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Tafelkop Mall
Integrated Water Use License Application and Integrated Water and Waste Management Plan

Report

Version – Draft for Public Review

22 April 2024

GCS Project Number: 22-1028

Client Reference: Tafelkop Mall IWULA

DWS Reference: WU28528

Fontis Development (Pty) Ltd

Tafelkop Mall (Pty) Ltd

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	Name	**Signature**	**Date**
Author	Tarryn Dale *Pr.Sci.Nat (400242/13)*		22 April 2024
Document Sign-off	Gerda Bothma *Pr. Sci. Nat: 117348*		20 March 2024

EXECUTIVE SUMMARY

Activity background

Tafelkop Mall (Pty) Ltd is proposing to build a shopping mall (Tafelkop Mall) located within the town of Tafelkop, Sekhukhune District Municipality in the Limpopo Province, South Africa. This area falls within the jurisdiction of the Elias Motsoaledi Municipality. Tafelkop is a settlement about 20km northeast of Groblersdal, Limpopo South Africa. The area is characterised by small settlements with a limited supply of formal retail facilities.

Tafelkop Mall will boasts over 134 shops, which include restaurants and service outlets. There is a notarial lease between Tafelkop Mall (Pty) Ltd and Tafelkop Retail (Pty) Ltd.

GCS Water and Environment (Pty) Ltd (GCS) were appointed by Fontis Development (Pty) Ltd to undertake the licensing process required to authorise water uses triggered in terms of Section 21 of National Water Act, 1998 (Act No. 36 of 1998) (NWA).

Water uses being applied for:

In compliance with the requirements of the NWA, Tafelkop Mall (Pty) Ltd is in the process of applying for a Water Use License (WUL) from the Department of Water and Sanitation (DWS) for water uses triggered in terms of Section 21 of the NWA. The following water uses have been identified and are being applied for as part of the Integrated Water Use License Application (IWULA) (See Table below):

- Section 21(a): Taking of water;
- Section 21(b): Storage of water; and
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.

Section 21 (a)						
Map No.	**Site Name**	**Description**	**Co-ordinates**		**Property**	**Volume (m^3/a)**
			Longitude	**Latitude**		
1	BH1	Abstraction of groundwater from a borehole pumped to RWTP for potable water	-25.03072	29.53403	Portion 6 Eensgevonden 119 JS	4.32 m^3/day 1576.8 m^3/a
2	BH2	Abstraction of groundwater from a borehole pumped to RWTP for potable water	-25.02946	29.53388	Portion 6 Eensgevonden 119 JS	19.44 m^3/day 7095.6 m^3/a
Section 21(b)						
Map No.	**Site Name**	**Description**	**Co-ordinates**		**Property**	**Capacity (m^3/a)**
			Longitude	**Latitude**		
3	Attenuation Dam 1 (Stormwater Pond)	Storage of Stormwater Run-off	-25.031057	29.531548	Portion 6 Eensgevonden 119 JS	600 m^3
4	Attenuation Dam 2 (Stormwater Pond)	Storage of Stormwater Run-off	-25.031381	29.531588	Portion 6 Eensgevonden 119 JS	2100 m^3
5	Raw Water Storage tank	Storage of raw water from boreholes	-25.030998	29.53202	Portion 6 Eensgevonden 119 JS	20 m^3
6 (i) 6 (ii)	Potable Water Storage Tanks (Main Centre Tanks)	Storage of treated water for potable use	-25.031066 -25.031026	29.531951 29.531979	Portion 6 Eensgevonden 119 JS	160 000 m^3
7 (i) 7 (ii) 7 (iii) 7 (v)	Potable Water Storage Tanks (Shoprite)	Storage of treated water for potable use	-25.031004 -25.029799 -25.029818 -25.029837	29.5319 29.534641 29.534659 29.534681	Portion 6 Eensgevonden 119 JS	60 000 m^3
8 (i) 8 (ii) 8 (iii)	Potable Water Storage Tanks (Boxer)	Storage of treated water for potable use	-25.031226 -25.030806 -25.030828	29.531324 29.532312 29.53233	Portion 6 Eensgevonden 119 JS	60 000 m^3
9 (i) 9 (ii)	Potable Water Storage Tanks (Roots)	Storage of treated water for potable use	-25.031198 -25.031211	29.53284 29.532863	Portion 6 Eensgevonden 119 JS	20 000
Section 21(g)						
Map No.	**Site Name**	**Description**	**Co-ordinates**		**Property**	**Volume (m^3/a)**
			Longitude	**Latitude**		
7	Raw Water Treatment PlantI	Treatment of raw water from the boreholes for tenant and public use	-25.031004	29.5319	Portion 6 Eensgevonden 119 JS	23.79 m^3/day 8672 m^3/a
8	Sewage Treatment Plant	Treated sewage water generated at mall ablutions	-25.031226	29.531324	Portion 6 Eensgevonden 119 JS	37.79 m^3/day 13792 m^3/a

Integrated Water and Waste Management Plan:

This document serves as the technical report for submission to the DWS for the authorisation of water uses triggered by the proposed project. As there are waste related uses associated with the proposed development, this report has been structured in line with the approved Integrated Water and Waste Management Plan (IWWMP) Operational Guideline compiled by the DWS.

This IWWMP document includes the activities proposed to be undertaken at Tafelkop Mall. The main purpose of this IWWMP is to consolidate all the various site-specific activities such as water balances, storm water management, water reuse, water conservation, waste minimization and recycling into a simple implementable management plan.

The IWWMP is therefore a living document that will be revised and updated throughout the life of the operations and as per the WUL conditions to accommodate additional information and improved technologies. These will ensure that water and waste management is continually optimised and adapted to the changing needs of the mall and the Water Management Area (WMA).

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1 INTRODUCTION

1.1 Activity Background

Tafelkop Mall (Pty) Ltd is proposing to build a shopping mall (Tafelkop Mall) located within the town of Tafelkop, Sekhukhune District Municipality in the Limpopo Province, South Africa. This area falls within the jurisdiction of the Elias Motsoaledi Municipality. Tafelkop is a settlement about 20km northeast of Groblersdal, Limpopo South Africa. The area is characterised by small settlements with a limited supply of formal retail facilities.

GCS Water and Environment (Pty) Ltd (GCS) were appointed by Fontis Development (Pty) Ltd to undertake the licensing process required to authorise water uses triggered in terms of Section 21 of National Water Act, 1998 (Act No. 36 of 1998) (NWA).

1.2 Contact Details

Tafelkop Mall (Pty) Ltd is the applicant for this IWULA. Refer to Table 1-1 for the contact details of the applicant as well as the details of the consultant compiling this application.

Table 1-1: Contact Details

Item	Company Contact Details
Client / Applicant	
Company Name	Fontis Development (Pty) Ltd
Company Registration	2013/126605/07
Telephone Number	012 809 4170
Contact Person	Cameron Theron
Contact Person Mobile Number	0847196485
Email Address	cameron@fontis.co.za
Postal Address	PO Box 11353 Silver Lakes 0054 South Africa
Physical Address	Unit 8, Block 9 Tijger Valley Office Park Silverlakes Road Pretoria 0054
Environmental Consultant	
Company Name	GCS Water and Environment (Pty) Ltd
Telephone Number	011 803 5726
Contact Person	Tarryn Dale
Email Address	tarrynd@gcs-sa.biz
Postal Address	PO Box 2597 Rivonia 2128

Item	Company Contact Details
Client / Applicant	
Physical Address	63 Wessel Road Rivonia 2128

1.3 Regional Setting and Location of Activity

1.3.1 Regional Setting

The proposed Tafelkop Mall is located in the Limpopo Province, 21km Northeast of Groblersdal Mall and 22km West of Moratiwa Crossing (Monsterlus) by road distance. Refer to Figure 1.1 for a map showing the locality of the project area.

1.3.2 Magisterial District and Local Municipality

Tafelkop Mall is located within the Sekhukhune District Municipality (SDM) and specifically located within the Elias Motsoaledi Local Municipality.

1.4 Property Description

The project area is located on Portion 6 Eensgevonden 119 JS.

Refer to Table 1-2 for the farm portion descriptions and to Figure 1.2 for a map showing the relevant farm portion.

Tafelkop Portion 6, Eensgevonden is zoned Business 1 with the primary use being shops, office use, dwelling unit with or without Outbuildings and the secondary use being vehicle sales lot, overnight accommodation, public garage, place of worship, place of instruction, social hall, dry cleaner, place of amusement, parking garage, service industry, commercial use and spacial use.

Table 1-2: Property Details

Property Description	Size of property (ha)	Title deed No.	Property owner
Portion 6 Eensgevonden 119 JS	5, 7482	T39433/2015	Tafelkop Mall (Pty) Ltd

