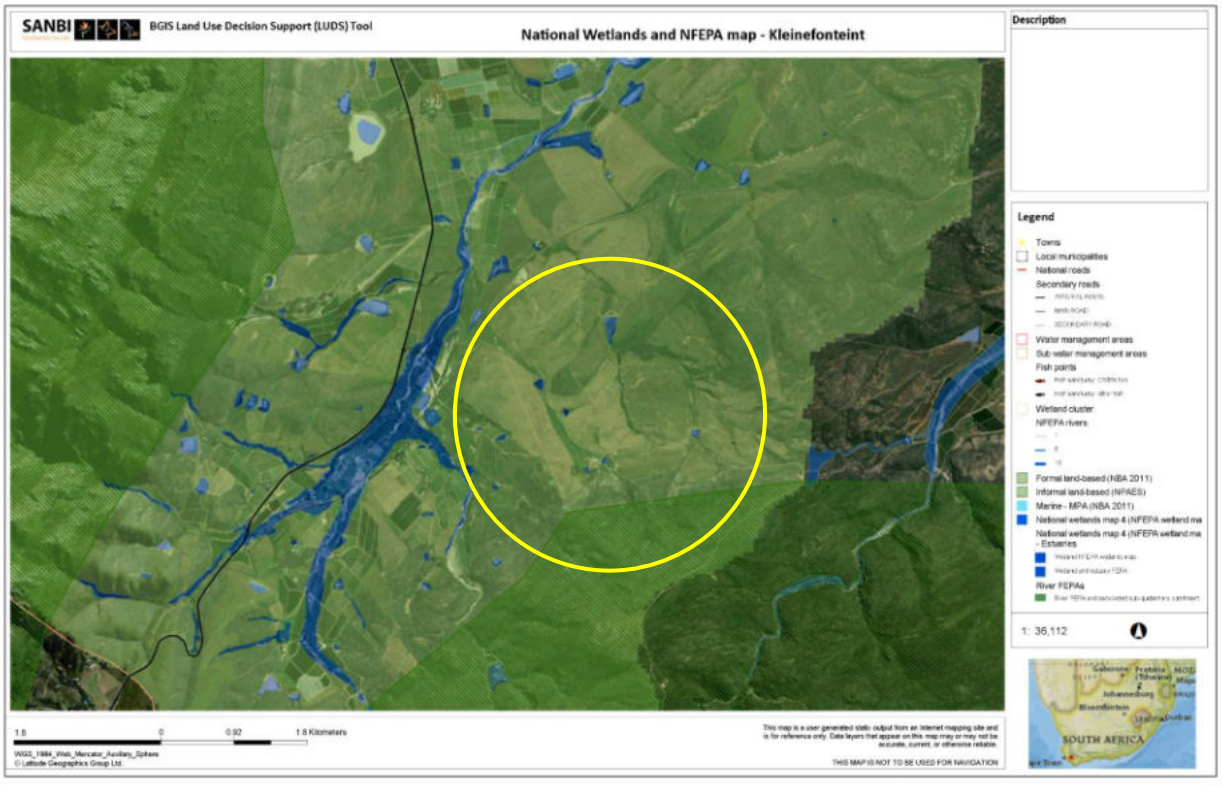

Figure 7: NFEPA map for the larger area surrounding the Project site (yellow circle)(SANBI GIS, 2025).

Aquatic assessment

Description of the freshwater features

The ecosystem and vegetation of the study area were assessed in its present, as well as its likely pre-expanded and historical composition. It is described in the context of the freshwater systems of the area as assessed at the beginning of the wet season, with the site visit done on 29 April 2025. Freshwater features found within the project site included several small seasonal tributaries of the Ratel River with their associated wet areas.

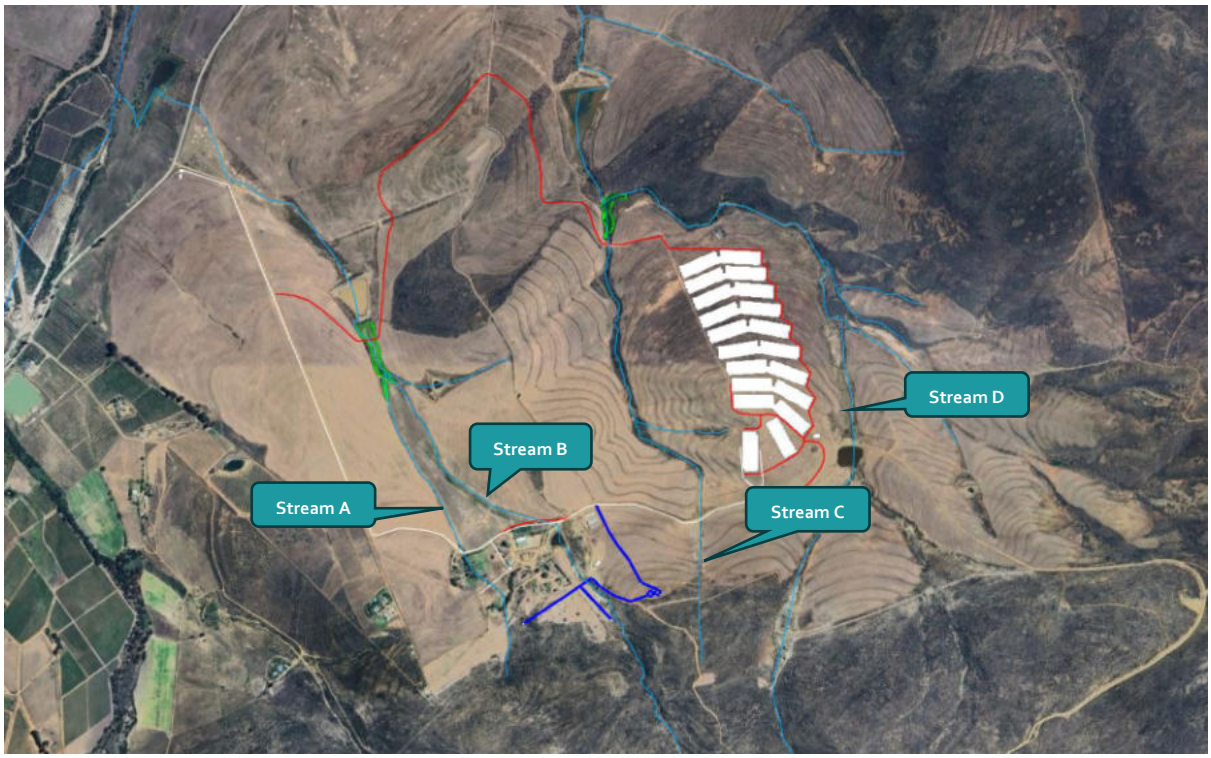

Figure 8: Satellite imagery indicating the project site with the proposed new roads (red lines), the broiler area (white polygons) as well as the affected streams (blue lines) with their associated wetland areas (green polygons).

For the purpose of this report, the freshwater features on site are referred to as Streams A to D (shown in Figure 8). All four streams are primarily seasonal, with permanently wet areas observed along their channels, suggesting a degree of groundwater contribution to baseflow. They originate in the hills to the southeast and flow generally in a north-northwestern direction, where Streams A and B, and Streams C and D converge, respectively, before joining the Ratel River.

The upper reaches of these streams remain largely in a natural state; however, their condition deteriorates to varying degrees (moderately to seriously modified) upon entering farmed areas. In these sections, several historic impacts have been observed, including vegetation removal, agricultural encroachment into riparian zones, the construction of instream dams, and artificial

canalisation, particularly in Streams A and B. Both of these converged stream systems terminate in large farm dams shortly before reaching the Ratel River.

A large portion of the Streams A and B system likely historically comprised an unchanneled valley-bottom wetland. However, this area has been so extensively modified that it has lost all ecological function. Only a small remnant of the wetland remains at the confluence of the two streams. In contrast, Streams C and D have been the least impacted, with large sections still ranging from largely natural to moderately modified in condition.

Due to their similar condition and geomorphological characteristics, as well as the fact that they form two distinct tributaries, Streams A and B were assessed as a single unit, as were Streams C and D.

Geomorphological and Ecological Assessment

The freshwater features mentioned above were assessed using the Classification System for Wetlands and Other Aquatic Ecosystems in South Africa (Ollis et al., 2013). Additionally, the River Index of Habitat Integrity (IHI) for rivers and streams, were utilised to determine the Present Ecological State (PES) of the affected freshwater features. Together with the Ecological Importance and Sensitivity (EIS) method, these tools were employed to evaluate the ecological condition, functional performance, and overall importance of the rivers, streams or wetlands on site.

Based on the above assessments, the Recommended Management Objective (RMO) and Recommended Ecological Class (REC) were determined. These approaches provide a comprehensive understanding of the streams' current state, their ecological roles, and their significance in terms of biodiversity and resilience. They also offer valuable insights into the key ecological drivers influencing these systems. Each freshwater feature has been evaluated using the methodology outlined in ***Annexure 1***, and detailed results of these assessments are provided in ***Annexure 2***.

TABLE 2: SUMMARY OF THE RIVER ASSESSMENT FOR THE UNNAMED TRIBUTARIES

	Stream A and B	Streams D and E
DWA catchment	H40F	
Vegetation type	Breede Shale Renosterveld (Critically Endangered)	
Rainfall region	Winter	
System	Inland System	
Regional Setting	Western Folded Mountains	
Landscape unit	Slope to Valley Floor	
Hydrogeomorphic Unit	Stream (Seasonal)	
Longitudinal zonation/Landform/ Outflow drainage	Foothill - Sand Bed	
Landform/Inflow drainage	Active Channel	
Substratum type	Loam and Clay	

Special conservational features (from desktop study)	**WCSBP (2017)**	Based on the 2023 WCBSP map (Figure 6), terrestrial Critical Biodiversity Areas (CBA's) were found around the remaining natural areas on the property Furthermore, aquatic Ecological Support Areas (ESA1: Ground Water Source) were also indicated specifically towards the south and east of the property.	
	NFEPA	According to the National Freshwater Ecosystem Priority Areas (NFEPA) dataset and the National Wetlands Map (NWM5) (refer to Figure 10), the broader catchment in which the project site is located is classified as a FishFEPA (Fish support area). In addition to the above, the National Wetlands Map classifies the Ratel River and its larger associated floodplain as East Coast Shale Renosterveld_Floodplain wetland, currently in a C condition (FEPA rank 5).	
PES	D/E: Largely to Seriously modified		A/B: Natural to Largely Natural
EIS	Low to Moderate		High
RMO and REC	RMO – D: Maintain; REC – D		RMO – A: Maintain; REC – A/B
Proposed Buffer Zone	**Road Crossings:** As the proposed work will occur within the stream channels, the implementation of a buffer zone is not considered feasible. **Other Activities:** All other activities should be located outside a 30-meter buffer zone measured from the edge of the streams' riparian areas.		

Impact Assessment

The freshwater impacts are rated in accordance with the Environmental Impact Assessment Regulations, 2010 and the criteria drawn from the IEM Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the (DEAT, 2006), as well as the Guideline Document on Impact Significance (DEAT, 2002).

As with any development activity within a natural system, such activity will give rise to potential impacts, either positive or negative, on the surrounding environment. In this section, the significance of the existing and potential impacts related to the project on the freshwater ecology at the site, as well as on downstream freshwater features, is assessed. In addition to that, a description of mitigation measures needed to limit the negative impacts was formulated, as well as the significance of the impacts, assuming that the mitigation measures are implemented in full, is assessed.

Of the proposed project components, only the new stream crossings will directly impact the freshwater features on site. Additionally, the nature of the development (a chicken broiler facility) could potentially pose a risk of indirect impacts on water quality, primarily affecting Streams C and D, as well as some limited hydrological impacts during the maintenance phase.

These activities might impact on the following:

- Loss of biodiversity, aquatic habitat and ecological structure;
- Potential hydrology modification and change in sediment balance;
- Potential Water Quality impacts.

Potential Impact – Loss of biodiversity and ecological structure:

The proposed activities involve the installation of three new road crossings, two over Streams A and B, and one over Stream C, as well as one pipeline crossing over Stream B. The road crossings will require soil excavation, vegetation clearance, and in-stream construction, and are therefore expected to have a definite impact on biodiversity and ecological structure at the crossing points. In contrast, the pipeline crossing will consist of a treated timber pole spanning the watercourse, with the pipeline mounted above the stream. As this method avoids direct disturbance to the streambed and banks, it is expected to have minimal impact on the aquatic environment.

Streams A and B have already been assessed as being in a largely to seriously modified state with low EIS at the proposed crossing locations, with significant existing alterations to the streambed and banks, as well as extensive vegetation removal. Consequently, the construction of road crossings over Streams A and B is expected to result in a **short-term, low negative impact**.

Although the general condition of Stream C was found to be in a largely natural state with high EIS, the proposed road crossing will be located at an existing informal crossing that has already undergone vegetation clearance and soil compaction. The formalisation of this crossing, combined with the rehabilitation of the surrounding disturbed areas, is anticipated to result in a **long-term, low to medium positive impact on the directly surrounding section of the stream**.

Mitigation measures:

To try and minimise this impact, the following mitigation measures are proposed.

Construction Phase:

- All road crossing structures must be designed to avoid obstruction of streamflow, including low flows.
- Construction activities directly involving freshwater features (i.e., road and pipeline crossings) should preferably be scheduled during the dry summer months—typically from December to March—when rainfall and runoff are at their lowest.
- If any flow is present within the streams during construction, appropriate measures must be taken to divert the water around the work area and ensure its release downstream.
- A buffer zone extending 6 meters upstream and downstream of the construction footprint should be clearly demarcated. No disturbance or activity should occur beyond these designated areas within the stream channel.
- The boundaries of this buffer zone must be physically demarcated using high-visibility fencing or flagging prior to the commencement of any construction activities.
- Work within the stream channels should be limited strictly to essential areas.
- Clearing of riparian or wetland vegetation must be avoided where possible or otherwise kept to a minimum. Where practicable, vegetation should be pruned or topped rather than grubbed or uprooted.

- All wetland/stream areas disturbed during construction must be rehabilitated and revegetated with appropriate indigenous wetland and riparian buffer species once construction is complete.

Operational Phase:

- All rehabilitated and revegetated areas within the wetland/stream areas should be monitored for the following 2 years, ensuring the establishment of good plant biodiversity.
- Monitoring of all stream crossings for signs of erosion, debris build-up or nuisance growth around the culverts, should be included and addressed in a formal Maintenance and Management Plan for the project.
- No use of machinery is allowed within any wetland/stream channels for the operational phase.
- All debris must be removed and properly disposed of.
- No dumping of debris should be allowed in the stream/wetland areas.
- Any wetland/ riparian or instream areas disturbed by Maintenance activities to be rehabilitated and revegetated (if necessary) after maintenance works

Impact with mitigation measures:

Should all mitigation measures be taken into account, the general impact of the above activities would be deemed to be of:

- **Construction Phase**: Short-term, Low Negative nature
- **Operational Phase:** Long Term, Low to Medium Positive nature**.**

Potential Impact - Water Quality Impairment:

During the construction phase, vegetation clearing and physical disturbances to stream banks and wetland areas at freshwater crossings may increase the risk of erosion and subsequent sedimentation in downstream freshwater systems. Additionally, construction activities inherently carry a risk of general pollution, which could lead to the degradation of surface water quality in receiving freshwater features. This impact is expected to be of a **short-term, low to medium negative nature**, affecting the immediate surrounding freshwater environment.

Looking at operational phase impacts, the nature of the proposed development, a chicken broiler facility located on a slope, poses a potential risk of significant water quality degradation in nearby freshwater systems. Broiler litter is typically rich in nutrients, microbes, organics, and trace metals; therefore, runoff from the broiler site could lead to eutrophication in downstream areas, particularly following the first seasonal rains. If not properly mitigated, such runoff could substantially degrade water quality and indirectly impact aquatic biodiversity associated with the streams.