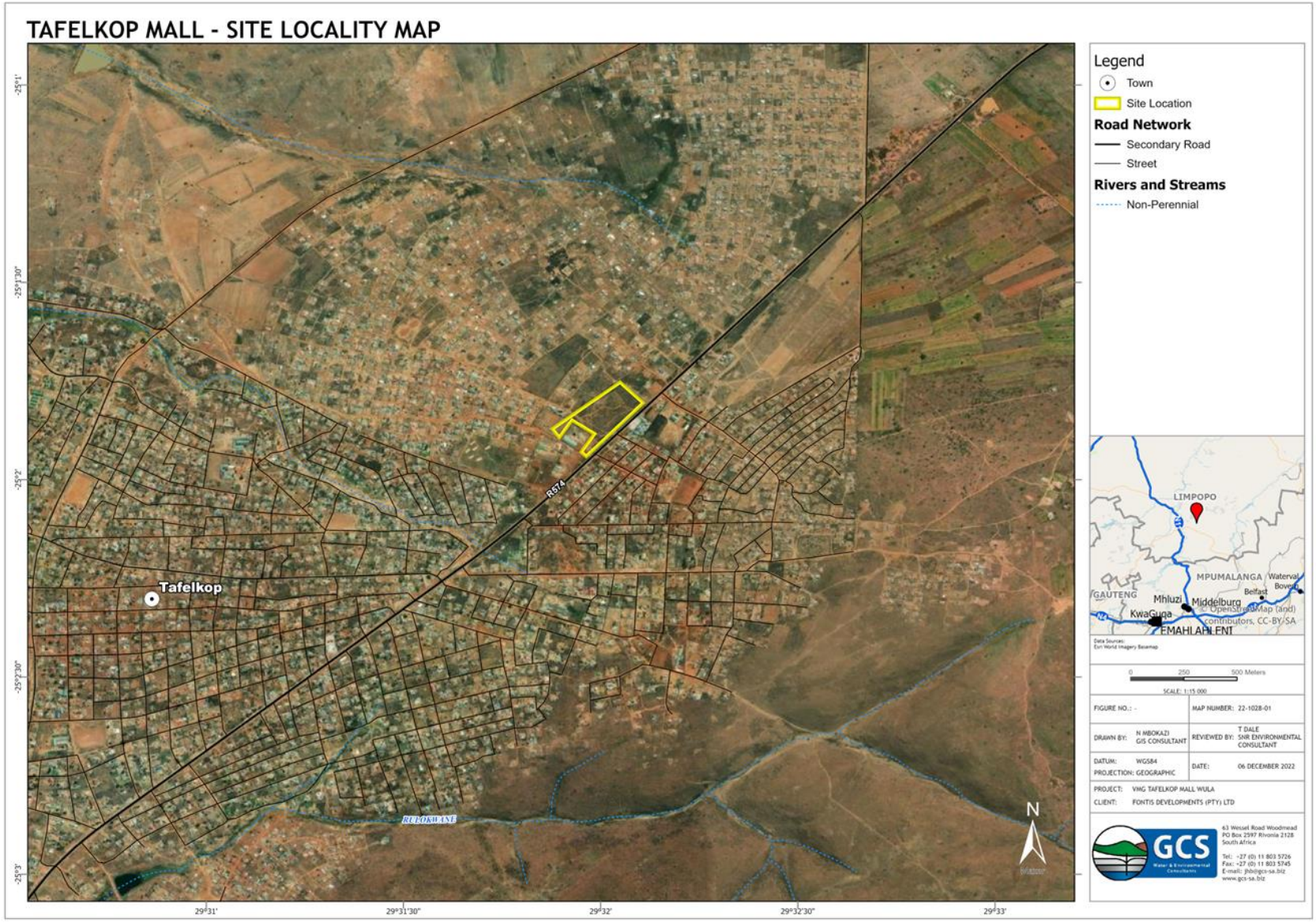

Figure 1.1: Locality of Project

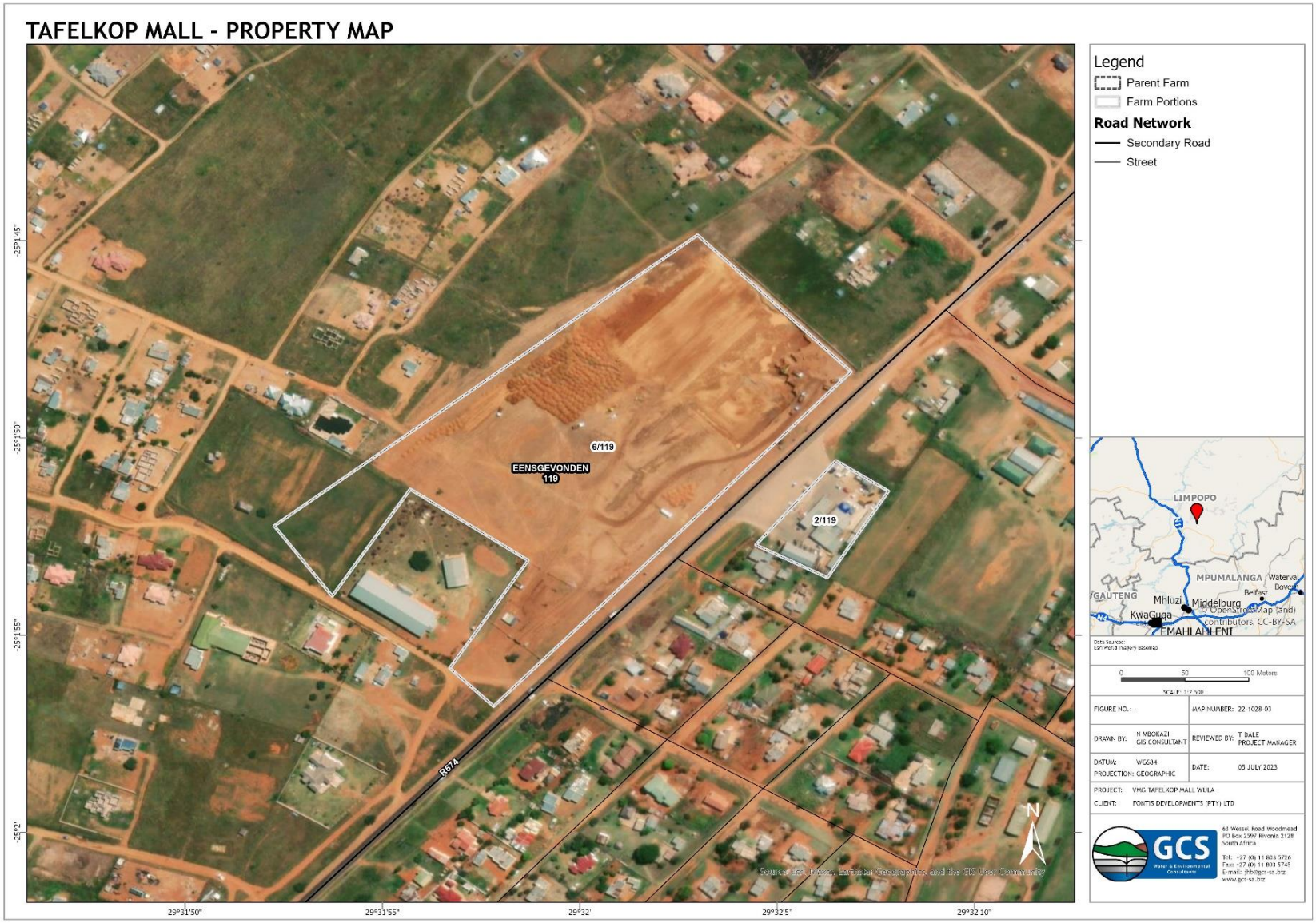

Figure 1.2: Project Properties

1.5 Purpose of the IWWMP

This document serves as the technical report to motivate for the authorisation of the water uses triggered by Tafelkop Mall.

As there are waste related uses associated with the proposed development, this report has been structured in line with the approved Integrated Water and Waste Management Plan (IWWMP) Operational Guideline compiled by the DWS.

The purpose of the IWWMP includes:

- Compilation of a site specific, implementable, management plan addressing all the identified water use and waste management relates aspects of a specific activity, in order to meet set goals and objectives in accordance with Integrated Water Resource Management (IWRM) principles;
- Provision of a management plan to guide the water user regarding the water and waste related measures which must be implemented on site in a progressive, structured manner in the short, medium and long term;
- Documentation of all the relevant information, as specified in the IWWMP Guideline as compiled by the DWS, to enable DWS to make a decision regarding the authorisation of a water use;
- Clarification of the content of the IWWMP for DWS officials and the water users, as the various regional offices of DWS might have different interpretations regarding the contents of the IWWMP;
- Standardisation of the format of supporting documentation which DWS requires during the submission of a IWULA;
- Provision of guidance on the content of information required in an IWWMP as part of the water use authorisation process and level of detail that DWS requires to enable them to evaluate the supporting documentation to make a decision on authorising a water use; and;
- Ensuring that a consistent approach is adopted by DWS and the various Regional Offices and Catchment Management Agencies (CMA) with regards to IWWMPs.

The IWWMP also strives to show the DWS that the selected management measures included into the IWWMPs action plan adhere to the SMART concept which refers to:

- S – Sustainable;
- M – Measurable;
- A – Achievable;
- R – Resources Allocated; and
- T – Timeframe Specific.

2 CONCEPTUALISATION OF THE ACTIVITY

2.1 Description of the Activity

Tafelkop Mall (Pty) Ltd is proposing to build a shopping mall (Tafelkop Mall) located within the town of Tafelkop, Sekhukhune District Municipality in the Limpopo Province, South Africa. This area falls within the jurisdiction of the Elias Motsoaledi Municipality. Tafelkop is a settlement about 20km northeast of Groblersdal, Limpopo South Africa. The area is characterised by small settlements with a limited supply of formal retail facilities.

Refer to Figure 2.1 for the Tafelkop Mall layout.