The client has indicated that management practices will include dry sweeping and the removal of manure, followed by high-pressure washing of broiler areas, with wash water directed into surrounding pastures. In addition, as part of a stormwater management plan, the construction of stormwater swales along access roads is proposed, designed to accumulate runoff in designated dry pans.

Should the above be applied, the operational phase of the project is expected to have a **very low negative impact on water quality within Streams C and D**.

Mitigation measures:

The following mitigation measures are proposed to minimise any impacts:

Construction Phase:

- As mentioned above, construction activities should preferably take place during the drier months, and special attention should be given to managing water quality impacts in the construction Environmental Management Programme (EMP).
- Temporary silt fencing, sandbags, or berms should be installed within downstream channels to prevent sediment generated during construction from entering downstream freshwater features.
- Implement a phased clearing approach, limiting vegetation clearance to areas required for active construction only.
- Designate stockpile locations at least 50 metres away from any watercourses or wetland areas.
- Prevent contaminated runoff from construction sites from entering adjacent streams or wetlands by using diversion drains and berms. Temporary detention basins or sediment traps should be constructed to capture excess sediment before it reaches wetland or stream areas.
- Good Site Management Practices include:
    - Portable chemical toilets must be provided at all work sites, or ensure that conveniently located site toilets are available. Toilet facilities must not be located within 100 metres of any stream or wetland areas.
    - Maintain and clean toilets regularly to ensure they remain in good working order and hygienic condition.
    - No waste or foreign materials may be dumped into streams or wetlands. These areas must also not be used for cleaning clothing, tools, or equipment.
    - Prevent the discharge of water containing polluting matter or visible suspended solids directly into streams or wetland areas.
    - Immediately clean any accidental oil or fuel spills or leaks. Do not hose or wash spills into the surrounding natural environment.
    - All operations involving the use of cement and concrete (outside of the batching plant) must be carefully controlled.
    - Limit cement and concrete mixing to designated sites wherever possible.

Operational Phase

- The existing plans would sufficiently address the possible water quality impacts posed by the broiler site.

Impact with mitigation measures:

If these mitigation measures are adhered to, the impact of the proposed upgrade works is expected to have a **Low to very low negative impact on the water quality of downstream freshwater features.**

Potential Impact – Flow modification and change in sediment balance:

The following flow modification impacts are expected during the construction and operational phases of the project.

Construction Phase

- If flow is present during construction, activities within the streams and associated wetland areas may impede flow, resulting in short-term hydrological modifications to downstream wetland features and potentially causing prolonged inundation of upstream wetland areas.
- Although construction is planned for the drier summer months, the risk of flow disruption remains. Warm and dry conditions may exacerbate impacts by reducing the availability of low/baseflows, thereby affecting ecosystems downstream that rely on these flows for ecological functioning.

Operational Phase

- The initial design for the proposed stream crossings (now the **alternative option**), particularly at the confluence of Streams A and B and at the lower crossing over Stream C, did not accommodate subsurface flow. This would have impeded groundwater movement and likely caused fragmentation and possible desiccation of downstream wetland areas associated with these reaches. In response, the **preferred option** now incorporates subsurface drainage via a no-fines sub-soil drain and an embedded pipe network to maintain hydrological connectivity and lower any flow modification impacts associated with these structures. Engineer plans for both the preferred and alternative options have been added under Annexure C.

Mitigation measures:

In order to reduce the possible impact of any flow modifications occurring, the following mitigation is proposed.:

Construction Phase:

- Low water bridges should be installed at or slightly below the natural streambed level to avoid obstructing low flows and to facilitate the unimpeded movement of aquatic biota.
- As mentioned under "Loss of Biodiversity", should flow be present during construction, temporary diversion structures should be implemented to reroute stream and wetland flow

around the active work area, ensuring that low flows remain uninterrupted throughout the construction period.

- As the client proposes to include subsoil drainage in the low-water bridge structures, the following mitigation should be taken into account:
    - Drainage should consist of several pipes or a continuous stone layer.
    - The subsoil drain's cross-sectional area should roughly match or exceed the flow cross-section of the natural subsurface seepage path, both up and downstream of the bridge. This should be at a minimum 0.3–0.5 m depth and width.
    - The subsoil drain must be wrapped in geotextile or similar to keep fine wetland sediments out.
    - Stone size must be uniform and coarse to maintain voids for long-term flow.

Operational Phase

- Regular maintenance should be conducted to remove debris accumulation and control nuisance vegetation growth, as outlined under the "Loss of Biodiversity" section, to prevent blockages and ensure continued flow over the bridge structure.

Impact with mitigation measures:

Should all mitigation measures be taken into account, the general impact of the above activities would be deemed to be of:

- **Construction Phase**: Short-term, Low Negative nature
- **Operational Phase:** Long Term, Low to Negligible Negative nature.

Summary of the expected impacts:

TABLE 3: SUMMARY OF THE EXPECTED IMPACTS RELATING TO THE CONSTRUCTION PHASE.

SITE CLEARANCE, CONSTRUCTION PHASE		
	Preferred Alternative	
Nature of impact:	Development of the new Chicken broiler and associated infrastructure.	
Description and consequence of impact or risk:	Impacts causing loss of the aquatic ecology and biodiversity of all the indicated stream crossings.	
Indirect impacts:	Water quality impairment and possible erosion, as well as flow modification within the marked streams and associated wet areas.	
	Without mitigation	**With mitigation**
MAGNITUDE of impact:	**Medium (-)** This impact could result in a remarkable alteration of the aquatic function and processes within the directly surrounding freshwater features.	**Low (-)** This impact could result in a slight alteration of the aquatic function and processes within the directly surrounding freshwater features.
DURATION:	**Short term**	

SITE CLEARANCE, CONSTRUCTION PHASE		
	Preferred Alternative	
	0-3 years.	
EXTENT (special scale/ influence of impact):	**Local** The impacted area should be limited to the site and the immediate surrounding area.	
IRREPLACEABLE loss of resources:	**Medium potential** Resources can be replaced with effort.	
INTENSITY and degree to which the impact can be REVERSED:	**Medium** With no mitigation in place, the natural processes of the affected freshwater features could be remarkably altered. Natural functions and processes can be reversed to their pre-activity state.	
PROBABILITY of occurrence:	**Medium** There is a distinct probability that the impact will occur.	
Significance rating of impact <u>without and with</u> mitigation:	**Medium-Low (-)** The overall significance of the above potential impact is predicted to be Medium-high, without mitigation. Impacts are important and require mitigation measures to reduce the negative impacts to acceptable levels.	**Low (-) to Low (+)** With mitigation, the overall significance of the above potential impacts is predicted to be low, with mitigation, and within the acceptable range.
Cumulative impact (with mitigation):	**Low on the larger freshwater system**	

TABLE 4: SUMMARY OF THE EXPECTED IMPACTS RELATING TO THE OPERATION PHASE.

OPERATIONAL PHASE		
	Preferred Alternative	
Nature of impact:	Operation of the Brioler site as well as proposed bridge maintenance activities.	
Description and consequence of impact or risk:	The most significant impact during the operational phase is expected to be limited flow modification and loss of biodiversity resulting from ongoing future maintenance activities.	
Indirect impacts:	A small possibility of a reduction in water quality through the operation of the broiler, which could cause eutrophication and limited loss in biodiversity in the surrounding streams C and D (where only the most sensitive species will be affected).	
	Without mitigation	**With mitigation**
MAGNITUDE of impact:	**Low (-)** This impact could result in minimal alteration of the aquatic function and processes within all affected freshwater features, largely through short-term impedance of flow through possible debris build-up around the low water bridges/during the maintenance clearing activities.	**Low (+)** Natural functioning of the environment is restored to some degree, with better flow within the streams through well-functioning bridge and rehabilitated areas.
DURATION:	**Short term**	

OPERATIONAL PHASE		
	Preferred Alternative	
	Although maintenance activities will take place throughout the operational phase of the broiler site, their actual occurrence and associated impacts will be limited to short, intermittent periods.	
EXTENT (special scale/ influence of impact):	**Local** Impacted area extends to the site and its immediate surrounding area.	
IRREPLACEABLE loss of resources:	**Low potential** No irreplaceable resources will be impacted.	
INTENSITY and degree to which the impact can be REVERSED:	**Low to Medium** Natural functioning of the environment is minimally to remarkably affected. Natural processes can be reversed to their original state.	
PROBABILITY of occurrence:	**Medium Probability** There is a distinct probability that the impact will occur	**Low probability** There is a low probability that the impact will occur
Significance rating of impact <u>without and with</u> mitigation:	**Low to Medium-low (-)** The overall significance of the above potential impact is predicted to be Low to Medium-low, without mitigation. Although impacts fall within an acceptable range, impacts are still considered important, and mitigation measures are required to reduce the negative impacts.	**Very Low (-)** This impact would result in a very limited change in the aquatic function within affected freshwater features.
Cumulative impact:	**Low negative impact on the larger freshwater system**	

Results and recommendations

The site contains four primarily seasonal streams (Streams A to D), which originate in the southeastern hills and flow north-northwest, eventually converging into two tributaries before joining the Ratel River. While their upper reaches remain natural, the streams become modified to varying degrees in farmed areas due to vegetation clearance, agricultural encroachment, instream dams, and canalisation, especially in Streams A and B. Both tributaries terminate in large farm dams near the Ratel River.

Due to their similar condition and geomorphological characteristics, as well as the fact that they form two distinct tributaries, Streams A and B were assessed as a single unit, as were Streams C and D. The freshwater assessment result can be summarised as follows:

TABLE 5. SUMMARY OF THE RIVER ASSESSMENT FOR THE UNNAMED TRIBUTARIES

	Stream A and B	Streams D and E
DWA catchment	H40F	
Vegetation type	Breede Shale Renosterveld (Critically Endangered)	

Rainfall region	Winter		
System	Inland System		
Regional Setting	Western Folded Mountains		
Landscape unit	Slope to Valley Floor		
Hydrogeomorphic Unit	Stream (Seasonal)		
Longitudinal zonation/Landform/ Outflow drainage	Foothill - Sand Bed		
Landform/Inflow drainage	Active Channel		
Substratum type	Loam and Clay		
Special conservational features (from desktop study)	**WCSBP (2017)**	Based on the 2023 WCBSP map (Figure 6), terrestrial Critical Biodiversity Areas (CBA's) were found around the remaining natural areas on the property Furthermore, aquatic Ecological Support Areas (ESA1: Ground Water Source) were also indicated specifically towards the south and east of the property.	
	NFEPA	According to the National Freshwater Ecosystem Priority Areas (NFEPA) dataset and the National Wetlands Map (NWM5) (refer to Figure 10), the broader catchment in which the project site is located is classified as a FishFEPA (Fish support area). In addition to the above, the National Wetlands Map classifies the Ratel River and its larger associated floodplain as East Coast Shale Renosterveld_Floodplain wetland, currently in a C condition (FEPA rank 5).	
PES	D/E: Largely to Seriously modified		A/B: Natural to Largely Natural
EIS	Low to Moderate		High
RMO and REC	RMO – D: Maintain; REC – D		RMO – A: Maintain; REC – A/B
Proposed Buffer Zone	**Road Crossings:** As the proposed work will occur within the stream channels, the implementation of a buffer zone is not considered feasible. **Other Activities:** All other activities should be located outside a 30-meter buffer zone measured from the edge of the streams' riparian areas.		

Of the proposed project components, only the new stream crossings will directly impact the freshwater features on site. Additionally, the nature of the development (a chicken broiler facility), together with some management activities, could potentially pose a risk of indirect impacts on water quality and hydrology.

These activities might have an impact on the following:

- Loss of biodiversity, aquatic habitat and ecological structure;
- Potential hydrology modification and change in sediment balance;
- Potential Water Quality impacts.

In order to mitigate the above, several mitigation measures have been included and would be applicable to all affected freshwater features/stream crossings along the road.

Conclusion

With the implementation of appropriate mitigation measures, the proposed activities with their expected operational phase are expected to result in a general short-term **low negative impact** on the site's freshwater features.

Following the assessment of the characteristics of the identified aquatic habitats, the DWS Risk Assessment Matrix (which is specified in the Government Notice R509 of 2016 for section 21 (c) and (i) water uses as defined under the NWA (1998)), was conducted to ascertain the significance of perceived impacts of the proposal on the key drivers and response processes (hydrology, water quality, geomorphology, habitat and biota) of the aquatic habitats. During both the construction and operational phases of the development, impacts on the freshwater features resulted in a **Low-risk score**.

As all the indicated freshwater features found within the project site would be defined as a watercourse, any activities that are to take place within 32 meters thereof could require authorisation in terms of the relevant regulations of NEMA. In addition, Section 21 of the National Water Act and Regulation 1199 of 2009, as it relates to the NWA, will also apply, and therefore, a Water Use License will usually be required for the proposed development unless a General Authorisation is granted.

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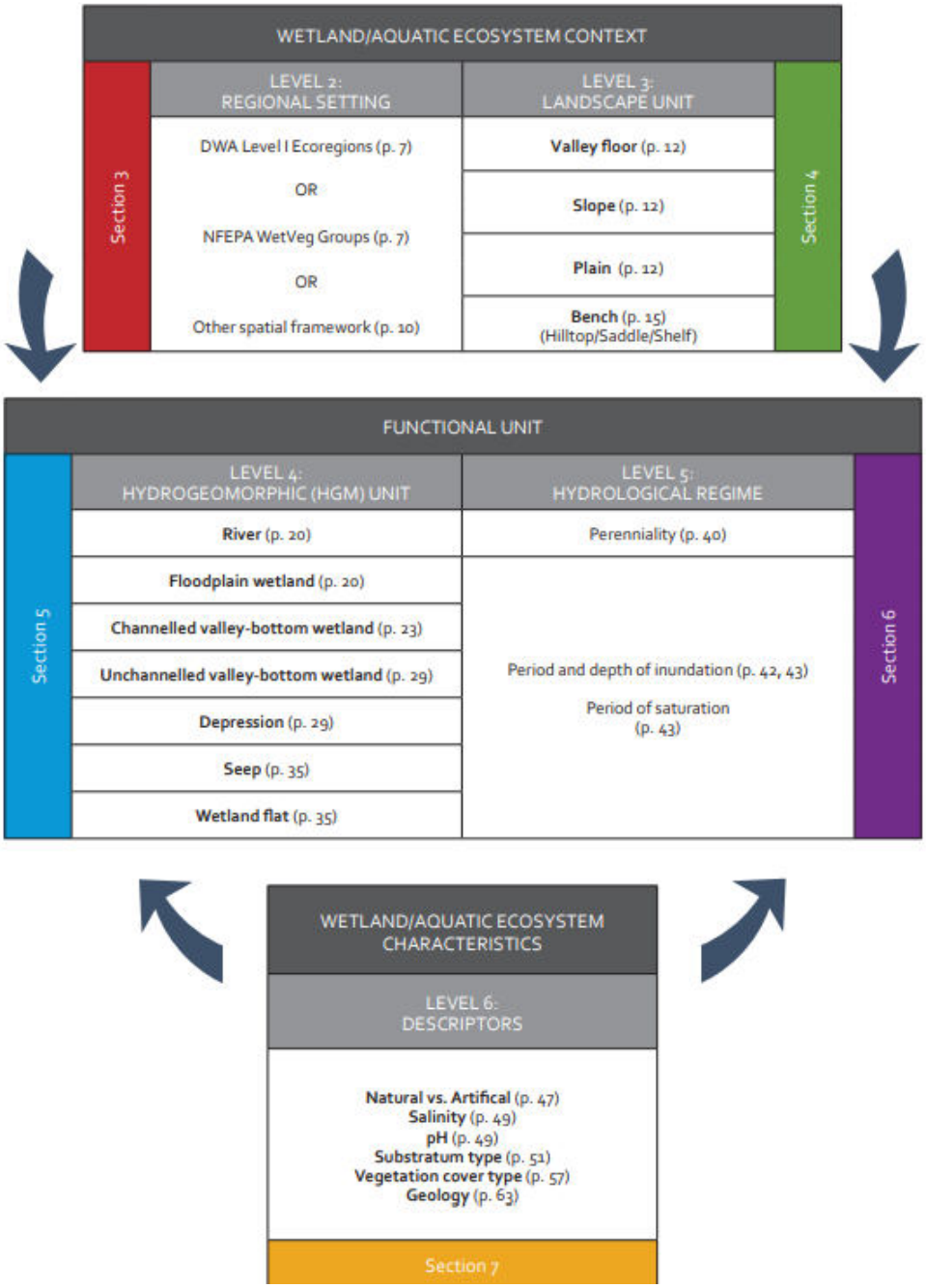
Annexure A- Assessment Methods & Criteria

Freshwater assessment methods:

Geomorphological and Physical Description of the Freshwater Features

The Classification System for Wetlands and Other Aquatic Ecosystems in South Africa (Ollis, 2013), was utilised to classify freshwater features encountered within the proposed study area. A summary of the classification system is presented below.



Classification of aquatic systems and Present ecological State calculation

A formal Habitat Integrity (PES), EIS (Ecostatus level III) and REC assessment were conducted to get a good representation of the present ecological state of the affected freshwater areas.

Ecological Assessment

River Habitat integrity (PES)

The habitat integrity of a river refers to the maintenance of a balanced composition of physico-chemical and habitat characteristics on a temporal and spatial scale that is comparable to the characteristics of natural habitats of the same region (Kleynhans 1996). The determination and categorization of the state of various biophysical attributes of rivers relative to the natural or close to the natural reference condition provides the information needed to derive desirable and attainable future ecological objectives for the river as well as determine to which degree it has been altered from its natural state.

During the habitat integrity assessment, the instream and riparian zone aspects of the river or stream are assessed in terms of the number and severity of disturbances on the stream. These disturbances include both abiotic and biotic factors, which are regarded as the primary causes of the degradation of a river. The river type context is also taken into account in order to consider the weight of the abovementioned metrics on both the instream and riparian zone and includes the flow regime, geomorphic zone as well as size of the river assessed.

The result of the integrity assessment is a percentage that is used to derive a descriptive habitat integrity category for the instream and riparian zone components and is also used as an indicator on the Present Ecological State (PES).

TABLE 1-1. IHI ECOLOGICAL CATEGORIES

Ecological Category	PES % Score	Description
A	90-100 %	**Unmodified, natural.**
B	80-89 %	**Largely natural with few modifications:** A small change in natural habitats may have taken place but the ecosystem functions are essentially unchanged.
C	60-79 %	**Moderately modified:** Loss and change of natural habitat and biota have occurred, but the basic ecosystem functions are still predominantly unchanged.

D	40-59%	**Largely modified.** A large loss and change of natural habitat, biota and basic ecosystem functions has occurred.
E	20-39%	**Seriously modified.** The loss of natural habitat, biota and basic ecosystem functions is extensive.
F	0-20 %	**Critically / Extremely modified:** Modifications have reached a critical level and the 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.

Ecological Importance and Sensitivity (EIS)

The ecological importance of a water resource is an expression of its importance to the maintenance of ecological diversity and functioning on local and wider scales. Ecological sensitivity refers to the system's ability to resist disturbance and its capability to recover from disturbance once it has occurred.

The Ecological Importance and Sensitivity (EIS) assessment considers a range of biotic and habitat determinants that indicate either ecological importance or sensitivity. These determinants are evaluated using a four-point scale, and the median of the scores is calculated to establish the overall EIS category.

TABLE 1-2 DEFINITION OF THE SCALE USED TO ASSESS BIOTIC AND HABITAT DETERMINANTS

Scale	Definition
1	One species/taxon judged as rare or endangered at a local scale.
2	More than one species/taxon judged to be rare or endangered on a local scale.
3	One or more species/taxon judged to be rare or endangered on a Provincial/regional scale.
4	One or more species/taxon judged as rare or endangered on National scale (SA Red Data Books)

TABLE 1-3. ECOLOGICAL IMPORTANCE AND SENSITIVITY CATEGORIES (DWAF, 1999)

EISC	General description	Range of median
Very high	Quaternaries/delineations considered to be unique on a national and international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat)	>3-4

	are usually very sensitive to flow modifications and have no or only a small capacity for use.	
High	Quaternaries/delineations considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.	>2-≤3
Moderate	Quaternaries/delineations considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are not usually very sensitive to flow modifications and often have substantial capacity for use.	>1-≤2
Low/ marginal	Quaternaries/delineations not unique on any scale. These rivers (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

Recommended Management Objective (RMO), Recommended Ecological Category (REC), Freshwater Delineation and Buffer Zones

Recommended Management Objective

The RMO (table below) was determined based on the results obtained from the PES, reference conditions and EIS of the freshwater resource (sections above), with the objective of either maintaining, or improving the ecological integrity of the freshwater resource in order to ensure continued ecological functionality.

TABLE 1-4: RECOMMENDED MANAGEMENT OBJECTIVES (RMO) FOR WATER RESOURCES BASED ON PES & EIS SCORES.

PES			Ecological Importance and Sensitivity (EIS)			
			Very High	High	Moderate	Low
	A	Pristine	A Maintain	A Maintain	A Maintain	A Maintain
	B	Natural	A Improve	A/B Improve	B Maintain	B Maintain
	C	Good	A Improve	B/C Improve	C Maintain	C Maintain
	D	Fair	C Improve	C/D Improve	D Maintain	D Maintain
	E/F	Poor	D* Improve	E/F* Improve	E/F* Maintain	E/F* Maintain

***PES Categories E and F are considered ecologically unacceptable (Malan and Day, 2012) and therefore, should a freshwater resource fall into one of these PES categories, an REC class D is allocated by default, as the minimum acceptable PES category.**

Recommended Ecological Category

The four ecological importance and sensitivity categories can be regarded as equivalent to the four default ecological management classes (DEMC; A to D) proposed for the purposes of the National Water Act (Table A-4), i.e. it is suggested that a very high ecological importance and sensitivity should justify the assignment of a very high ecological management class, etc. Default ecological management classes are defined in terms of the sensitivity of a system to disturbance and the risk of damaging the system (i.e. its capacity for sustainability and self-recovery). Based on this, there would be a desire to manage the system within particular ranges of protection. The Recommended Ecological Class (REC) for the affected freshwater features were determined by considering the results of the IHI and EIS assessments.

TABLE 1-5: DEFAULT ECOLOGICAL MANAGEMENT CLASSES FOR RIVERS (ADAPTED FROM KLEYNHANS 1996 AND KLEYNHANS ET AL. 1998).

Default Ecological Management Classes	Description Of Perceived Conditions And Allowable Risk
A Highly sensitive systems: No human-induced hazards	Highly sensitive systems. The natural abiotic template should not be modified. The characteristics of the resource should be determined by unmodified natural disturbance regimes. There should be no human-induced hazards to the abiotic and biotic maintenance of the resource.
B Sensitive systems: Small risk allowed	Sensitive systems. Only a small risk of modifying the natural abiotic template and exceeding the resource base should be allowed. Although the risk to the well-being and survival of especially intolerant biota (depending on the nature of the disturbance) at a very limited number of localities may be slightly higher than expected under natural conditions, the resilience and adaptability of biota must not be compromised. The impact of acute disturbances must be totally mitigated by the presence of sufficient refuge areas.
C Moderately sensitive systems: Moderate risk allowed	Moderately sensitive systems. A moderate risk of modifying the abiotic template and exceeding the resource base may be allowed. Risks to the well being and survival of intolerant biota (depending on the nature of the disturbance) may generally be increased with some reduction of resilience and adaptability at a small number of localities. However, the impact of local and acute disturbances must at least partly be mitigated by the presence of sufficient refuge areas.
D Resilient systems: Large risk allowed	Resilient systems. A large risk of modifying the abiotic template and exceeding the resource base may be allowed. Risks to the well-being and survival of intolerant biota (depending on the nature of the disturbance) may be allowed to generally increase substantially with resulting low abundances and frequency of occurrence, and a reduction of resilience and adaptability at a large number of localities. However, the associated increase in the abundance of tolerant species must not be allowed to assume pest proportions. The impact of local and acute disturbances must at least to some extent be

Freshwater Delineation and Buffer Zones

Freshwater features were delineated at a desktop level using historical digital satellite imagery (2003-2024) as well as topographical maps and were verified during a field visit according to the guidelines suggested by DWA (2008). Furthermore, the Buffer Zone Tool for the Determination of Aquatic Impact Buffers developed by the Department of Water and Sanitation (2014) was used to determine the extent of the buffer zone required for all freshwater features.

Impact Assessment Criteria

The freshwater impacts are rated in accordance with the Environmental Impact Assessment Regulations, 2014, as amended, and the criteria are drawn from the IEM Guidelines Series, Guideline 5: Assessment of Alternatives and Impacts, published by the (DEAT, 2006) as well as the Guideline Document on Impact Significance (DEAT, 2002).

The following criteria have been used to evaluate the significance of impacts:

- **Nature**: This is an appraisal of the type of effect the activity is likely to have on the affected environment. The description includes what is being affected and how. The nature of the impact will be classified as positive or negative, and direct or indirect.
- **Extent and location**: This indicates the spatial area that may be affected

Rating	Extent	Description
1	Site	Impacted area is only at the site – the actual extent of the activity.
2	Local	Impacted area is limited to the site and its immediate surrounding area
3	Regional	Impacted area extends to the surrounding area, the immediate and the neighbouring properties.
4	Provincial	Impact considered of provincial importance
5	National	Impact considered of national importance – will affect entire country.

- **Duration**: This measures the lifetime of the impact

Rating	Duration	Description
1	Short term	0 – 3 years, or length of construction period
2	Medium term	3 – 10 years
3	Long term	> 10 years, or entire operational life of project.
4	Permanent – mitigated	Mitigation measures of natural process will reduce impact – impact will remain after operational life of project.
5	Permanent – no mitigation	No mitigation measures of natural process will reduce impact after implementation – impact will remain after operational life of project.

- **Intensity/magnitude**: This is the degree to which the project affects or changes the environment; it includes a measure of the reversibility of impacts

Rating	Intensity	Description
1	Negligible	Change is slight, often not noticeable, natural functioning of environment not affected.
2	Low	Natural functioning of environment is minimally affected. Natural, cultural and social functions and processes can be reversed to their original state.
3	Medium	Environment remarkably altered, still functions, if in modified way. Negative impacts cannot be fully reversed.
4	High	Cultural and social functions and processes disturbed – potentially ceasing to function temporarily.
5	Very high	Natural, cultural and social functions and processes permanently cease, and valued, important, sensitive or vulnerable systems or communities are substantially affected. Negative impacts cannot be reversed.

- **Probability**: This is the likelihood or the chances that the impact will occur

Rating	Probability	Description
1	Improbable	Under normal conditions, no impacts expected.
2	Low	The probability of the impact to occur is low due to its design or historic experience.
3	Medium	There is a distinct probability of the impact occurring.
4	High	It is most likely that the impact will occur
5	Definite	The impact will occur regardless of any prevention measures.

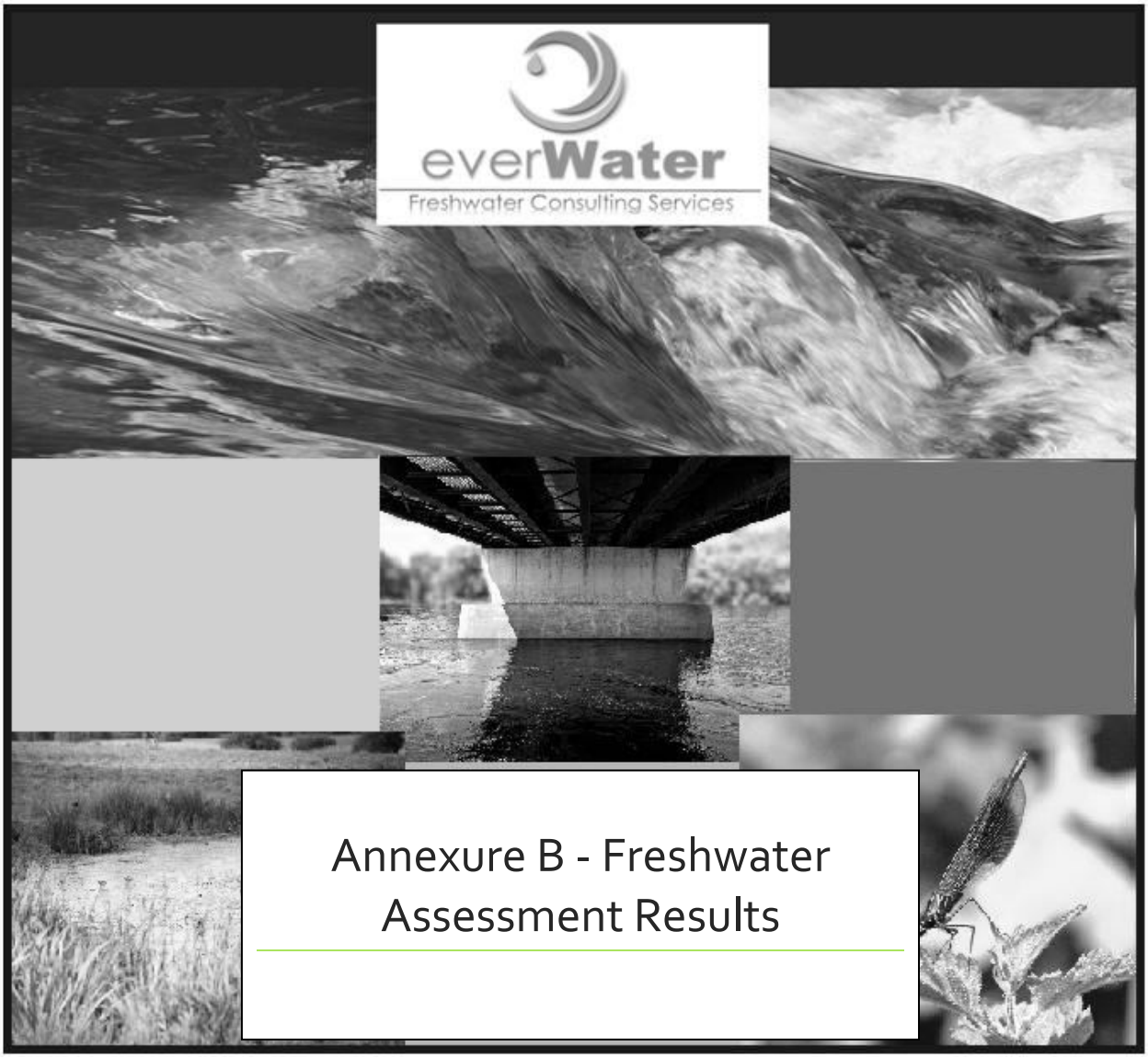
- **Potential for irreplaceable loss of resources:** This is the degree to which the project will cause loss of resources that are irreplaceable

Rating	Potential for irreplaceable loss of resources	Description
1	Low	No irreplaceable resources will be impacted.
3	Medium	Resources can be replaced, with effort.
5	High	There is no potential for replacing a particular vulnerable resource that will be impacted.

- **Significance**: The significance will be rated by combining the consequence of the impact and the probability of occurrence (i.e. consequence x probability = significance). The maximum value which can be obtained is 100 significance points

Rating	Significance	Description
1-14	Very low	No action required.
15-29	Low	Impacts are within the acceptable range.
30-44	Medium-low	Impacts are within the acceptable range but should be mitigated to lower significance levels wherever possible.
45-59	Medium-high	Impacts are important and require attention; mitigation is required to reduce the negative impacts to acceptable levels.
60-80	High	Impacts are of great importance, mitigation is crucial.
81-100	Very high	Impacts are unacceptable.