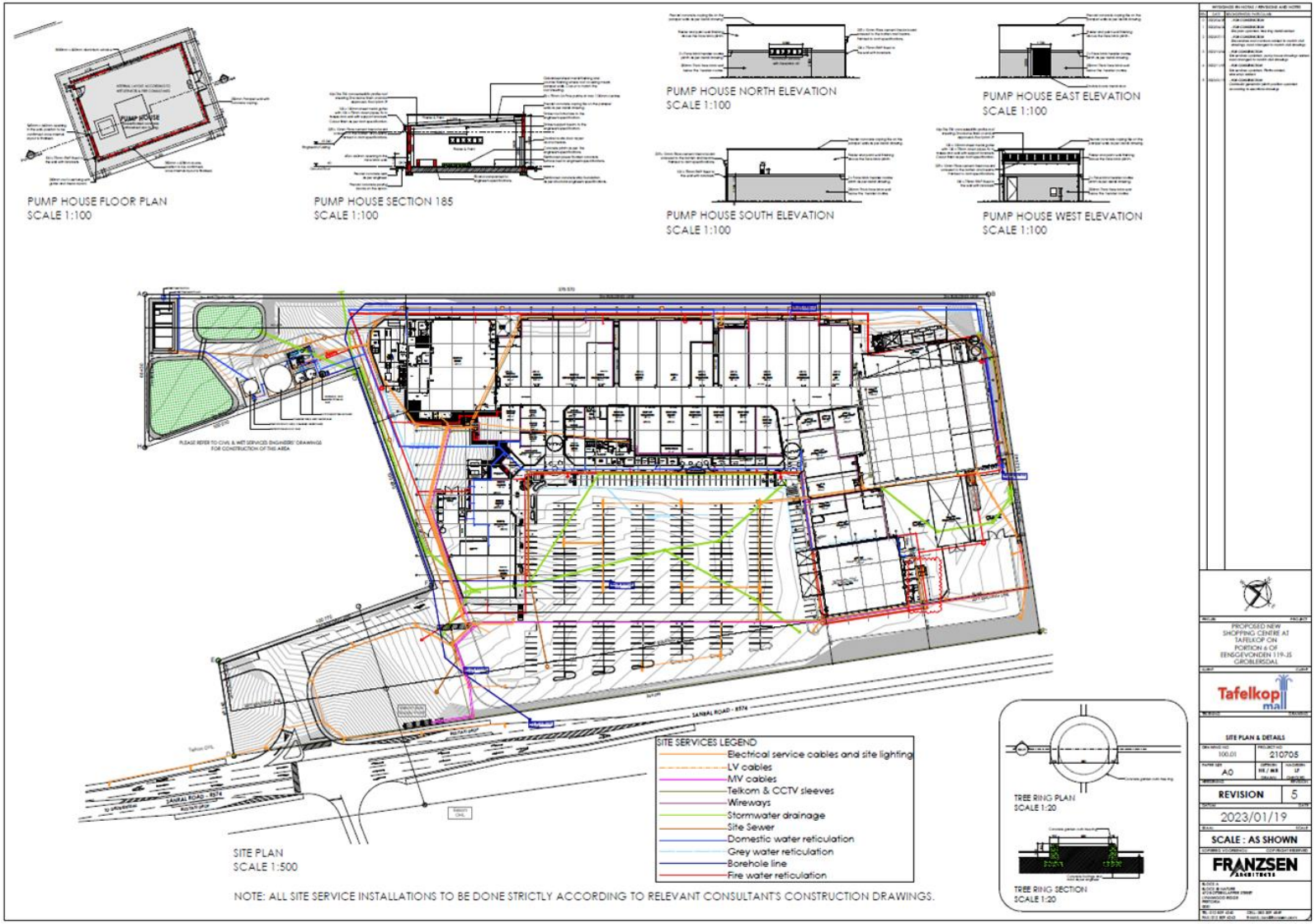

Figure 2.1: Tafelkop Mall Layout

2.2 Extent of the Activity

Tafelkop Mall will cover a total area of 5.7 hectares.

2.3 Key Activity Related Processes and Products

The mall is a 50 000m^2 development and boasts over 134 shops, which include restaurants and service outlets. There is a notarial lease between Tafelkop Mall (Pty) Ltd and Tafelkop Retail (Pty) Ltd.

2.4 Activity Life Description

It is anticipated that the mall will be operable until such time that it becomes redundant or ceases due to unforeseen / unpredictable circumstances.

2.5 Activity Infrastructure Description

The mall includes:

- Buildings covering 18 148.34m^2
- 629 x parking bays; and
- 287 x taxi bays.

2.6 Key Water Uses and Waste Streams

2.6.1 Water Uses

The NWA defines a water use in Section 21 and these water uses relate to the consumption of water, as well as activities which may affect water quality and the condition of the resource itself. Water uses are defined by Section 21 of the NWA as follows:

- Section 21(a): Taking of water;
- Section 21(b): Storing of water; and
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.

Refer to Section 3.5 for a detailed summary of the proposed water uses being applied for. The shopping mall will be supplied with treated borehole water, sourced from two new boreholes located within the mall's boundary line. Water from the boreholes will be pumped to a water treatment plant where it will be treated to potable standards. After the treatment process, the water will be pumped to a domestic storage tank to allow for 60 hours of water storage. The additional water from this tank will be used as a buffer during normal operating conditions from which water will be pumped throughout the mall, supplying water to all tenant and public spaces.

Refer to **Annexure A** for the Domestic Water Design Report, 2022 undertaken by VMG Consultants.

2.6.2 Water Storage

The domestic storage is sized to allow the mall to have 60 operating hours of uninterrupted supply which shall continuously be pumped throughout the mall. If the mall operates on a 12-hour regime this will provide 5 days' worth of demand.

2.6.3 Boreholes

The borehole water will be pumped to the water treatment plant and stored in a raw water tank before undergoing the treatment process.

2.6.4 Water Treatment Plant

The water treatment plant shall be designed based on the water quality test results from the borehole water so that the correct water treatment can be designed for, to allow the water to be supplied to the mall at potable standards.

The treated water will be pumped to the domestic water storage tank based on the float valve level within the storage tank.
Raw and treated water parameters such as PH, TDS and water flow rates are remotely monitored. This allows for fault finding and monitoring of water leaks and unusual water usage. The treatment plant will undergo regular maintenance to ensure efficient operation over the life of the plant.
Toilets will be supplied from pressure reduced valved branch take offs from the underground fire mains. Zoned risers from the fire line will reticulate to centralized toilets wherever required. Toilets are fed off an independent water mains from the pump station.

Refer to Figure 2.2 for the water treatment plant design.

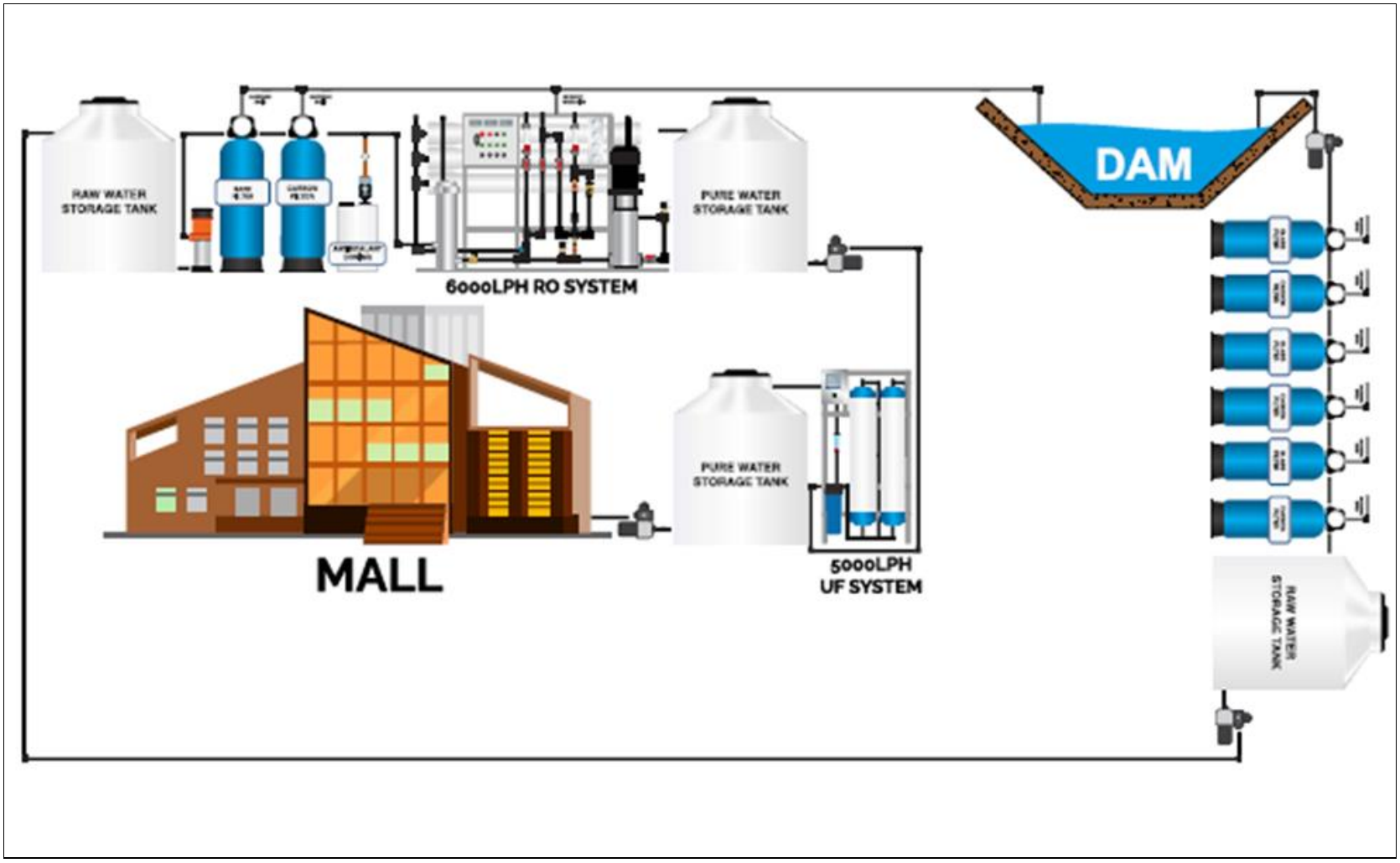

Figure 2.2: Water Treatment Plant Design

2.6.5 Booster pumps

A double or triple header booster pump will be installed in an enclosed pump house and will pump water from the water storage tanks to where it's required throughout the mall.

2.6.6 Potable Reticulation

Boosted water supply water to each shop will be provided at the required working pressures via a reduced pipe diameter (roughly 65mm diameter pipe) as the toilets load will be shifted to the fire line.

2.6.7 Waste Streams

The following waste streams have been identified at Tafelkop Mall:

- Food waste;
- Paper/cardboard, metal, glass and plastic;
- General waste which is limited to domestic and commercial waste.
- Sewage Water and Sludge.

Refer to Section 5.2.4 of this report for more details pertaining to the waste generated on site and the management thereof.

2.7 Organisational Structure of Activity

The mall is confirmed as 50 000m^2 development and boasts over 134 shops, which include restaurants and service outlets. There is a notarial lease between Tafelkop Mall (Pty) Ltd and Tafelkop Retail (Pty) Ltd.

Refer to Figure 2.3 for the organogram.

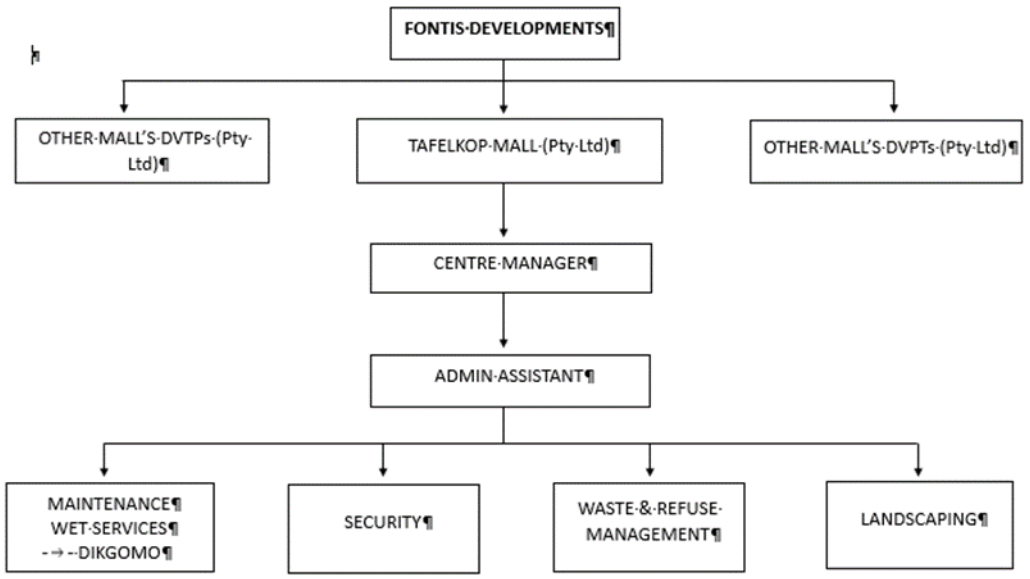

Figure 2.3: Organogram

2.8 Business and Corporate Policies

In the rural areas of our country, many people travel long distances to a source of water so that they can be replenished and refreshed. The name FONTIS is derived from the word 'fountain'. In the same way as the water provided by a fountain is an essential source of nutrition that supports life, so the shopping malls developed by Fontis provide residents within the catchment area of the developments with the convenience of large national retailers and suppliers.

Fontis Developments is an established development company, which focuses on the development of retail shopping malls in rural areas.

The success of Fontis Developments lies in the professional collaboration between all contractors and parties involved.

3 REGULATORY WATER AND WASTE MANAGEMENT FRAMEWORK

3.1 Summary of all Water Uses

The following water uses have been identified in terms of Section 21 and are being applied for as part of this IWULA:

- Section 21(a): Taking of water;
- Section 21(b): Storing of water; and
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.

Refer to 3.5 for details of the water uses being applied for at Tafelkop Mall.

3.2 Existing Lawful Water Uses

Existing Lawful Water Use (ELWU) is defined in section 32 of the National Water Act 1998, (Act No. 36 of 1998) (NWA) as any water use which has taken place at any time during a period of two years immediately before the date of commencement of the NWA or which has been declared an existing lawful water use under section 33 and which was authorised by or under any law which was in force immediately before the date of commencement of the NWA.

There are no existing lawful water use taking place on the property. The water use triggered is being applied for as part of the IWULA and will need to be authorised in terms of a Water Use License (WUL) issued by the DWS.

3.3 Relevant Exemptions

The Minister of Water and Sanitation is responsible for the protection, use, development, conservation, management and control of the water resources of South Africa on a sustainable basis. The requirements prescribed in terms of the regulations must be seen as minimum requirements to fulfil this goal.

There are no exemptions required for inclusion in this IWULA.

3.4 Generally Authorised Water Uses

All water uses that are being applied for, are being done so as part of this IWULA and not as a General Authorisation. Thus, there are no general authorisations applicable to Tafelkop Mall.

3.5 New Water Uses to be Licensed

The water uses triggered for Tafelkop Mall requires authorisation in terms of Section 21 (a), (b) and (g) of the NWA. Refer to Table 3-1 for a summary of the water use being applied for. Refer to Figure 3.1 for the locality of the water uses being applied for.

Table 3-1: Tafelkop Water Uses

Section 21 (a)						
Map No.	**Site Name**	**Description**	**Co-ordinates**		**Property**	**Volume (m^3/a)**
			Longitude	**Latitude**		
1	BH1	Abstraction of groundwater from a borehole pumped to RWTP for potable water	-25.03072	29.53403	Portion 6 Eensgevonden 119 JS	4.32 m^3/day 1576.8 m^3/a
2	BH2	Abstraction of groundwater from a borehole pumped to RWTP for potable water	-25.02946	29.53388	Portion 6 Eensgevonden 119 JS	19.44 m^3/day 7095.6 m^3/a
Section 21(b)						
Map No.	**Site Name**	**Description**	**Co-ordinates**		**Property**	**Capacity (m^3/a)**
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4	Attenuation Dam 2 (Stormwater Pond)	Storage of Stormwater Run-off	-25.031381	29.531588	Portion 6 Eensgevonden 119 JS	2100 m^3
5	Raw Water Storage tank	Storage of raw water from boreholes	-25.030998	29.53202	Portion 6 Eensgevonden 119 JS	20 m^3
6 (i) 6 (ii)	Potable Water Storage Tanks (Main Centre Tanks)	Storage of treated water for potable use	-25.031066 -25.031026	29.531951 29.531979	Portion 6 Eensgevonden 119 JS	160 000 m^3
7 (i) 7 (ii) 7 (iii) 7 (v)	Potable Water Storage Tanks (Shoprite)	Storage of treated water for potable use	-25.031004 -25.029799 -25.029818 -25.029837	29.5319 29.534641 29.534659 29.534681	Portion 6 Eensgevonden 119 JS	60 000 m^3

8 (i) 8 (ii) 8 (iii)	Potable Water Storage Tanks (Boxer)	Storage of treated water for potable use	-25.031226 -25.030806 -25.030828	29.531324 29.532312 29.53233	Portion 6 Eensgevonden 119 JS	60 000 m^3
9 (i) 9 (ii)	Potable Water Storage Tanks (Roots)	Storage of treated water for potable use	-25.031198 -25.031211	29.53284 29.532863	Portion 6 Eensgevonden 119 JS	20 000
Section 21(g)						
Map No.	**Site Name**	**Description**	**Co-ordinates**		**Property**	**Volume (m^3/a)**
			Longitude	**Latitude**		
7	Raw Water Treatment PlantI	Treatment of raw water from the boreholes for tenant and public use	-25.031004	29.5319	Portion 6 Eensgevonden 119 JS	23.79 m^3/day 8672 m^3/a
8	Sewage Treatment Plant	Treated sewage water generated at mall ablutions	-25.031226	29.531324	Portion 6 Eensgevonden 119 JS	37.79 m^3/day 13792 m^3/a

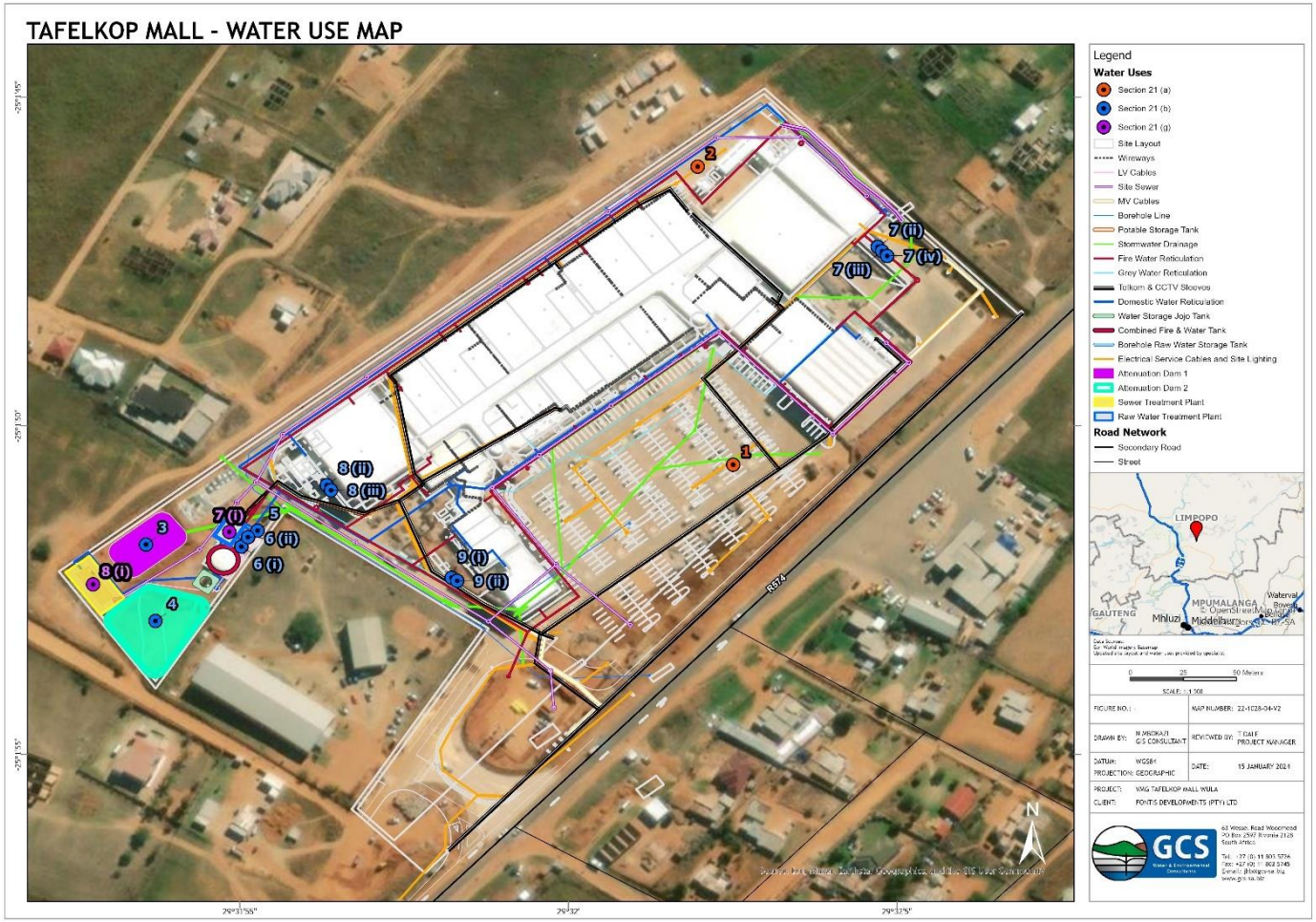

Figure 3.1: Water Use Map

3.6 Waste Management Activities (NEM: WA)

The National Environmental Management: Waste Act, 2008 (Act No. 59 of 2008) (NEM:WA) fundamentally reformed the law regulating waste management, and for the first time provides a coherent and integrated legislative framework addressing all the steps in the waste management hierarchy. The objectives of the NEM:WA are to protect health, well-being and the environment by providing reasonable measures for, inter alia, remediating land where contamination presents, or may present, a significant risk of harm to health or the environment. The objectives of the NEM: WA are structured around the steps in the waste management hierarchy, which is the overall approach that informs waste management in South Africa. The waste management hierarchy consists of options for waste management during the lifecycle of waste, arranged in descending order of priority; i.e. waste avoidance, reduction, re-use, recycling, recovery, treatment, and safe disposal as a last resort.