- **Cumulative Impacts**: This refers to the combined, incremental effects of the impact. The possible residual impacts will also be considered



Annexure B - Freshwater Assessment Results

Habitat Integrity (PES)

IHI Assessment and Results:

The following assessment was conducted for Streams A and B, and Streams C and D, respectively, as they were considered similar units based on their condition and geomorphological characteristics. Streams A and B, as well as Streams C and D, each converge near the proposed development area, forming two tributaries that flow toward the Ratel River. This assessment focuses on the condition of the larger stream sections surrounding the proposed road crossings.

TABLE B-1. INDEX OF HABITAT INTEGRITY ASSESSMENT RESULTS AND CRITERIA ASSESSED FOR THE RIPARIAN ZONE OF THE AFFECTED STREAMS AT THEIR STREAM CROSSINGS.

RIPARIAN ZONE HABITAT INTEGRITY	Streams A and B	Streams D and E
Vegetation Removal (Impact 1 - 25)	20	3
Exotic Vegetation (Impact 1 - 25)	0	0
Bank Erosion (Impact 1 - 25)	15	8
Channel Modification (Impact 1 - 25)	15	0
Water Abstraction (Impact 1 - 25)	12	3
Inundation (Impact 1 - 25)	5	0
Flow Modification (Impact 1 - 25)	12	3
Water Quality (Impact 1 - 25)	7	3
INTEGRITY CLASS	**E**	**B**

TABLE B-2. INDEX OF HABITAT INTEGRITY ASSESSMENT RESULTS AND CRITERIA ASSESSED FOR THE INSTREAM ZONE OF THE AFFECTED STREAMS AT THEIR STREAM CROSSINGS.

INSTREAM HABITAT INTEGRITY	Streams A and B	Streams D and E
Water Abstraction (Impact 1 - 25)	14	3
Flow Modification (Impact 1 - 25)	14	3
Bed Modification (Impact 1 - 25)	18	0
Channel Modification (Impact 1 - 25)	15	0
Water Quality (Impact 1 - 25)	5	0

Inundation (Impact 1 - 25)	5	0
Exotic Macrophytes (Impact 1 - 25)	0	0
Exotic Fauna (Impact 1 - 25)	0	0
Rubbish Dumping (Impact 1 - 25)	5	3
INTEGRITY CLASS	**D**	**A**

Findings:

According to the IHI (Index of Habitat Integrity) assessment, Streams A and B were found to be in a *Largely to Seriously Modified* state, in their riparian and instream zones. The primary impacts on these streams include the presence of upstream dams, significant alteration of the original streambed and channel, and loss of riparian vegetation.

Streams D and E were assessed to be in a Natural to *Largely natural* state, with only slight flow modification and bank erosion (natural), found within the stream.

Ecological Importance and Sensitivity (EIS)

TABLE B-3. RESULTS OF THE EIS ASSESSMENT

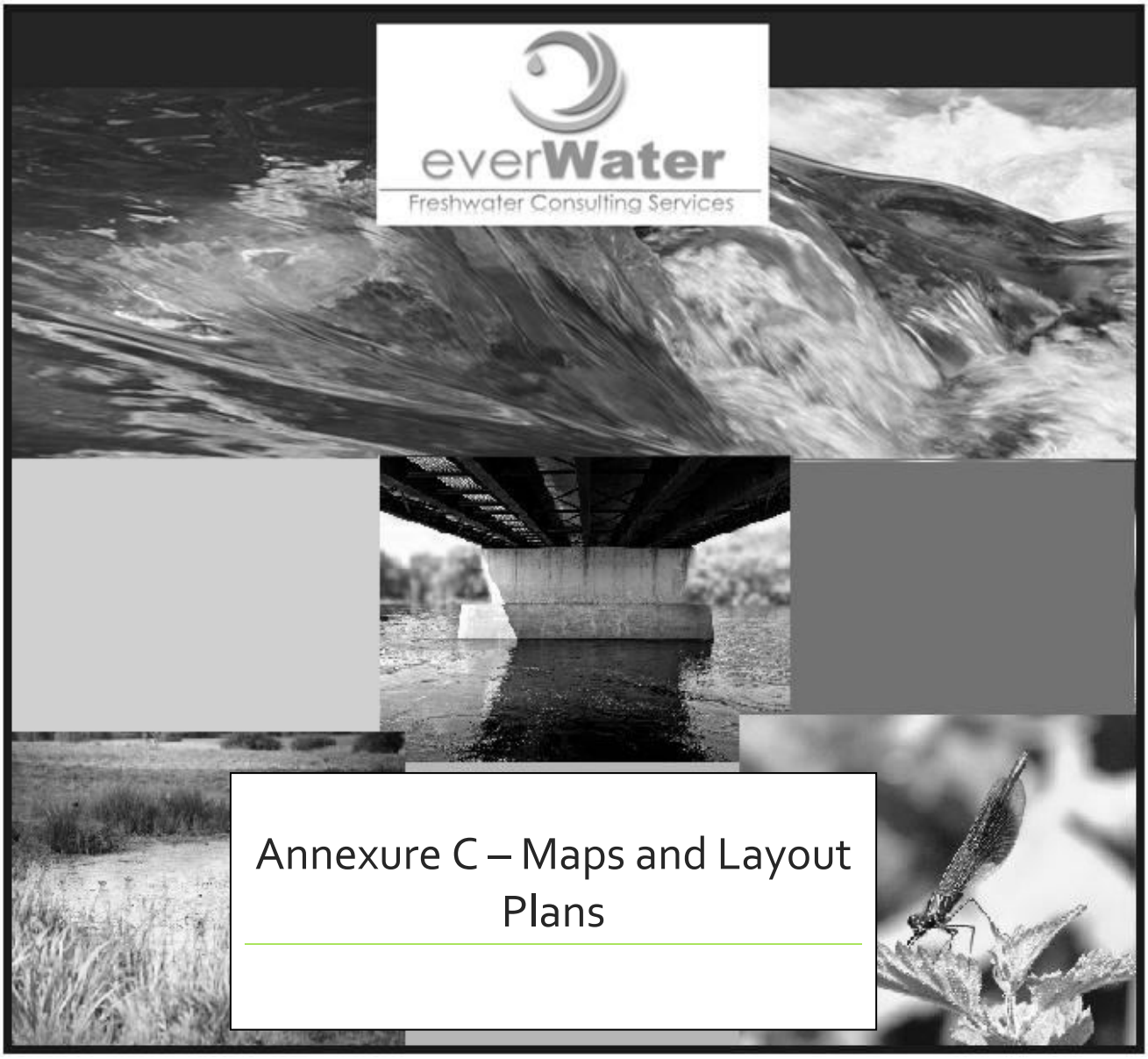
Biotic Determinants	Streams A and B	Streams D and E
Rare and endangered biota	1.5	3
Unique biota	0.5	2
Intolerant biota	1	2
Species/taxon richness	0.5	3
Aquatic Habitat Determinants		
Diversity of aquatic habitat types or features	2	2.5
Refuge value of habitat type	1	2.5
Sensitivity of habitat to flow changes	0.5	1
Sensitivity of flow-related water quality changes	0.5	1
Migration route/corridor for instream and riparian biota	2	2
National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs	1	1
Total	1.05	2
EIS CATEGORY	**Low to Moderate**	**High**

RMO, REC and Buffer zone.

TABLE B-4. RESULTS OF THE RMO, REC AND BUFFER ZONE ASSESSMENT

	RMO	REC	Buffer zone
Streams A and B	D-Maintain	Resilient systems. A large risk of modifying the abiotic template	**Road crossings**: As the work will occur

		and exceeding the resource base may be allowed. Risks to the well-being and survival of intolerant biota (depending on the nature of the disturbance) may be allowed to generally increase substantially with resulting low abundances and frequency of occurrence, and a reduction of resilience and adaptability at a large number of localities. However, the associated increase in the abundance of tolerant species must not be allowed to assume pest proportions. The impact of local and acute disturbances must at least to some extent be	within the stream channels at the proposed road crossings, the implementation of a buffer zone is not considered feasible. **Other activities:** All other activities should fall outside of 30m of the stream's riparian zones.
Streams D and E	A-Maintain	Sensitive systems. Only a small risk of modifying the natural abiotic template and exceeding the resource base should be allowed. Although the risk to the well-being and survival of especially intolerant biota (depending on the nature of the disturbance) at a very limited number of localities may be slightly higher than expected under natural conditions, the resilience and adaptability of biota must not be compromised. The impact of acute disturbances must be totally mitigated by the presence of sufficient refuge areas.	


everWater
Freshwater Consulting Services
Annexure C – Maps and Layout Plans

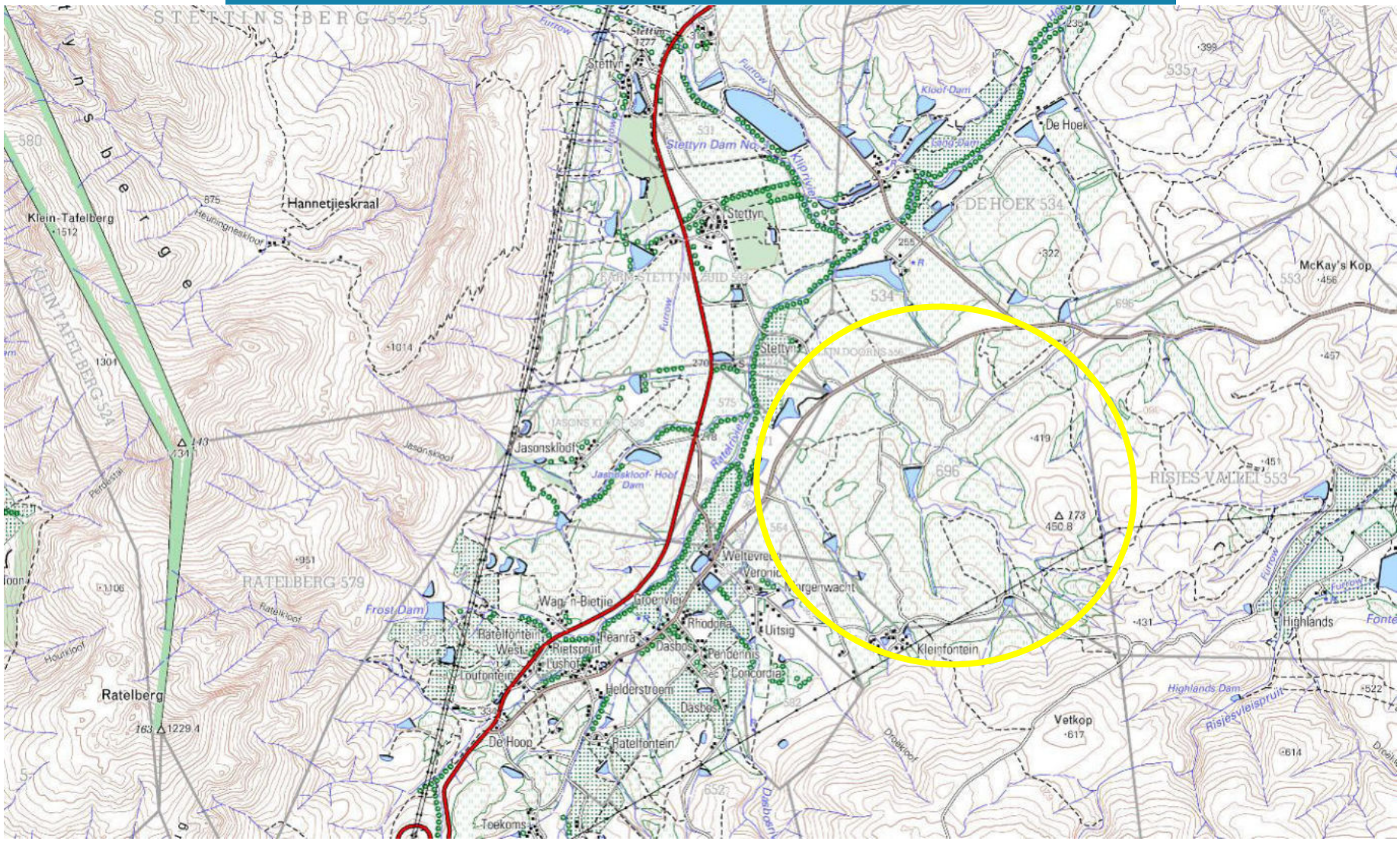


Figure C-1: 1:50 000 Topographical map of the area with the project location (3319CD)

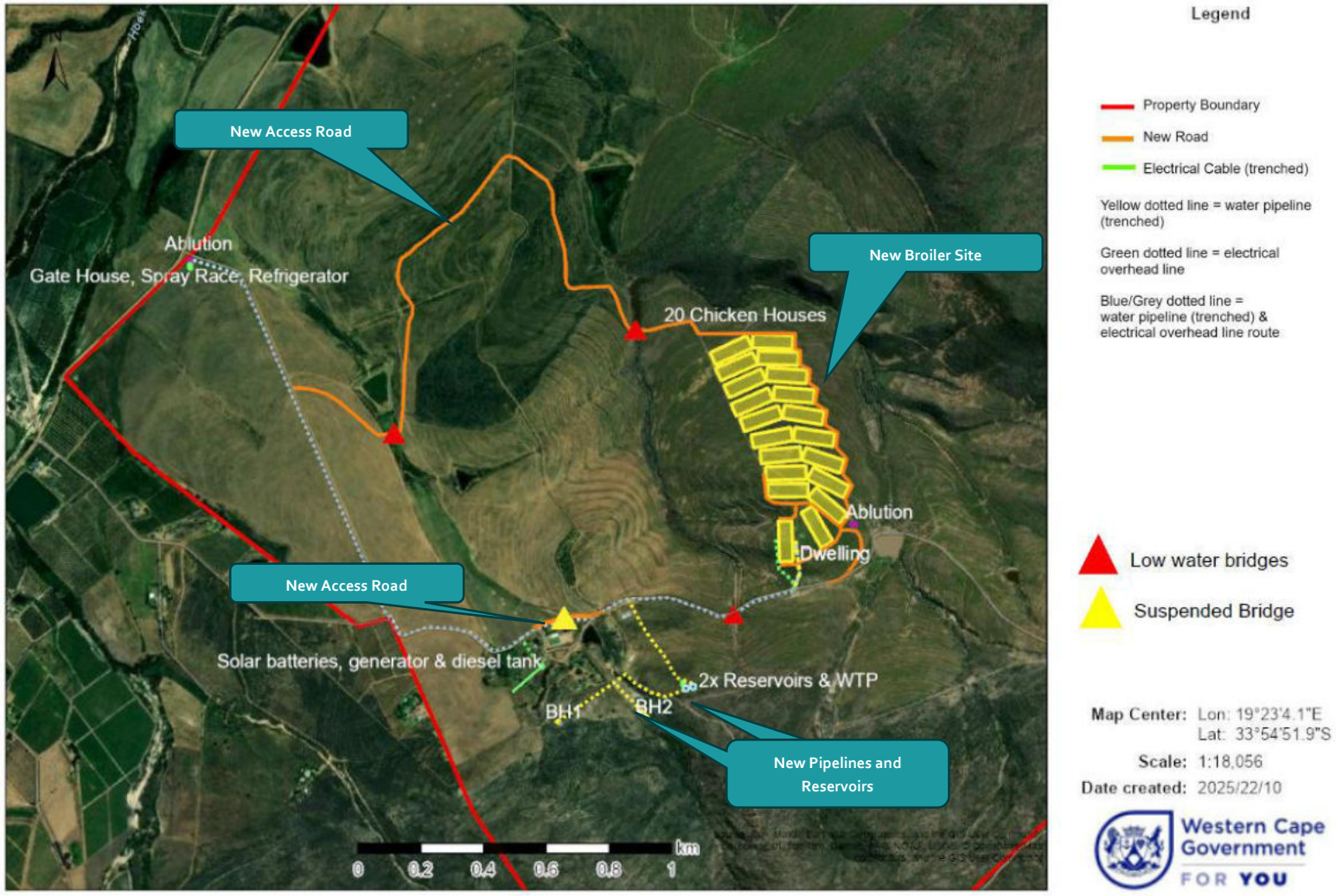


Figure C-2: Proposed activities in relation to the affected freshwater features (Google Earth, 2025).

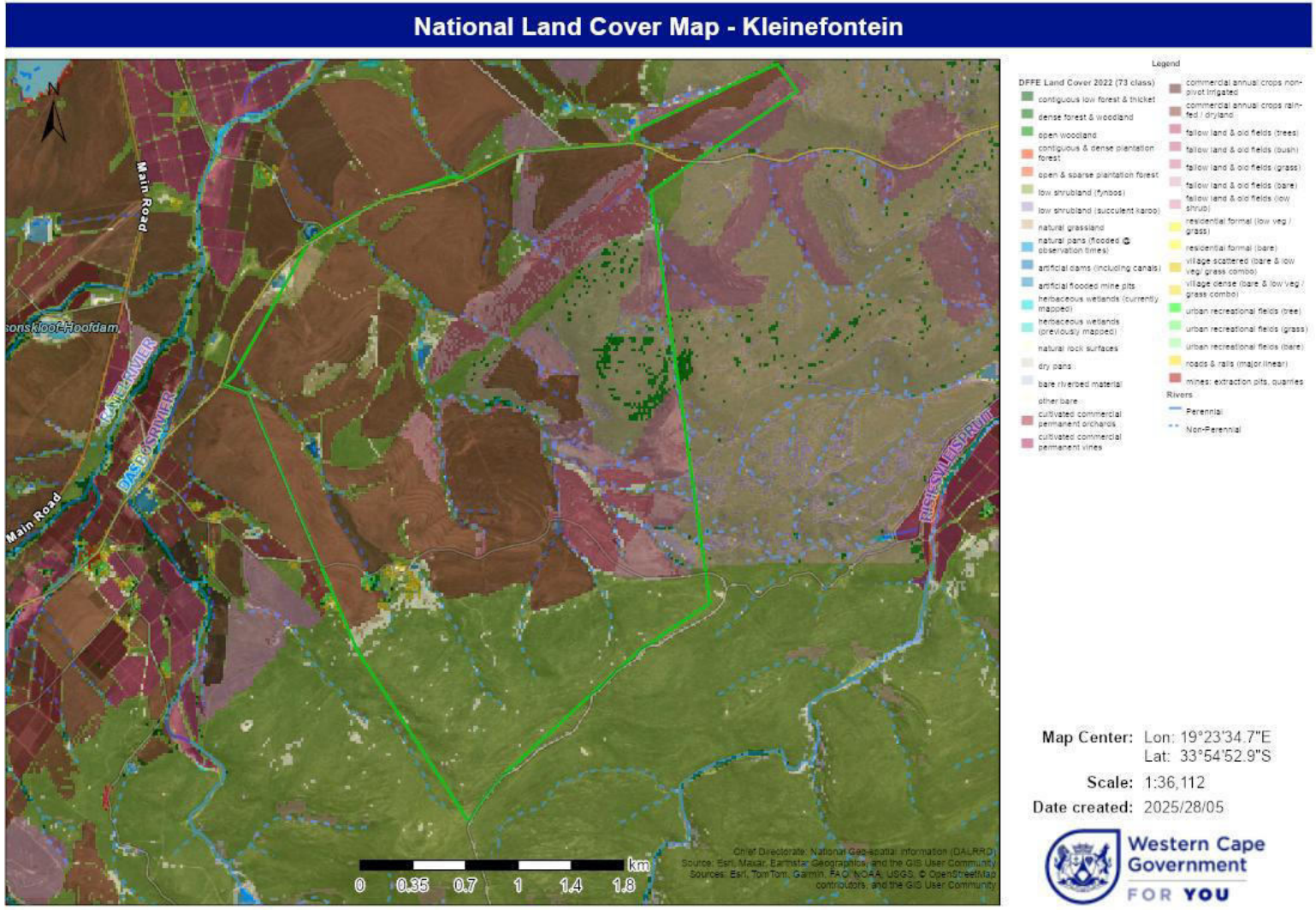


Figure C-3: National land cover map (2014) covering the proposed development area (CFM, 2025)

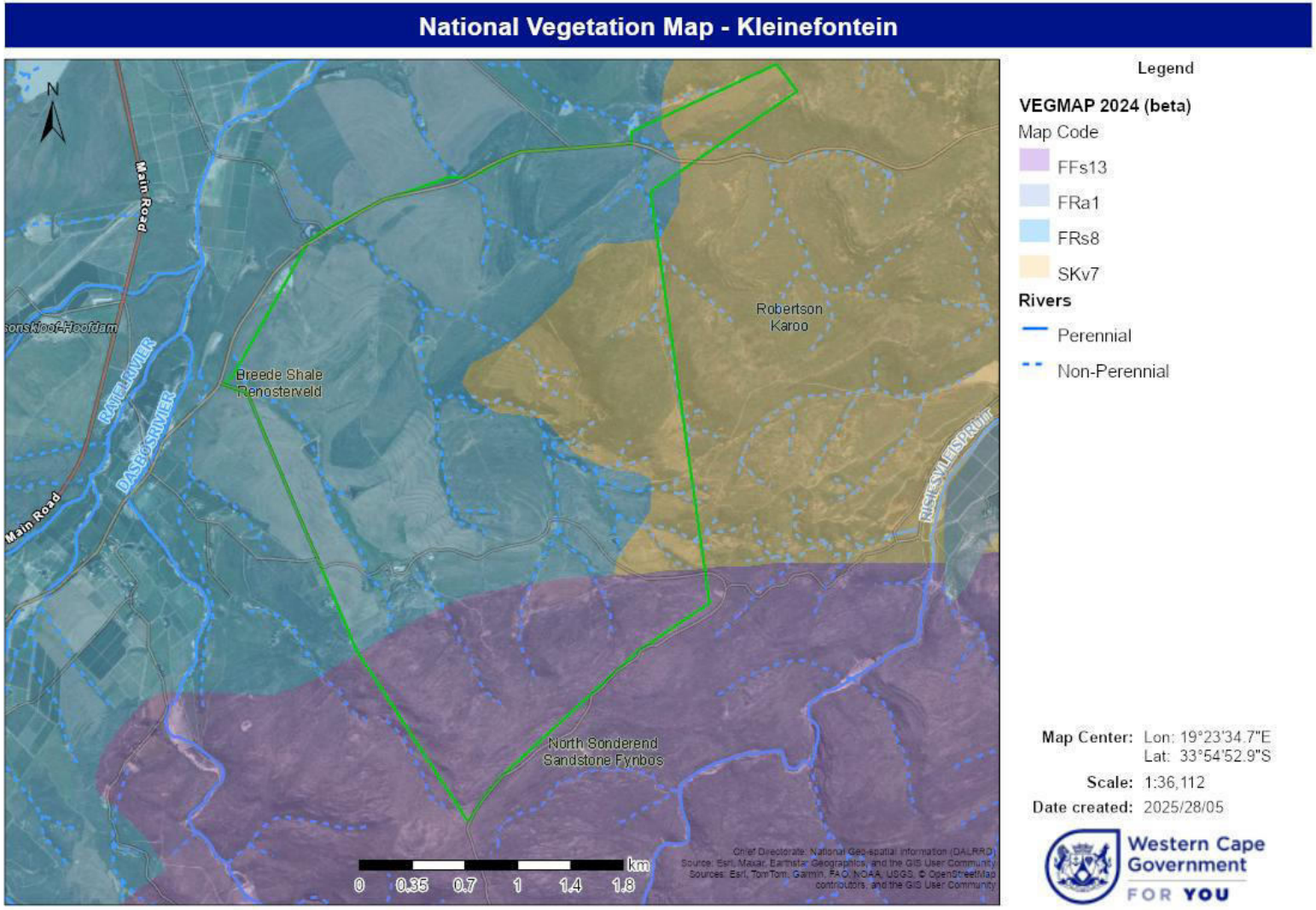


Figure C-4: National vegetation map for the project site (green polygon) (CFM, 2025).

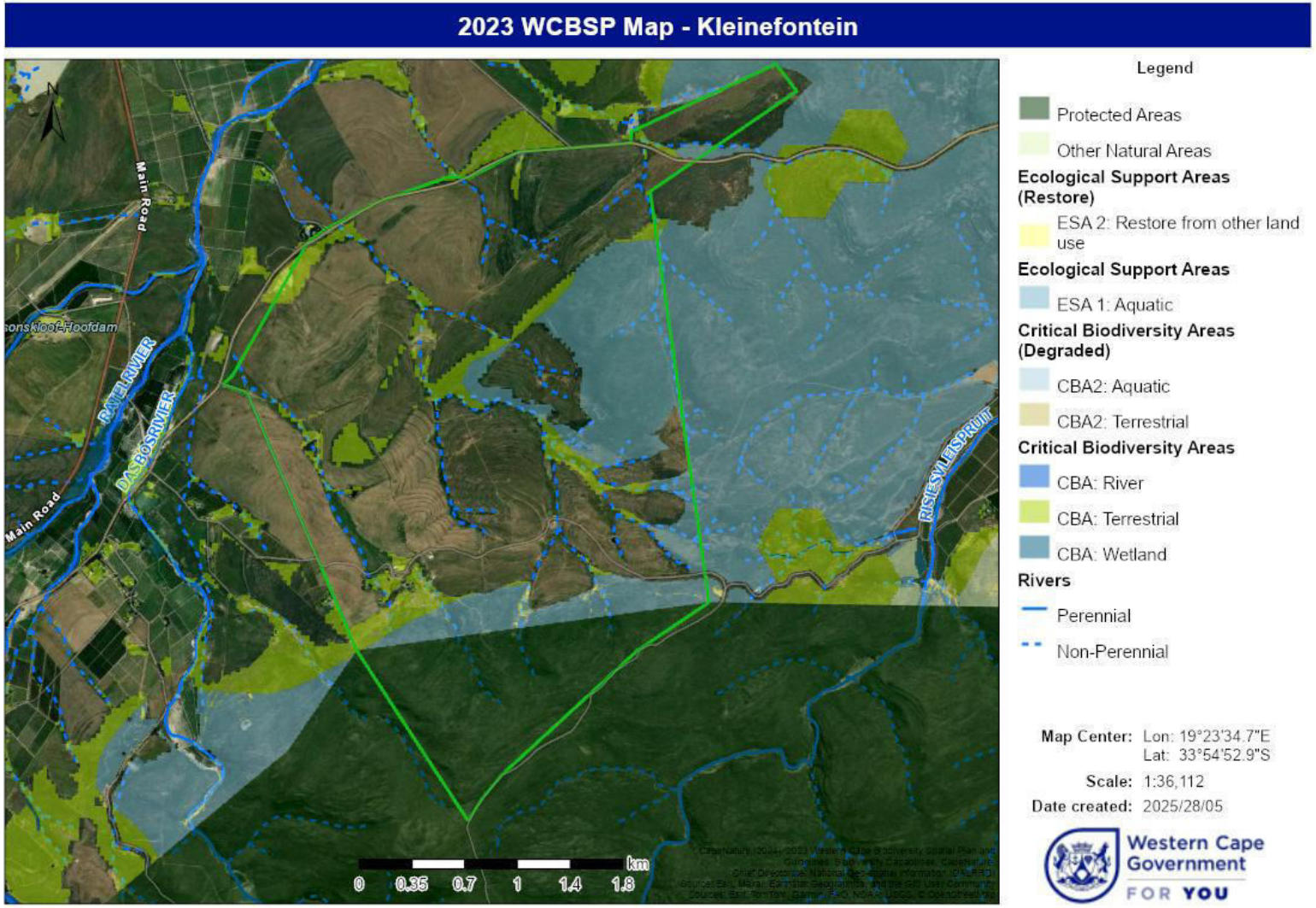


Figure C-5: 2025 Western Cape Biodiversity Spatial Plan for the project site (green polygon) (CFM, 2025).

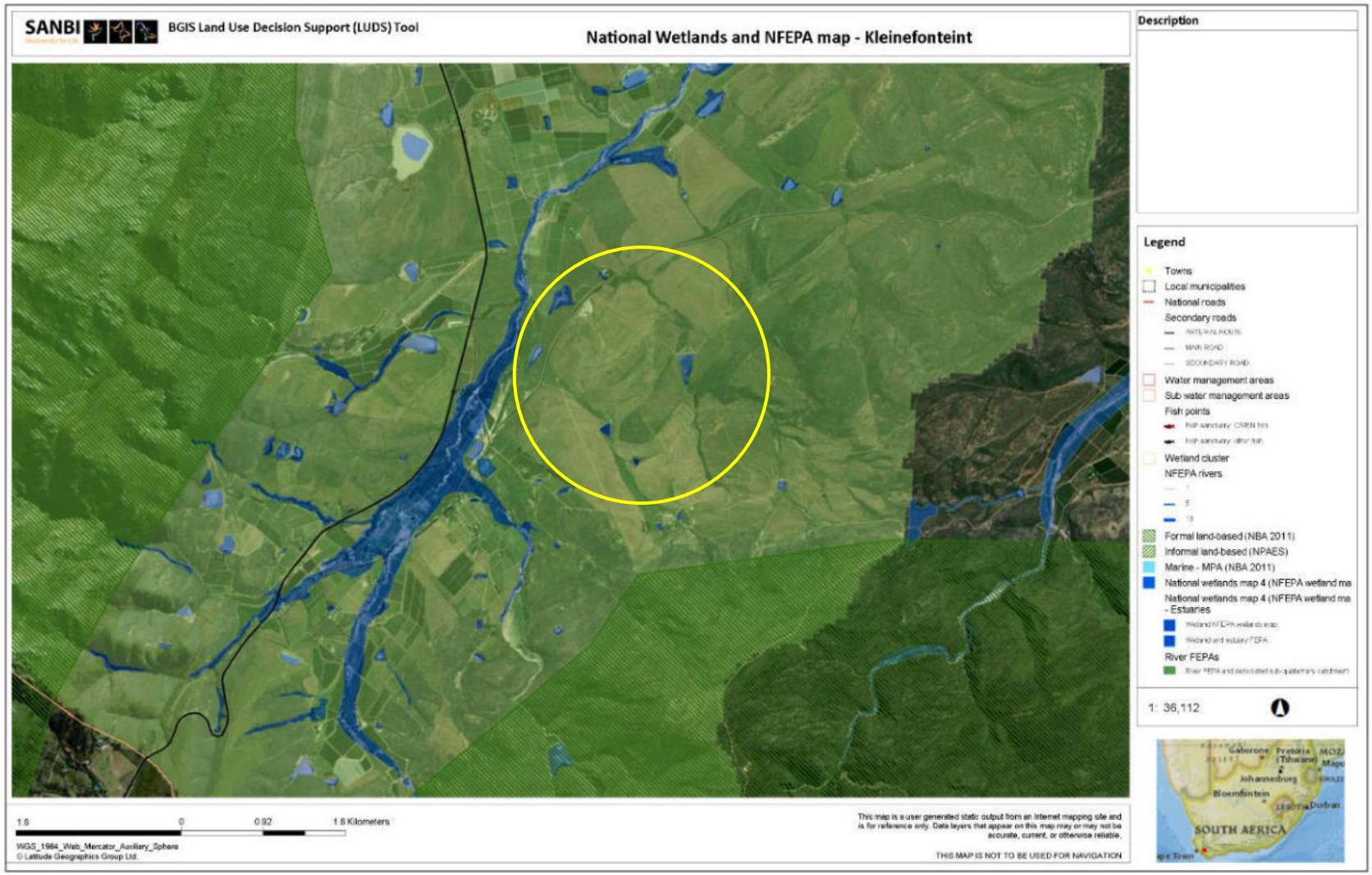


Figure C-6: NFEPA map for the larger area surrounding the Project site (yellow circle)(SANBI GIS, 2025).