NEMA, as previously mentioned, introduced a number of additional guiding principles into South African environmental legislation, including the life-cycle approach to waste management, producer responsibility, the precautionary principle and the polluter pays principle (i.e. the sustainability principles as contained in Section 2 of NEMA). Section 5(2) of the NEM: WA stipulates that the Act should be interpreted and guided in accordance with these sustainability principles. The NEM: WA, furthermore, echoes the duty of care provision, in terms of Section 28 of NEMA, by obliging holders of waste to take reasonable measures to implement the waste management hierarchy. Section 16(1) of the NEM: WA provides that:

"A holder of waste must, within the holder's power, take all reasonable measures to –

a) Avoid the generation of waste and where such generation cannot be avoided, to minimise the toxicity and amounts of waste that are generated;
b) Reduce, re-use, recycle and recover waste;
c) Where waste must be disposed of, ensure that the waste is treated and disposed of in an environmentally sound manner;
d) Manage the waste in such a manner that it does not endanger health or the environment or cause a nuisance through noise, odour or visual impacts;
e) Prevent any employee or any person under his or her supervision from contravening this Act; and
f) Prevent the waste from being used for an unauthorised purpose."

While the NEM: WA creates a comprehensive legal framework for waste management, its provisions will be meaningless without measures to monitor and, where necessary, enforce compliance. Compliance monitoring is supported by a range of reporting provisions

contained in the NEM:WA. In addition to compliance reports for waste management licences and norms and standards, the NEM: WA has provisions for annual performance reports on the implementation of provincial and local Integrated Waste Management Plans. Industry Waste Management Plans are subject to review at intervals to be determined by the authority that mandated the plan. Furthermore, Environmental Management Inspectors and Waste Management Officers can request a Waste Impact Report where they suspect a contravention of the Act, licence conditions or exemption conditions.

The NEM: WA provides for a licensing regime specific to waste management activities. It replaces the historical system of permits issued in terms of the repealed Section 20 of the ECA. Transitional arrangements allow existing permits granted in terms of ECA to be regarded as licences in terms of the NEM: WA until the Minister requires a licence application as per the NEM: WA category of the waste management activity (i.e. category A or B). The NEM: WA waste management categories determine the environmental assessment procedure (which is the equivalent of the NEMA EIA regulations' requirements) required to obtain a licence.

Category A activities require a BA process to be undertaken, whilst Category B activities require a S&EIR process to be undertaken.

Depending on the location of developments, it is important to note that applicable Norms and Standards are no different from regulations in law in that they are both equally binding.

3.7 Waste Related Authorisations

There are no waste related authorisations applicable to Tafelkop Mall.

3.8 Other Authorisations (EIAs, EMPs, RODs, Regulations)

Tafelkop Mall was granted an Environmental Authorisation (Ref No. 12/1/9/1-GS20) in terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998) (NEMA) by the Limpopo Department of Economic Development, Environment and Tourism (LEDET) on 27 March 2014.

4 PRESENT ENVIRONMENTAL SITUATION

4.1 Climate

4.1.1 Regional Climate

Tafelkop has a climate characterized by semi-rid climate, where it hardly rains. January, October, November, and December are the hottest months of the year at a mean maximum

temperature of 28 °C, while June, July and August are the coldest months of the year with mean minimum temperatures of as low as 2°C.

4.1.2 Rainfall

The project area is situated in rainfall zone B3E. The rainfall data used to calculate Mean Annual Precipitation (MAP) was obtained from rainfall station 0553151W (situated 7.3 km east of the site). Available rainfall data suggest a MAP ranging from 360.9 (30th percentile) to 1504.6 (90th percentile) mm/a, based on a historical record of 35 years (i.e., 1961 to 1995). The average rainfall is in the order of 588.5 mm/a.

4.1.3 Evaporation

Catchment B32J falls within evaporation zone 4A, of which Mean Annual Evaporation (MAE) ranges from 1 800 to 2 000 mm/a, average in the order of 1 459 mm/a. The MAE far exceeds the MAP for the site, which implies greater evaporative losses when compared to incident rainfall.

4.2 Surface Water

The information provided in this section has been sourced from the Water Balance Report compiled by GCS. Refer to Annexure C for the full report.

4.2.1 Water Management Area (WMA)

The Tafelkop Mall falls within the B32J quaternary catchment of the Olifants Water Management Area (DWS, 2016).

4.2.2 Surface Water Hydrology

The topographic elevations of the site range from 1 389 meters above mean sea level (mamsl) to 1 403 mamsl (JAXA, 2022). The site is located 4 km from the headwater of the Rulokwane River, a non-perennial tributary of the Olifants River. The site is also situated between two (2) non-perennial tributaries of the non-perennial Moganyake River, flowing towards the Olifants River.

Two (2) hydrological response units (HRUs) describe the natural drainage for the study area (using a 1:10 000 stream count and 20m DTM fill) – refer to Figure 4.1. The HRUs delineated correspond well to known non-perennial rivers and drainage lines associated with the study area. Drainage in the HRUs is towards the northwest via two non-perennial streams bi-

lateral of the site, which drains towards the Olifants River. Surface water drainage for the Tafelkop Mall occurs primarily within HRU1.

4.2.3 Surface Water Quality

Tafelkop Mall is located in a fully urbanised catchment with no surface water features falling within 500m of the shopping centre.

4.2.4 Mean Annual Runoff (MAR)

Runoff from natural (unmodified) catchments in Catchment B32J is simulated in WR2012 as being equivalent to 7 mm/a over the surface area (WRC, 2015). This is equal to approximately 1% of the MAP.

4.2.5 Resource Class and River Health

Tafelkop Mall is located in a fully urbanised catchment with no surface water features falling within 500m of the shopping centre.

4.2.6 Receiving Water Quality Objectives and Reserve

Tafelkop Mall is located in a fully urbanised catchment with no surface water features falling within 500m of the shopping centre.

4.2.7 Surface Water User Survey

Tafelkop Mall is located in a fully urbanised catchment with no surface water features falling within 500m of the shopping centre.

4.2.8 Sensitive Areas Survey

Tafelkop Mall is located in a fully urbanised catchment with no surface water features falling within 500m of the shopping centre.

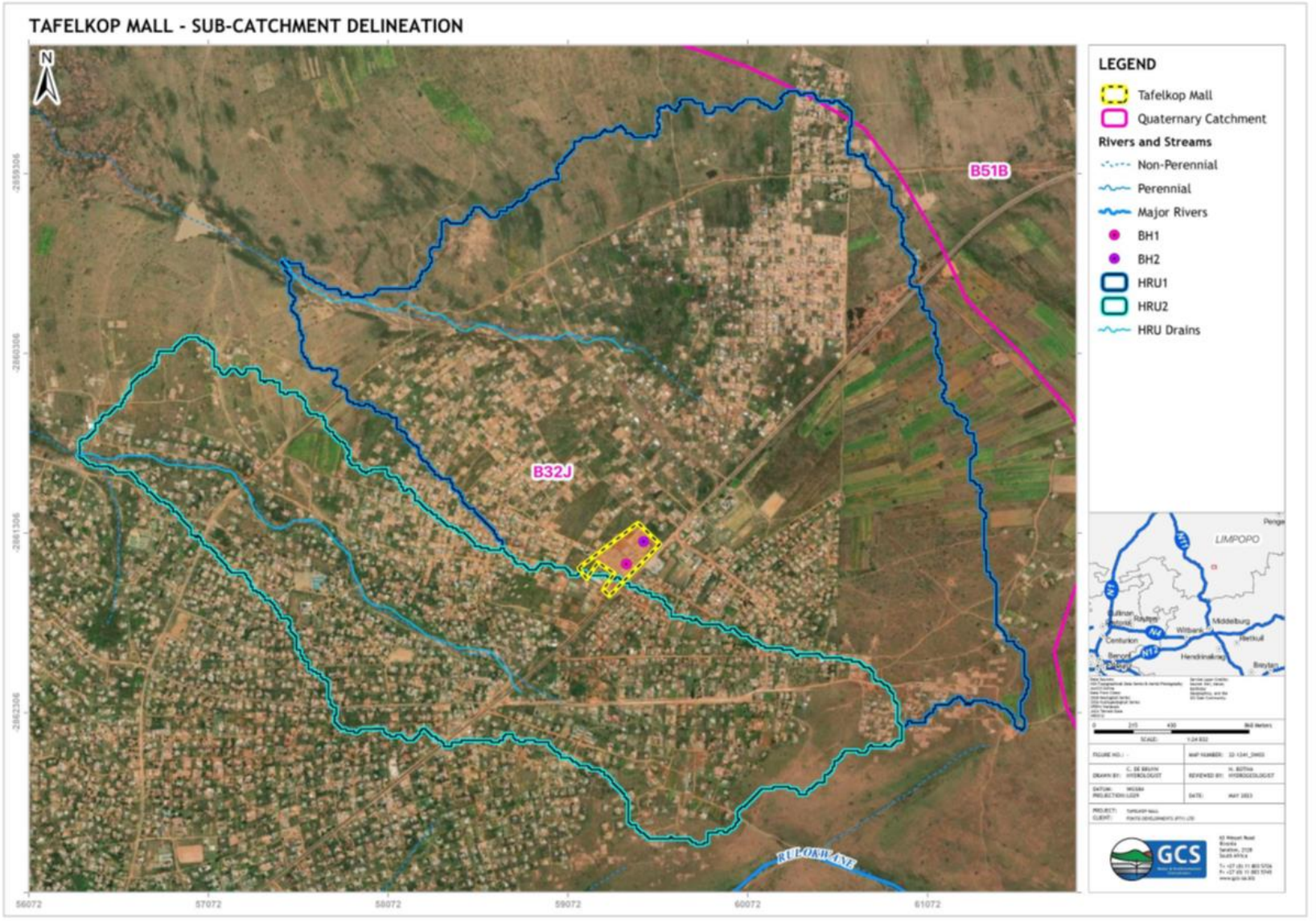

Figure 4.1: Sub-catchment Delineation

4.3 Groundwater

The information provided in this section has been sourced from the Hydrogeological Investigation compiled by GCS (2023). Refer to Annexure D for the full report.

4.3.1 Aquifer Characterisation

Figure **4.2** presents the hydrogeological characterisation across the area surrounding the site location. The surface lithology indicates an assemblage of acid/intermediate/alkaline intrusive rocks (various granitoids) which have low primary permeability or inconsistent permeability. The aquifer underlying the site location may be classified as a minor aquifer system (Parsons et al, 1995), of an intergranular and fractured type associated with a D3 principal groundwater occurrence. Groundwater occurrence is associated mainly with deeper weathered zones, whereas fault and fracture zones and dyke contacts represent other less common modes of occurrence (Barnard, H.C., 2000).