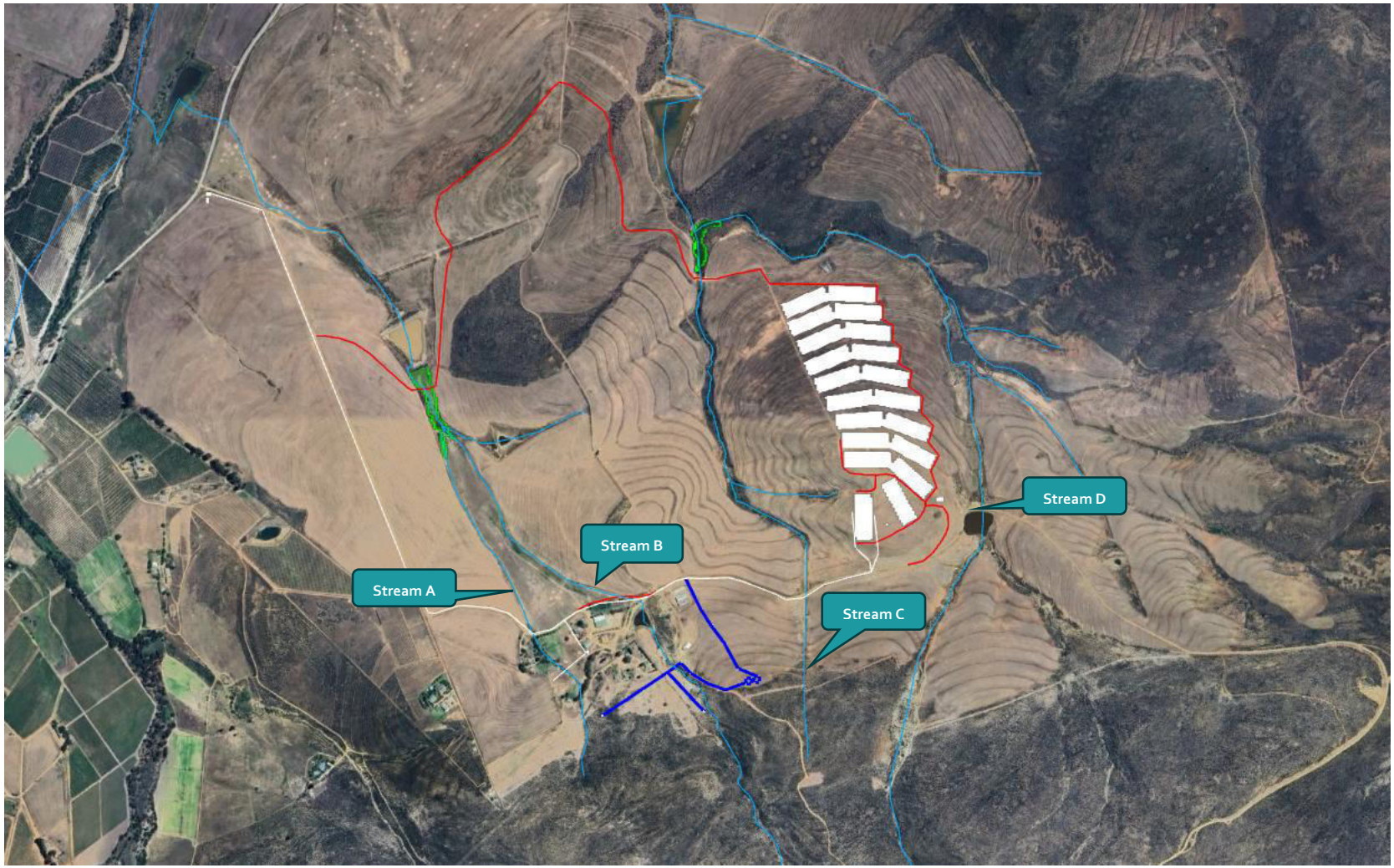


Figure C-7: Satellite imagery indicating the project site with the proposed new roads (red lines), the broiler area (white polygons) as well as the affected streams (blue lines) with their associated wetland areas (green polygons).

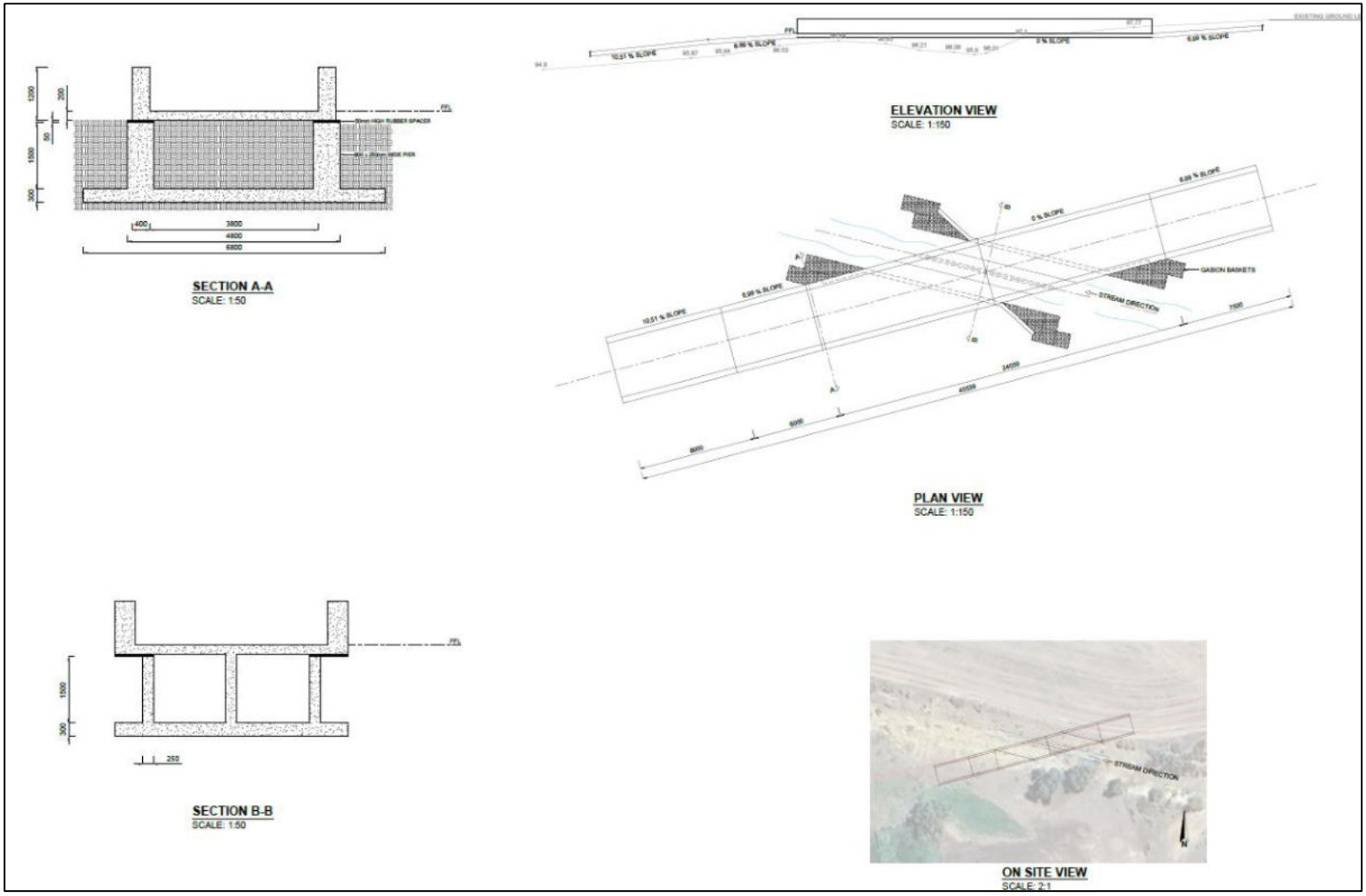


Figure C-8: Engineer drawings for the preferred alternative for the bridge crossing Stream B.

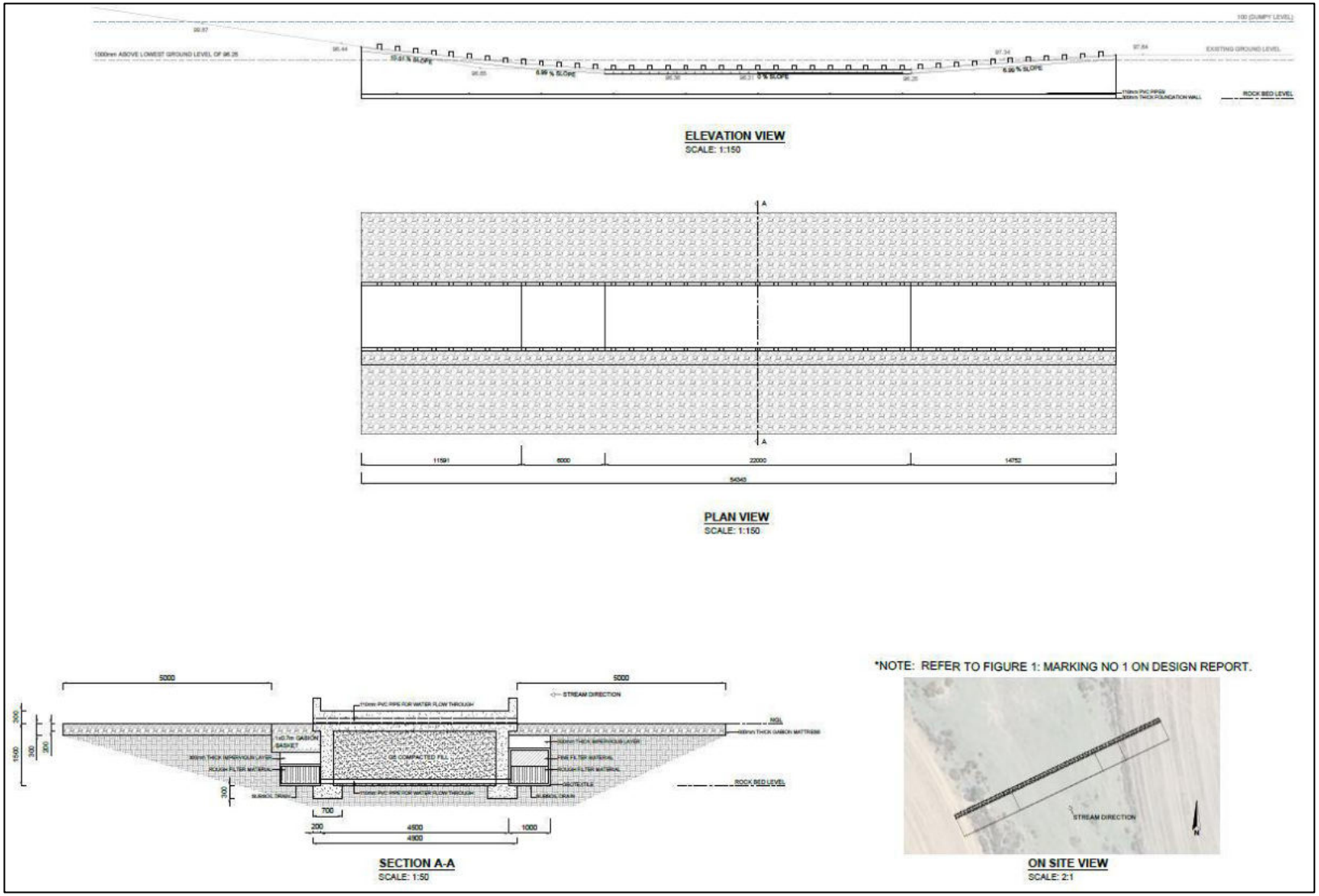


Figure C-9: Engineer drawings for the preferred alternative for the bridge crossing after the confluence of Streams A & B.

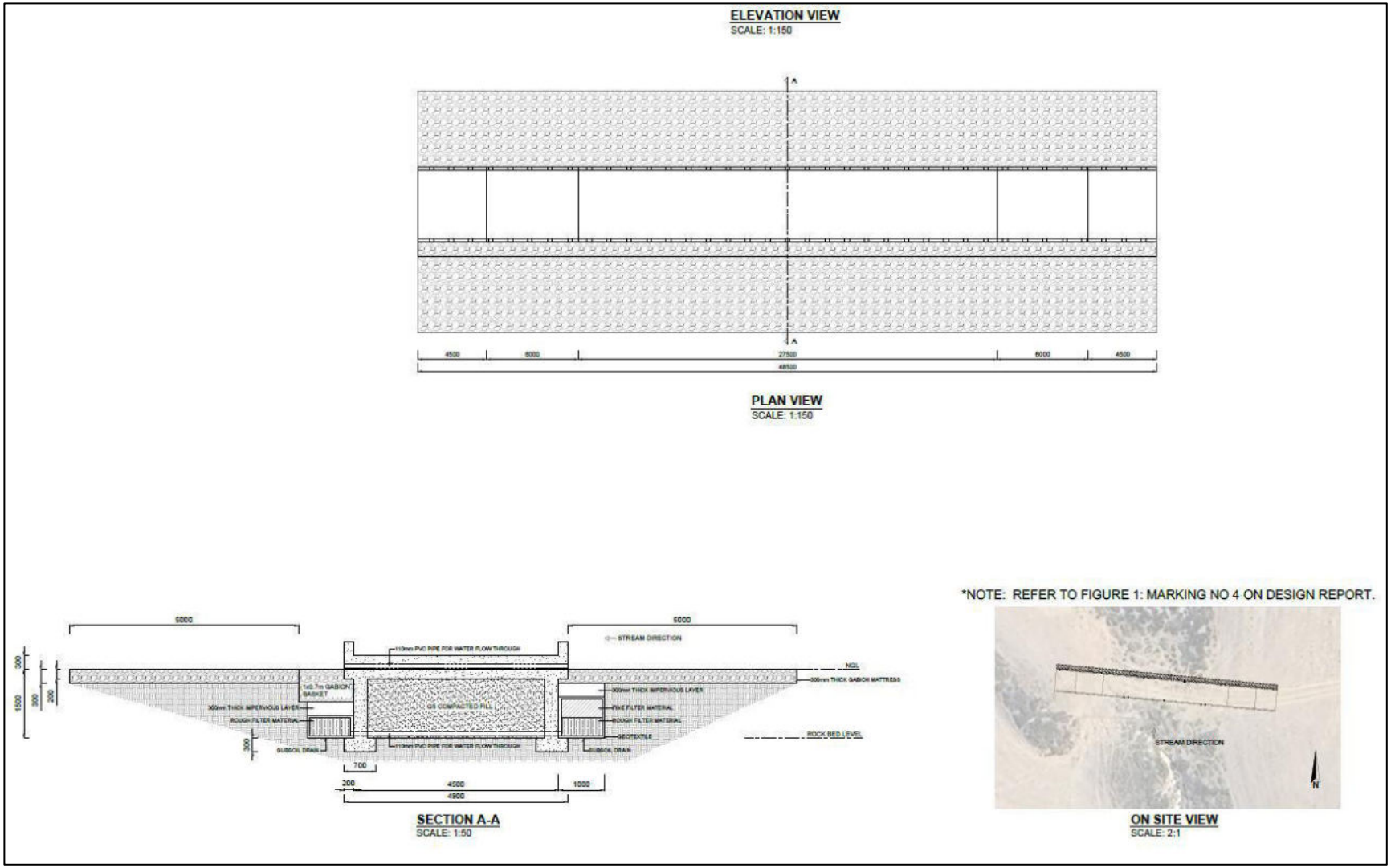


Figure C-10: Engineer drawings for the preferred alternative for the bottom bridge crossing Stream C.

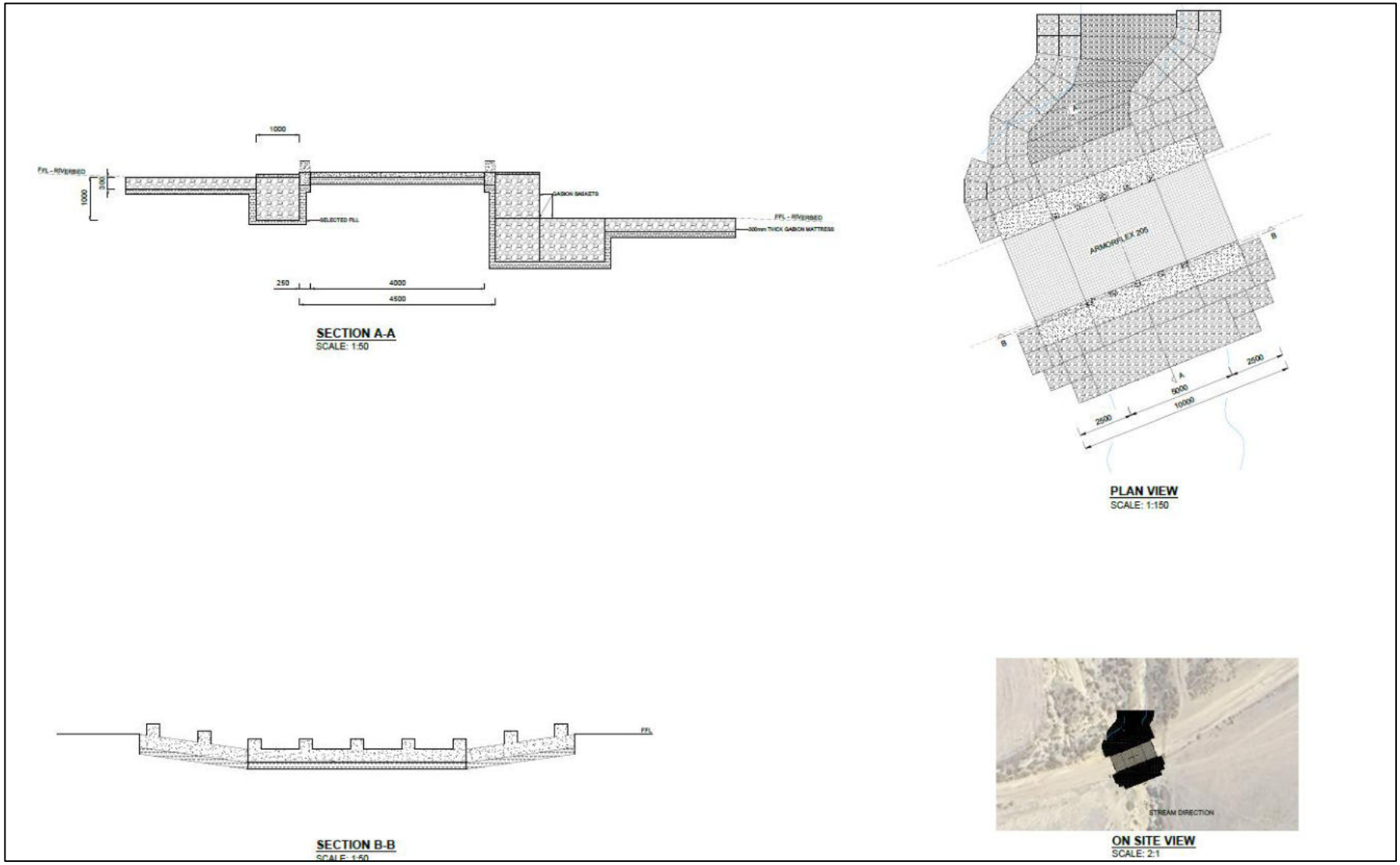
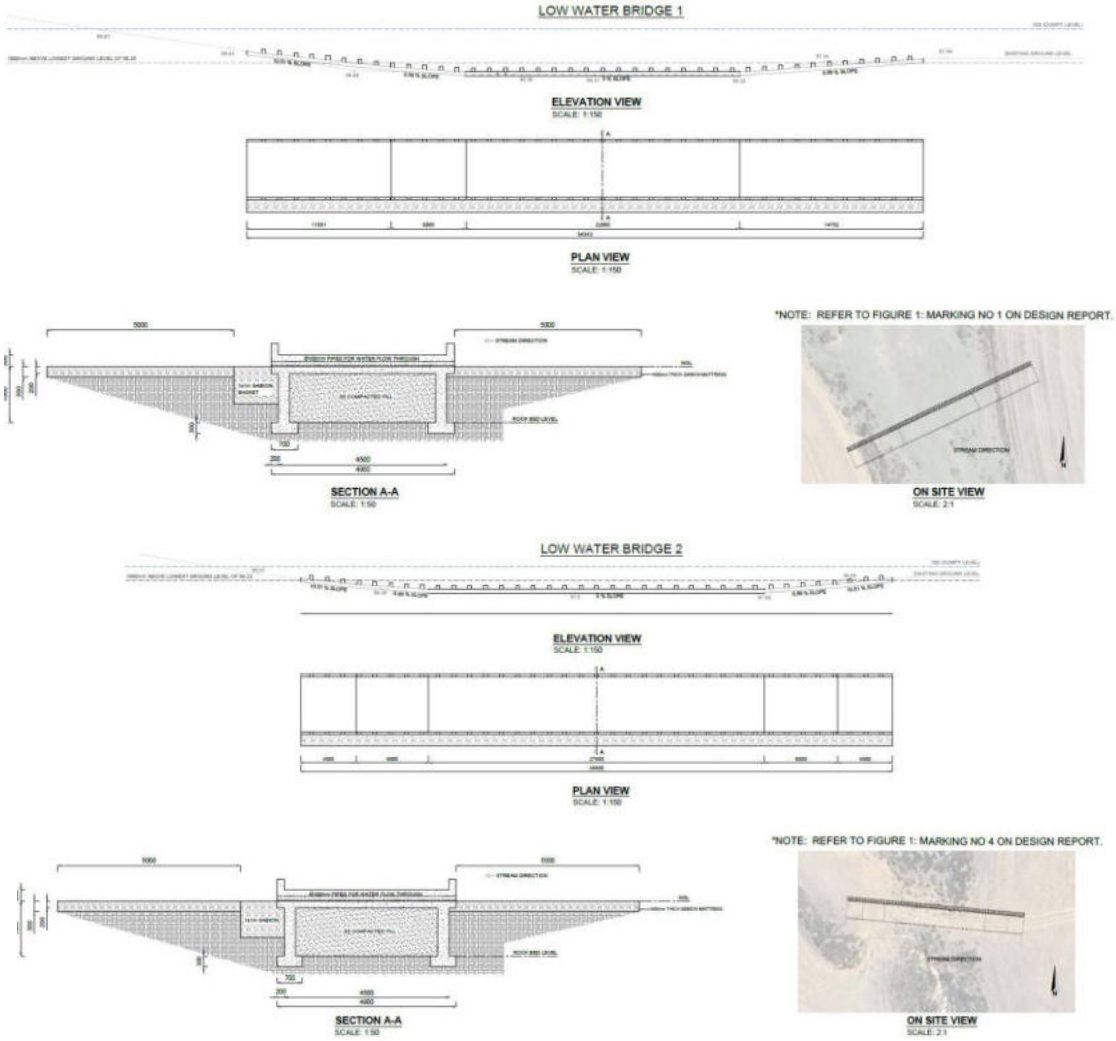


Figure C-11: Engineer drawings for the preferred alternative for the top crossing at Stream C.

Alternative bridge designs for the bridge crossings at the confluence of Streams A & B and the bottom of Stream C, which does not include subsurface drainage:



Annexure D – Risk Matrix

PROJECT:	**Risk Assessment for the Proposed New Development on Farm numbers 563, 564, 565 and Farm Kleinfontein number 954, Worcester, Western Cape**
RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.1	
Name of Assessor:	Jeanne Snyman
SACNASP Registration Number:	400091/17
Date of assessment:	05/06/2025

Signature: 

Risk to be scored for all relevant phases of the project (factoring in specified control measures). MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

Phase	Activity	Impact	Potentially affected watercourses			Overall Intensity (max = 10)	Spatial scale (max = 5)	Duration (max = 5)	Severity (max = 20)	Importance rating (max = 5)	Consequence (max = 100)	Likelihood (Probability) of impact	Significance (max = 100)	Risk Rating	Confidence level
			Name/s	PES	Overall Watercourse Importance										
CONSTRUCTION (Stream crossings)	<1>Site access	<1a>Slight altering of bed and banks and slight loss of biodiversity	Stream A and B	D/E	Low	2	1	1	4	2	8	20%	1.6	L	High
			Stream C and D	A/B	High	2	1	1	4	4	16	20%	3.2	L	High
	<2>Excavation of soils and vegetation removal associated with site preparation around the construction site.	<2a>Altering the bed and banks, loss of biodiversity and possible siltation and sedimentation, as well as other pollutants towards receiving freshwater features.	Stream A and B	D/E	Low	4	1	1	6	2	12	100%	12	L	High
			Stream C and D	A/B	High	4	1	1	6	4	24	100%	24	L	High
	<3>Construction activities associated with the new road crossings.	<3a>Further altering the bed and banks, loss of biodiversity and possible siltation and sedimentation, as well as other pollutants towards receiving freshwater features.	Stream A and B	D/E	Low	4	1	1	6	2	12	80%	9.6	L	High
			Stream C and D	A/B	High	2	1	1	4	4	16	80%	12.8	L	High
	<4>Construction activities associated with the pipeline crossing.	<4a>Very slight altering the bed and banks and loss of biodiversity.	Stream B	B/C	Low	2	1	1	4	2	8	20%	1.6	L	High
OPERATIONAL (Operation of broiler)	<1>Future operation of the broiler facility	<1a>Risk of water quality impacts on Stream C and D	Stream C and D	A/B	High	2	1	1	4	4	16	80%	12.8	L	High
OPERATIONAL (Future road and dam maintenance)	<1>Future culvert maintenance with clearing of sediment and debris build-up or nuisance vegetation.	<1a>Disturbance of soils and local biodiversity	Stream A and B	D/E	Low	2	1	1	4	2	8	60%	4.8	L	High
			Stream D and E	A/B	High	2	1	1	4	4	16	60%	9.6	L	High

Mitigation Measures:

Construction Phase:

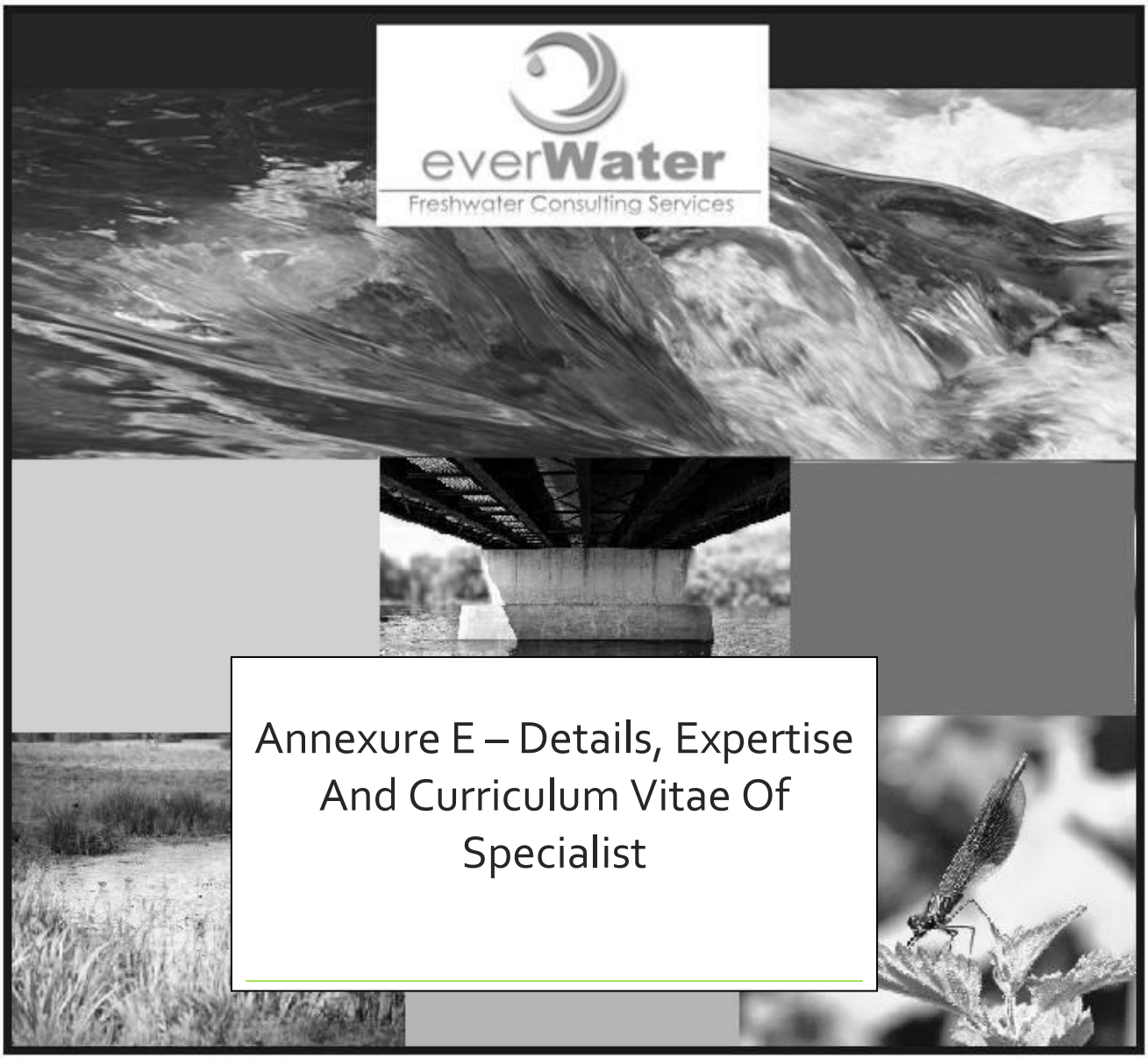
- All road crossing structures must be designed to avoid obstruction of streamflow, including low flows.
- Construction activities directly involving freshwater features (i.e., road and pipeline crossings) should preferably be scheduled during the dry summer months—typically from December to March—when rainfall and runoff are at their lowest.
- If any flow is present within the streams during construction, appropriate measures must be taken to divert the water around the work area and ensure its release downstream.
-

- A buffer zone extending 6 meters upstream and downstream of the construction footprint should be clearly demarcated. No disturbance or activity should occur beyond these designated areas within the stream channel.
- The boundaries of this buffer zone must be physically demarcated using high-visibility fencing or flagging prior to the commencement of any construction activities.
- Work within the stream channels should be limited strictly to essential areas.
- Clearing of riparian or wetland vegetation must be avoided where possible or otherwise kept to a minimum. Where practicable, vegetation should be pruned or topped rather than grubbed or uprooted.
- All wetland/stream areas disturbed during construction must be rehabilitated and revegetated with appropriate indigenous wetland and riparian buffer species once construction is complete
- Special attention should be given to managing water quality impacts in the construction Environmental Management Programme (EMP).
- Temporary silt fencing, sandbags, or berms should be installed within downstream channels to prevent sediment generated during construction from entering downstream freshwater features.
- Implement a phased clearing approach, limiting vegetation clearance to areas required for active construction only.
- Designate stockpile locations at least 50 metres away from any watercourses or wetland areas.
- Prevent contaminated runoff from construction sites from entering adjacent streams or wetlands by using diversion drains and berms. Temporary detention basins or sediment traps should be constructed to capture excess sediment before it reaches wetland or stream areas.
- Good Site Management Practices include:
    - Portable chemical toilets must be provided at all work sites, or ensure that conveniently located site toilets are available. Toilet facilities must not be located within 100 metres of any stream or wetland areas.
    - Maintain and clean toilets regularly to ensure they remain in good working order and hygienic condition.
    - No waste or foreign materials may be dumped into streams or wetlands. These areas must also not be used for cleaning clothing, tools, or equipment.
    - Prevent the discharge of water containing polluting matter or visible suspended solids directly into streams or wetland areas.
    - Immediately clean any accidental oil or fuel spills or leaks. Do not hose or wash spills into the surrounding natural environment.
    - All operations involving the use of cement and concrete (outside of the batching plant) must be carefully controlled.
    - Limit cement and concrete mixing to designated sites wherever possible.
- Low water bridges should be installed at or slightly below the natural streambed level to avoid obstructing low flows and to facilitate the unimpeded movement of aquatic biota.