The median yield that can be expected in association with the site location ranges from 0.5 to 2 l/s. The groundwater yield potential is classed as low on the basis that 82 % of the boreholes on record produce less than 2 l/s (Barnard, H.C., 2000).

These types of aquifers do not often produce large quantities of water, but due to the fractured network, the median yields might be more than expected.

4.3.2 Groundwater Quality

Groundwater sampling was undertaken from the two (2) tested boreholes to characterize groundwater quality. The samples were collected towards the end of the constant rate discharge testing to ensure that the samples are representative of the aquifer material. The samples were submitted to a South African National Accredited System (SANASS) laboratory for the analysis of inorganic water quality parameters as well as microbiological parameters.

Samples were kept in a refrigerated storage facility on site until transported in cool, dark insulated containers to the analytical laboratory (X-lab Earth Sciences). Transportation occurred under strict chain-of-custody (CoC) protocols with documentation for sample tracking and specification of the required analytical suites.

The results show that no parameters exceed the SANS241:2015 water quality guidelines and water abstracted from BH01 and BH02 at Tafelkop Mall is fit for domestic use.

4.3.3 Hydro-Census

A total of eighty three (83) boreholes were found within a 5 km radius of the project site based on the available National Groundwater Archive (NGA) and Water use Authorisation & Registration Management System (WARMS) data. Only six (6) of the available 83 boreholes had water level information of which only one (1) borehole had static water level information. Table 4-1 lists the available information on the boreholes in the area according to the National Groundwater Archive (NGA). According to Barnard, H.C. (2000), the depth to static groundwater level is generally shallow and seldom exceeds 15 m below surface. Furthermore, the comparatively low storage capacity of the granitic rocks is reflected in the appearance of numerous springs and seepages resulting from a rise in groundwater rest levels following rainfall and associated recharge events (Barnard, H.C., 2000).

The regional spatial distribution of the NGA boreholes with available water level information within a 5 km radius around the site can be seen in Figure **4.3**. The ambient groundwater flow tends to mimic the topography with a west/northwesterly flow direction.

Table 4-1: NGA borehole information

Identifier	Latitude	Longitude	Farm Name	Water Level Status	Water Level (mbgl)
H06-1789	-25.05425	29.49895	TAFELKOP	Static Water Level	2.02
2529BA00109	-25.05591	29.52031	TAFELKOP		2.44
2529BA00110	-25.05592	29.52031	TAFELKOP		14.33
2529BA00113	-25.05593	29.52033	TAFELKOP		18.29
2529BA00111	-25.05592	29.52032	TAFELKOP		18.29
2529BA00030	-25.05062	29.56252	BOEKENHOUTKLOOF		28.96

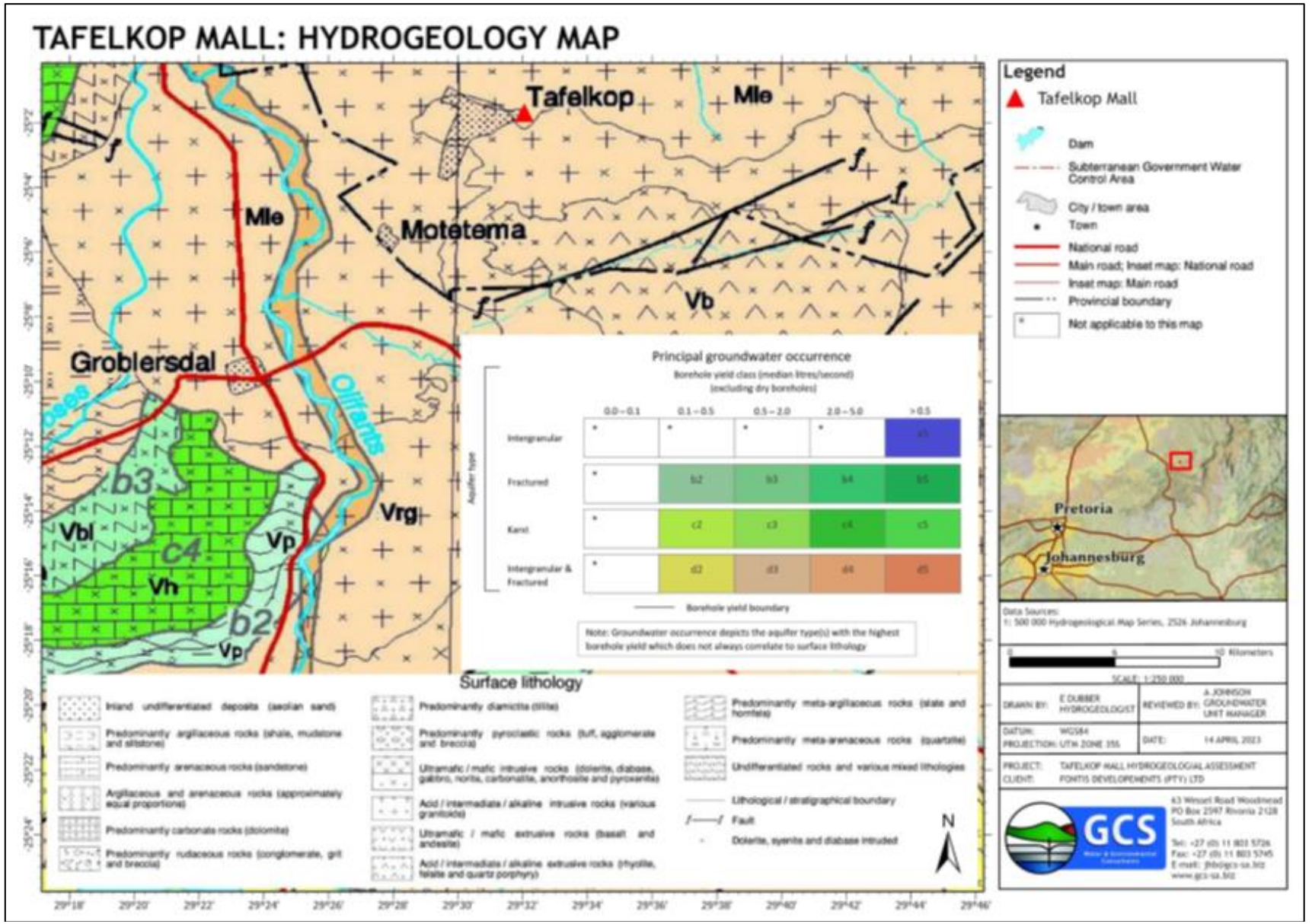

Figure 4.2: Hydrogeological series (2526 Johannesburg)

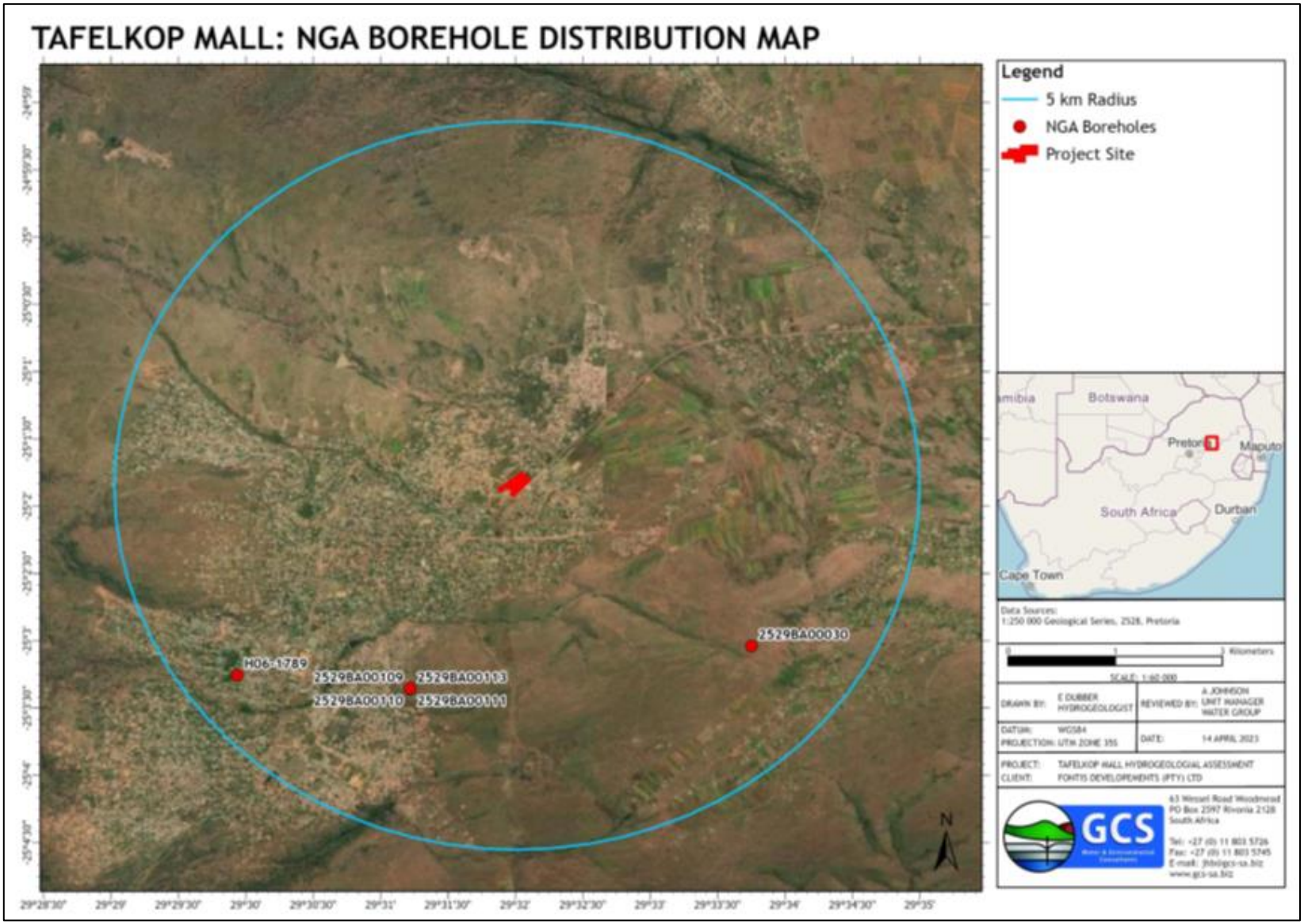

Figure 4.3: 5 km radius NGA borehole distribution map

GCS carried out a hydrocensus field programme on 28 March 2023 within 1km of the project site. The hydrocensus focused on the identification of groundwater use, groundwater level measurements, as well as possible sources of contamination. The following information was collected and is shown in Table 4-1 below:

- Borehole locality (coordinates using a hand-held global positioning system- GPS);
- Borehole status (incl. equipment) and construction details;
- Static water level (SWL); and
- Primary groundwater usage (incl. abstraction rates).

The results of the hydrocensus survey are summarised in Table 4-2, while their spatial distribution concerning the project site is presented in Figure **4.4**.

During the hydrocensus field programme, a total of five (5) boreholes were identified, including 2 of the clients boreholes. All the boreholes are production boreholes utilised for water supply and are used as potable water sources for domestic use, while the two (2) resident boreholes are also used for garden irrigation.

Groundwater level measurements were obtained from four (4) boreholes, with the measured groundwater level ranging between 4.2 to 27.95 mbgl – BH1 (21.11 mbgl), BH2 (27.95 mbgl), Fuel Station BH (7.85 mbgl), and Resident 1.1 BH (4.2 mbgl).

Table 4-2: Hydrocensus Survey Summary

Borehole ID	Coordinate & Elevation Information			Borehole Status & Equipment Information			Water Use Application		Static Water Level
	Latitude	Longitude	Elevation	Status		Equipment	Water Use Application	Abstraction Rate	
				Borehole	Equipment	Type [2]	Primary Use		
[-]	[DD]	[DD]	[m amsl]	[-]	[-]	[-]	[-]	[L/s]	[mbgl]
BH1 (client)	-25.03072	29.53403	1416	Operational	--	No equipment	Drinking water	Unknown	21.11
BH2 (client)	-25.02946	29.53388	1410	Operational	--	No equipment	Drinking water	Unknown	27.95
Fuel Station BH	-25.03135	29.53514	1411	Operational	Operational	Submersible Pump	Drinking water	Unknown	7.85
Resident 1.1	-25.03188	29.5347	1409	Not operational	No equipment	-	Irrigation/ Drinking water	Unknown	4.2
Resident 1.2	-25.031876	29.534668	1409	Operational	Operational	Submersible Pump	Irrigation/ Drinking water	Unknown	--

Note/s:
Unit and coordinate system description:
- [-] - not applicable
- [DD] - decimal degrees
- [m amsl] - metres above mean sea level
- [mbgl] - metres below ground level
- [L/s] - Litres per second
- Coordinate system - Projection: *Geographic*
  Datum: *WGS84*

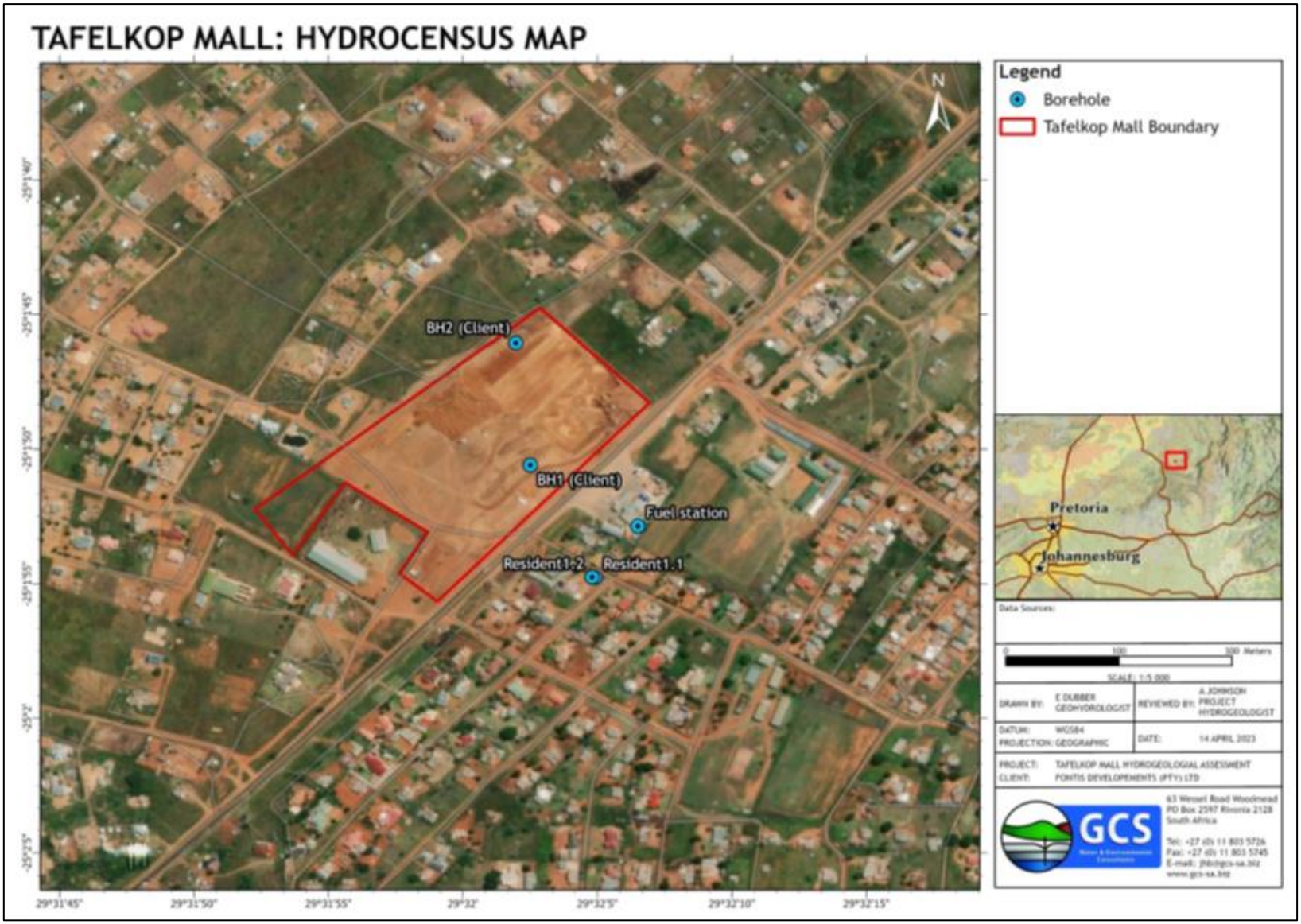

Figure 4.4: Hydrocensus map

4.3.4 Potential Pollution Source Identification

The hydrogeological risk assessment follows the approach as stipulated in the DWAF (2008) Best Practice Guidelines for Impact prediction (G4) known as the source-pathway-receptor (SPR) principle. Based on the source-pathway-receiver (SPR) model, the following receptors of potential pollution are noted:

• Vadose zone and the water table underlying the area of the proposed development.

The proposed construction activities at the site are likely to disturb the vadose zone during the excavation of foundations, and trenches for water pipelines. Poor quality seepage from machinery used to excavate soils could lead to hydrocarbon contamination of the vadose zone which could percolate to the shallow aquifer.

During the operational phase, poor quality seepage and runoff from the sewer lines (if there are leakages or spillages), could lead to contamination of the vadose zone and water table.

4.3.5 Groundwater Model

The objective of the aquifer testing programme was to estimate the sustainable yields, in-situ aquifer hydraulic parameters (storativity and transmissivity), and interpretation of hydrogeological characteristics (e.g., hydraulic conductivity).

Before the commencement of the aquifer test programme, static water levels were measured in the test boreholes to allow drawdown calculations during the aquifer tests. All groundwater level measurements were collected from a fixed reference point (e.g., top of casing) using an “electrical contact groundwater level” meter (water level meter) and data loggers/pressure transducers.

The aquifer testing programme included the following:

- Constant-Rate Test (CRT) - during the CRT, the groundwater level drawdown was recorded over time in the pumped borehole. The pumping rate was also monitored throughout the test and was varied if the rate differed from the initial constant rate.
- Recovery Test (RT) – the RT was initiated at the cessation of the CRT where groundwater levels immediately recover (residual drawdown) within the test monitoring borehole. Measurement of the residual drawdown was conducted until groundwater levels were within 90 to 100 % of pre-pumping levels.

4.3.6 Data Analysis

The existing boreholes BH01 and BH02 were subjected to various aquifer hydraulic testing methodologies. Interpretation of the constant-rate test and recovery monitoring data of the tested boreholes were undertaken to establish a relationship between drawdown and pumping rate and to derive preliminary aquifer parameters.

BH01:

Borehole BH01 was pumped at a constant discharge rate of 0.11 l/s for twenty-four (24) hours, during which a maximum drawdown of ~45.09 m of the ~116.67 m available drawdown was achieved at the end of the pumping period. Following cessation of the constant-rate test, the recovery of the water levels was measured and 98.3% recovery of the pre-test static water level (12.33 mbgl) was reached in 340 minutes, suggesting a rapid recovery.

BH02:

Borehole BH02 was pumped at a constant discharge rate of 0.09 l/s for six (6) hours, during which a maximum drawdown of ~14.46 m of the ~95.76 m available drawdown was achieved at the end of the pumping period. The borehole could only be tested for 6-hours due to access limitations on site, preventing the hydrogeologists to carry out a 24-hour pumping test. Following cessation of the constant-rate test, the recovery of the water levels was measured and 94.5 % recovery of the pre-test static water level (9.74 mbgl) was reached in 90 minutes, suggesting a rapid recovery.

4.4 Socio-economic Environment

The information provided in this section has been sourced from the Elias Motsoaledi Local Municipality (EMLM) Draft IDP, 2023-2024.

4.4.1 Regional

The EMLM (formerly Greater Groblersdal Local Municipality) is located in the Sekhukhune District Municipality of Limpopo province, South Africa and the seat of EMLM is Groblersdal. The EMLM was established in 2000 as a category B municipality as determined in terms of municipal structures act (1998). The EMLM has collective executive system as contemplated in section 2(a) of the Northern Province Determination of Types of Municipalities Act (2000).

The EMLM is predominantly rural in nature with a high unemployment rate resulting in high poverty levels and is linked with many other places through shared environmental, social and economic systems and structures. The most apparent of these links are with neighbouring and nearby municipalities across Sekhukhune District Municipality. The EMLM is also integral to the provinces of Limpopo and Mpumalanga and has significant development potential in sectors such as agriculture (both horticulture and livestock), tourism and mining.