- As mentioned under "Loss of Biodiversity", should flow be present during construction, temporary diversion structures should be implemented to reroute stream and wetland flow around the active work area, ensuring that low flows remain uninterrupted throughout the construction period.
- As the client proposes to include subsoil drainage in the low-water bridge structures, the following mitigation should be taken into account:
    - Drainage should consist of several pipes or a continuous stone layer.
    - The subsoil drain's cross-sectional area should roughly match or exceed the flow cross-section of the natural subsurface seepage path, both up and downstream of the bridge. This should be at a minimum 0.3–0.5 m depth and width.
    - The subsoil drain must be wrapped in geotextile or similar to keep fine wetland sediments out.
    - Stone size must be uniform and coarse to maintain voids for long-term flow.

Operational Phase:

- All rehabilitated and revegetated areas within the wetland/stream areas should be monitored for the following 2 years, ensuring the establishment of good plant biodiversity.
- Monitoring of all stream crossings for signs of erosion, debris build-up or nuisance growth around the low water bridges, should be included and addressed in a formal Maintenance and Management Plan for the project.
- No use of machinery is allowed within any wetland/stream channels for the operational phase.
- All debris must be removed and properly disposed of.
- No dumping of debris should be allowed in the stream/wetland areas.
- Any wetland/ riparian or instream areas disturbed by Maintenance activities to be rehabilitated and revegetated (if necessary) after maintenance works.



Annexure E – Details, Expertise And Curriculum Vitae Of Specialist

Abbreviated Curriculum Vitae

Personal Details

Surname : Snyman

Names : Jeanne Celeste

Date of Birth : 17 June 1983

Nationality : RSA

Profession : Freshwater Ecologist (SACNASP reg nr: 400091/17)

Key Qualifications

Academic Qualifications Institution (Date finished)	**Degree(s) or Diploma(s) obtained:**
North West University _ Potchefstroom campus. (2004)	BSc degree with Zoology and Microbiology
North West University _ Potchefstroom campus. (2006)	M.Env degree in Water Sciences (Cum laude),
North West University _ Potchefstroom campus. (2006)	Postgraduate Certificate In Education (PGCE)

Work Experience

Jeanne Snyman is Pr Sci Nat registered (400091/17) in the following fields of practice: Water Resource Science. Jeanne is an Aquatic, Wetland and Biodiversity Specialist with more than 13 years' experience in the environmental consulting field. She possesses a BSc. Masters in Freshwater Sciences and has worked on projects related to residential developments, infrastructural developments, sustainable energy and general natural resource management. Her work focusses mostly on doing Freshwater Impact Assessments, River Management and Maintenance plans, Rehabilitation plans and Audit Reports. Each project takes a total of approximately 24 (Supplementary Reports) to 50 hours (Freshwater assessments, RMMP's and Rehabilitation plans).

List of 2023/2024 projects:

- Snyman, J.C. March 2024. Freshwater Assessment For Alleged Unlawful Activities That Took Place On Portion 16 Of Farm Derde Heuvel 149, Montagu Rd, Western Cape
- Snyman, J.C. March 2024. Freshwater Impact Assessment for the Proposed Maintenance Activities Associated with Main Road 174, Stellenbosch, Western Cape
- Snyman, J.C. May 2024. Freshwater Assessment For The Proposed Expansion Of The Berg River Boulevard, Paarl, Western Cape.
- Snyman, J.C. May 2024. Situation Assessment For The Rehabilitation Of A Section Of A Non-Perennial Watercourse, at Farm Sandfontein 232/5, Swellendam RD.
- Snyman, J.C. July 2024. Freshwater Compliance Statement For The Proposed Extension Of The Quay Link Road, Saldanha Feeport Development, Saldanha, Western Cape
- Snyman, J.C. September 2024. Freshwater Assessment And RMMP For The Proposed Dam Repair Works On Farm 43, Stellenbosch, Western Cape
- Snyman, J.C. September 2024. Freshwater Assessment For The Proposed Upgrading Of The Klapmuts Wastewater Treatment Works (Wwtw), Portion 5 Of Farm 736, Paarl, Western Cape
- Snyman, J.C. September 2024. Freshwater Assessment For The Proposed New Development On Portion 14 Of Farm Slange Rivier 303, Swellendam, Western Cape.
- Snyman, J.C. September 2024. Freshwater Assessment For The Proposed Upgrading Of The Onrus Main Pump Station, On The Remainder Of Erf 2702, Caledon, Western Cape
- Snyman, J.C. October 2024. Freshwater Compliance Statement For The Proposed Works Within The Bok River As Part Of The Extension Of The Blue Bay Lodge Development, Saldanha, Western Cape
- Snyman, J.C. October 2024. Freshwater Monitoring Plan For The Proposed Operation Of The New Korhaanshoogte Dam, Portion 25 Of Farm 433, Clanwilliam
- Snyman, J.C. November 2024. Audit Report For The Rehabilitation Of A Section Of A Non-Perennial Watercourse, At Farm Sandfontein 232/5, Swellendam Rd
- Snyman, J.C. February 2025. Freshwater Assessment For The Proposed New Proposed Casa Maris Residential Development, Somerset West, Western Cape
- Snyman, J.C. February 2025. Freshwater Assessment For The New Water Use Of Biodegradable Effluent From The Remainder Of Farm 494, Clanwilliam, Western Cape
- Snyman, J.C. February 2025. Freshwater Baseline Report For The Proposed New Agricultural Development On The Remainder Of Farm 472, Vanrhynsdorp, Western Cape
- Snyman, J.C. March 2025. Freshwater Assessment For The Proposed New Development On Portion 14 Of Farm Slange Rivier 303, Swellendam, Western Cape

Appendix 4

WULA application status

Application Status

Water User

EFRC Agri Operations Pty Ltd

Application

WU44082 - Water Use Application Kleinfontein EFRC

Duration: Day 0 of 90

Current Status: Site Inspection Determinations

#	Date	Applicant	Department	Duration in Days
1	Oct 28 2025 11:48AM		Site Inspection Determinations	1 Day(s) (Current)
2	Oct 7 2025 2:35PM	Site Inspection Determinations		16 Day(s)
3	Oct 6 2025 8:19AM		Pre Application Enquiry	2 Day(s)
4	Sep 23 2025 3:56PM		Site Inspection Determinations	9 Day(s)
5	Sep 23 2025 3:32PM		Site Inspection Determinations	1 Day(s)
6	Sep 15 2025 7:46AM	Applicant : Prepares WUL Application for submission		7 Day(s)
7	Jul 9 2025 2:32PM		Pre Application Enquiry	49 Day(s)
8	Jul 9 2025 11:51AM		Pre Application Enquiry	1 Day(s)
9	Jun 10 2025 3:23PM	Applicant : Prepares Pre-application for submission		22 Day(s)

Appendix 5

Proposed Septic tank design

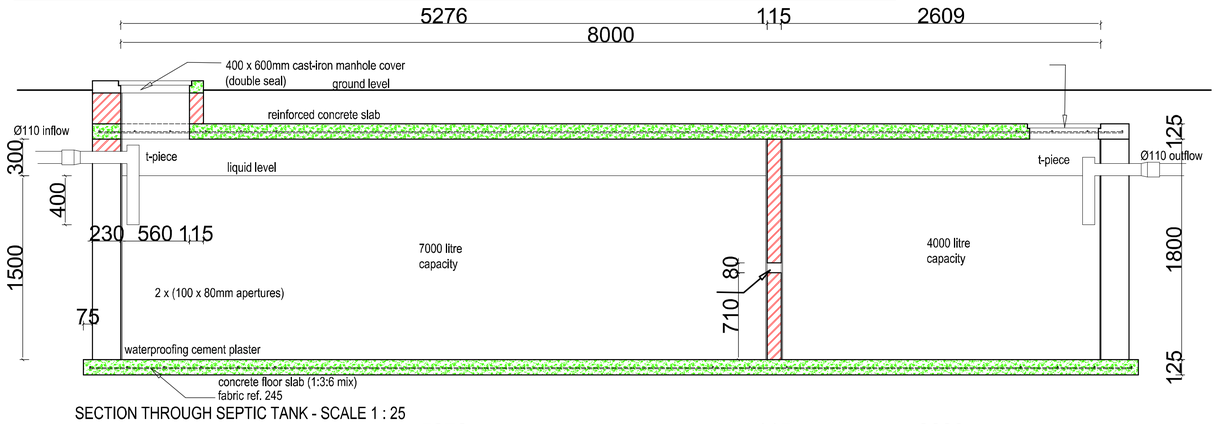
BENDING SCHEDULE PER CONCRETE SLAB

PART	NUMBER OF	BARD PER PART	DIAMETER	MARK	LENGTH	TOTAE BARS	FORM CODE	BENDING A	BENDING B	BENDING C	BENDING D	MASS KG
SLAB 01	1	16	Y10	01	600	16	35	430				5.923
		2	Y10	02	1500	2	35	1360				1.851
		6	Y10	03	8510	6	35	8360				31.452
		33	Y10	04	1500	33	35	1360				30.492
		3	Y10	05	6850	3	35	6700				12.658
		4	Y10	06	1000	4	20	1000				2.468

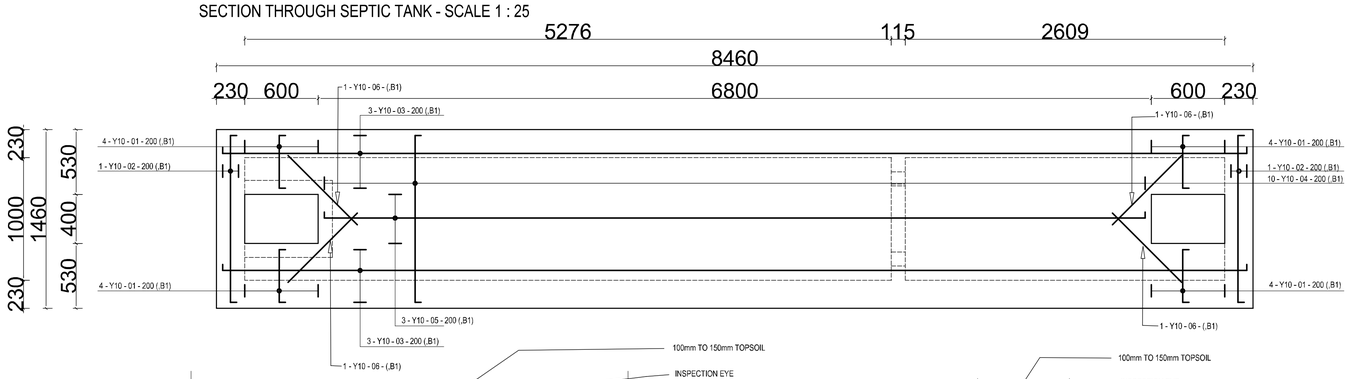
MASS / METER FOR DIFFERENT DIAM.

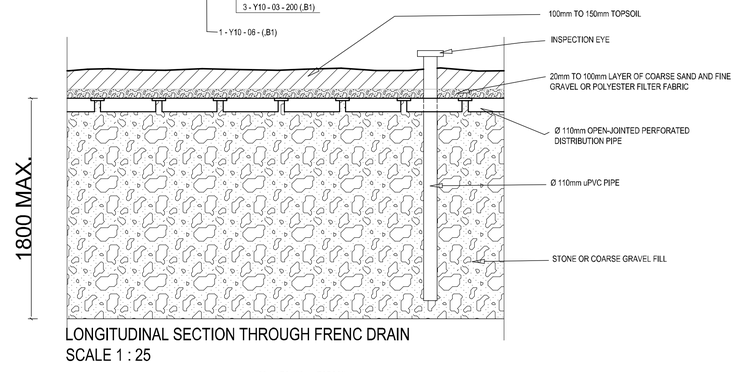
6mm - 0,22 kg/m
8mm - 0,395 kg/m
10mm - 0,617 kg/m
12mm - 0,888 kg/m
16mm - 1,578 kg/m
20mm - 2,466 kg/m
25mm - 3,854 kg/m
32mm - 6,313 kg/m
40mm - 9,864 kg/m

RC/BWK RETAINING WALL (PER 12m LENGTH)

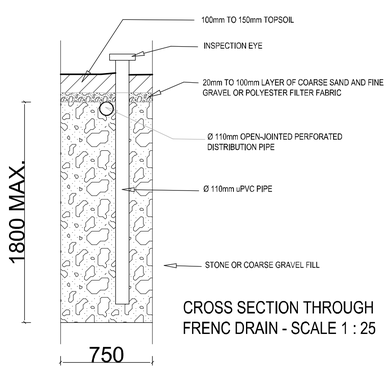


SECTION THROUGH SEPTIC TANK - SCALE 1 : 25





LONGITUDINAL SECTION THROUGH FRENC DRAIN
SCALE 1 : 25



CROSS SECTION THROUGH
FRENC DRAIN - SCALE 1 : 25

100mm TO 150mm TOPSOIL

NO	REVISIONS	DATE
	ISSUED TO CLIENT	
1	MUNICIPAL	09-10-2025

Legal note:

- Please note that the legal liability of this plan expires after 5 years from date on plan
- All products specified have to be installed as specified. Any other method of installation or deviation from the specs will release Van Heerden Architecture(Pty) Ltd of any legal liability.
- All products carry a manufacturers guarantee, and can't be guaranteed by Van Heerden Architecture(Pty) Ltd. Any deviation from the plans has to be reported to Van Heerden Architecture(Pty) Ltd before such deviation is applied, and a new altered plan has to be acquired before any deviation may be made. Making any changes contradicting this plan is a offence.
- All building work has to comply with SANS10400 and NHBRC regulations.

PROJECT DETAILS

SEPTEC TANK DETAIL

PROPERTY DETAILS

JACO VILJOEN

VAN HEERDEN ARCHITECTURE

8 Taaibos Steet
Protea Heights ,Brackenfell
REG. NO. 2016/034496/07
Pieter van Heerden
072 596 5070
pieter@vhvm.co.za
SACAP T1094
SAIAT 32642

OWNER'S SIGNATURE

ARCHITECTURAL TECHNOLOGIST

DRAWING STATUS CODES:

A: Design • B: Marketing • C: Municipal • D: Tender • E: Construction • F: As Built

SITE PLAN	○	DETAILS	○
FLOOR PLANS	●	ROOF PLAN	●
SECTIONS	○	STORM WATER	●
ELEVATIONS	●	SPECS	○
SEWERAGE	●	SCHEDULES	○

DESIGNED	PW van Heerden
DRAWN	PW van Heerden
CHECKED	PW van Heerden
SCALE	As Indicated
DATE	09-10-2025

SCALE/SHEET SIZE: **1:100/A1**

DRAWING No.: **2025-001-01**

REVISION: **-**

MUNICIPAL APPROVAL