The municipality evolved as an amalgamation of the former Moutse Transitional Local Council (TLC), Hlogotlou (TLC), Tafelkop, Zaaiplaas, Motetema and other surrounding areas in the year 2000. The municipality is named after the struggle hero Elias Motsoaledi who was sentenced to life imprisonment on Robben Island with the former president of the Republic of South Africa, Nelson Mandela. The municipal borders Makuduthamaga Local Municipality in the south, Ephraim Mogale Local Municipality in the east, Greater Tubatse Local Municipality and Mpumalanga's Dr JS Moroka, Thembisile Hani, Steve Tshwete, Emakhazeni and Thaba Chweu local municipalities.

It is situated about 180km from Polokwane, 135km from Pretoria and 150kms from Nelspruit. The municipality is the third smallest of the five (5) local municipalities in Sekhukhune District, constituting 27, 7% of the area with 3 668 334m^2 of the district's 13 264m^2. Land ownership is mostly traditional and the municipality is predominantly rural with about sixty-two settlements, most of which are villages.

The Groblersdal Magisterial District, Roossenekal and Laersdrift are pivotal to the economic growth of the municipality. Moutse Magisterial District population and its economic activities include the settlements in the western part of the Elias Motsoaledi Local

Municipality. The settlements in the northeastern parts of the municipal area are located in the Hlogotlou and surrounding areas. It should thus be borne in mind that these four magisterial districts do not only form part of the Elias Motsoaledi Local Municipality but also partly comprises adjacent local municipalities. It does however provide an indication of the economic structure and characteristics in different parts of the EMLM.

4.4.2 Demographics

4.4.2.1 Population Distribution

The population of the municipality is 268 256 which shows population increase of about 7,58% as compared to the 2011 population figures. The growth of the population from 249 363 in 2011 could be attributed to natural growth and job opportunities and the overall growth in economic activities in the municipal area. The population growth between 2011 and 2016 means 0.9% of the people are aged 0-14 years old and 3.2% of people are aged 15-65 years old. The sex ratio indicates that for every 100 females there are 87 males.

4.4.3 Education

Outcome 1 of the Delivery Agreement requires the improvement of the quality of basic education in general and in Maths and Science in particular. The EMLM has an inherited problem namely that the low-income levels per household in the community correlate to the low education levels in the area. Statistics show that approximately (48.4%) of the population above 15 years of age has had no schooling, the majority of which did not complete primary school. This translates into a major challenge for the municipality as even in an ecomomic growth cycle future meaningful employment prospects are minimal. Only (9.5%) of the total population completed the schooling curriculum at matric level. The municipality is serviced by one (1) Further Education Training (FET) located in Sekhukhune.

4.4.3.1 Economic Perspective

There are certain opportunities because of the spatial landscape within the municipal area. Groblersdal is a provincial growth point, and a number of important arteries connect it with other towns (i.e. Middelburg, Marble Hall, Bronkhorstpruit and Stofberg) through the N11 and R25. These arteries can create social and economic viability and diversified development in the area. In addition, as per provision of the Groblersdal Town Planning Scheme (2006), other economic opportunities could flourish in co-existence with agriculture as the main economic base. It is possible to use the area for industrial purposes and this poses business opportunities. That in turn could lead to job creation for the local community. This will improve quality of life for the community.

Furthermore, there are strategically located parcels of land in close proximity to already existing developments. Most of the latter parcels of land are underutilised or not used at all. With utilisation of this land, the surrounding settlement will benefit. The construction of the De Hoop dam is also likely to unleash spatial opportunities that will benefit both Elias Motsoalei and Greater Tubatse municipalities. The dam will improve water provision to mines and the settlements. Mining could then flourish and it will co-exist with human settlement.

The municipality has a great opportunity to grow economically, socially and infrastructural through investment opportunities. The focus areas are in the sectors as stated:

- Mining;
- Agricultural land; and
- Tourism opportunities Land for development.

With regards to business development, Groblersdal, Dennilton, Monsterlus and Tafelkop are the main business nodes within EMLM. The remaining business development occurs mainly scattered along arterial routes or within settlement areas.

4.4.3.2 Employment Profile

Elias Motsoaledi Local Municipality employs a total number of 48 400 people within its local municipality. The local municipality that employs the highest number of people relative to the other regions within Sekhukhune District Municipality is Greater Tubatse/Fetakgomo local municipality with a total number of 65 700. The local municipality that employs the lowest number of people relative to the other regions within Sekhukhune District Municipality is Ephraim Mogale local municipality with a total number of 20 800 employed people.

In EMLM the economic sectors that recorded the largest number of employment in 2018 were the trade sector with a total of 11 300 employed people or 23.3% of total employment in the local municipality. The community services sector with a total of 9 450 (19.5%) employs the second highest number of people relative to the rest of the sectors. The electricity sector with 295 (0.6%) is the sector that employs the least number of people in Elias Motsoaledi Local Municipality, followed by the mining sector with 1 010 (2.1%) people employed.

In 2018, the unemployment rate in EMLM (based on the official definition of unemployment) was 22.62%, which is a decrease of -8.19 percentage points. The unemployment rate in EMLM is lower than that of Sekhukhune. Comparing to the Limpopo Province it can be seen that the unemployment rate for EMLM was higher than that of Limpopo which was 19.49%.

The unemployment rate for South Africa was 27.18% in 2018, which is a increase of -3.59 percentage points from 23.60% in 2008.

When comparing unemployment rates among regions within Sekhukhune District Municipality, Makhuduthamaga Local Municipality has indicated the highest unemployment rate of 41.3%, which has decreased from 51.3% in 2008. It can be seen that the Ephraim Mogale Local Municipality had the lowest unemployment rate of 21.0% in 2018, this decreased from 29.4% in 2008.

5 ANALYSIS AND CHARACTERISATION OF THE WATER USE ACTIVITY

5.1 Site Delineation for Characterization

Refer to Section 2.2 for the extent of the project area.

5.2 Water and Waste Management

5.2.1 Process Water

The information provided in this section has been sourced from the Water Balance Report and was compiled by GCS (Pty) Ltd (2023). Refer to Annexure C for the full report. Refer to Annexure A for the Domestic Water Design Report undertaken by VMG Consultants.

5.2.1.1 Water Balance

A schematic presentation of the water process flow diagram (PFD) for the development was drafted using the information obtained from the client regarding the components that need to be licensed. The PFD represented the operational phases of the project. The PFD presents schematically the sources of water, storage, linkages to different uses and losses from the system of the proposed development.

The client provided the estimates of the daily water requirements for the operational phases of the proposed development activities. The provided estimates of water requirements were used, together with the finalised PFDs to calculate average annual water balances. In the case where there was a lack of information in terms of water requirements, reasonable assumptions were made to determine the water balance. The water balance is based on techniques described by (DWAF, 2006).

As part of this study, a conceptual water balance was developed (operational phase including proposed infrastructure). The water balance was developed in MS Excel and further considers the Best Practice Guideline G2: Water and Salt Balances (DWAF, 2006). The water balance aims to characterise the water distribution system of the site.

The average annual water balance is summarised in Table 5-1.

Table 5-1: Water balance results – annual/daily/monthly (average)

Facility Name	Water Circuit/stream	Quantity (m^3/a) - IN	Water Circuit/stream	Quantity (m^3/a) - OUT	Balance
Mall Area	From: Rainfall	33 546	To: Runoff into Attenuation Ponds 1, 2 and 3	29 910	
			To: Seepage	671	
			To: Evaporation	2 965	
	Total	33 546	Total	33 546	0
Sub-Catchments Runoff	From: Rainfall	127 120	To: Runoff	95 606	
			To: Evaporation	31 514	
	Total	127 120	Total	127 120	0
Boreholes	From: Groundwater Aquifer	8 672	To: RWTP	8 672	
	Total	8 672	Total	8 672	0
RWTP	From: Boreholes	8 672	To: Potable Water Storage Tanks	8 499	
			To: Treatment Loses	173	
	Total	8 672	Total	8 672	0
Retail	From: Raw Water Storage Tanks	14 801	To: Wastewater	11 841	
			To: Loss	2 960	
	Total	14 801	Total	14 801	0
Restaurants	From: Raw Water Storage Tanks	11 031	To: Wastewater	8 825	
			To: Loss	2 206	
	Total	11 031	Total	11 031	0
Misc.	From: Raw Water Storage Tanks	22	To: Used / Consumed	22	
	Total	22	Total	22	0
SWTP	From: Wastewater	20 688	To: Treated Grey Water Tank	13 792	
	From: Ablutions	13 792	To: Loss	20 688	
	Total	34 479	Total	34 479	0
Product Water & Grey Water Tank	From: SWTP	13 792	To: Ablutions	13 792	
			To: Fire Hydrant (Emergency Use Only)	0	
	Total	13 792	Total	13 792	0
Ablutions	From: Product Water & Grey Water Tank	13 792	To: WTP	13 792	

Facility Name	Water Circuit/stream	Quantity (m^3/a) - IN	Water Circuit/stream	Quantity (m^3/a) - OUT	Balance
	Total	13 792	Total	13 792	0
Emergency (Fire Hoses)	From: Product Water & Grey Water Tank	0			
	Total	0	Total	0	0
RED = Estimated, BLUE = Available Data	*Total IN*	257 255	*Total Out*	257 255	0
Percent Error					*0.00%*

The process flow diagram (PFD) developed for the site is shown in Figure **5.1**, below. An average year PFD is presented.

Raw water will be abstracted from the two boreholes and pumped to the water treatment plant via a raw water storage tank. The water will enter through media filters, and then pass through cartridge filters, where it then undergoes reverse osmosis. Backwash waste from the media filters and brine from the reverse osmosis process must be disposed of. After the treatment process, clean water flows into two potable water storage tanks. From these storage tanks, water is pumped to various sections of the mall for tenant and public use.

5.2.2 Stormwater

Refer to Annexure E for the Civil Design Report undertaken by Struxit and Figure 5.2 for the Stormwater Management Plan.

Stormwater Management (SWM):

- According to the stormwater management layout (Figure 5.2) by STRUXIT Projects (Pty) Ltd, there are three main drainage areas, each with a discharge point.
- Drainage area 1 is the largest and covers the entrance, the parking lot, and some shops. Stormwater runoff from this area will be routed towards attenuation ponds for rainwater harvesting. Overflow and other stormwater will be discharged at discharge point 1.
- Drainage area 2 generates roof water runoff that will be routed via the service road and chutes to discharge point 2, where it will flow outside the site area. Stormwater from an adjacent church will be routed underneath the development and also discharged at this discharge point.
- Drainage area 3 generates roof and batter runoff, which will be routed via a kerb inlet towards an attenuation pond. Overflows will discharge to the surrounding environment via discharge point 3.

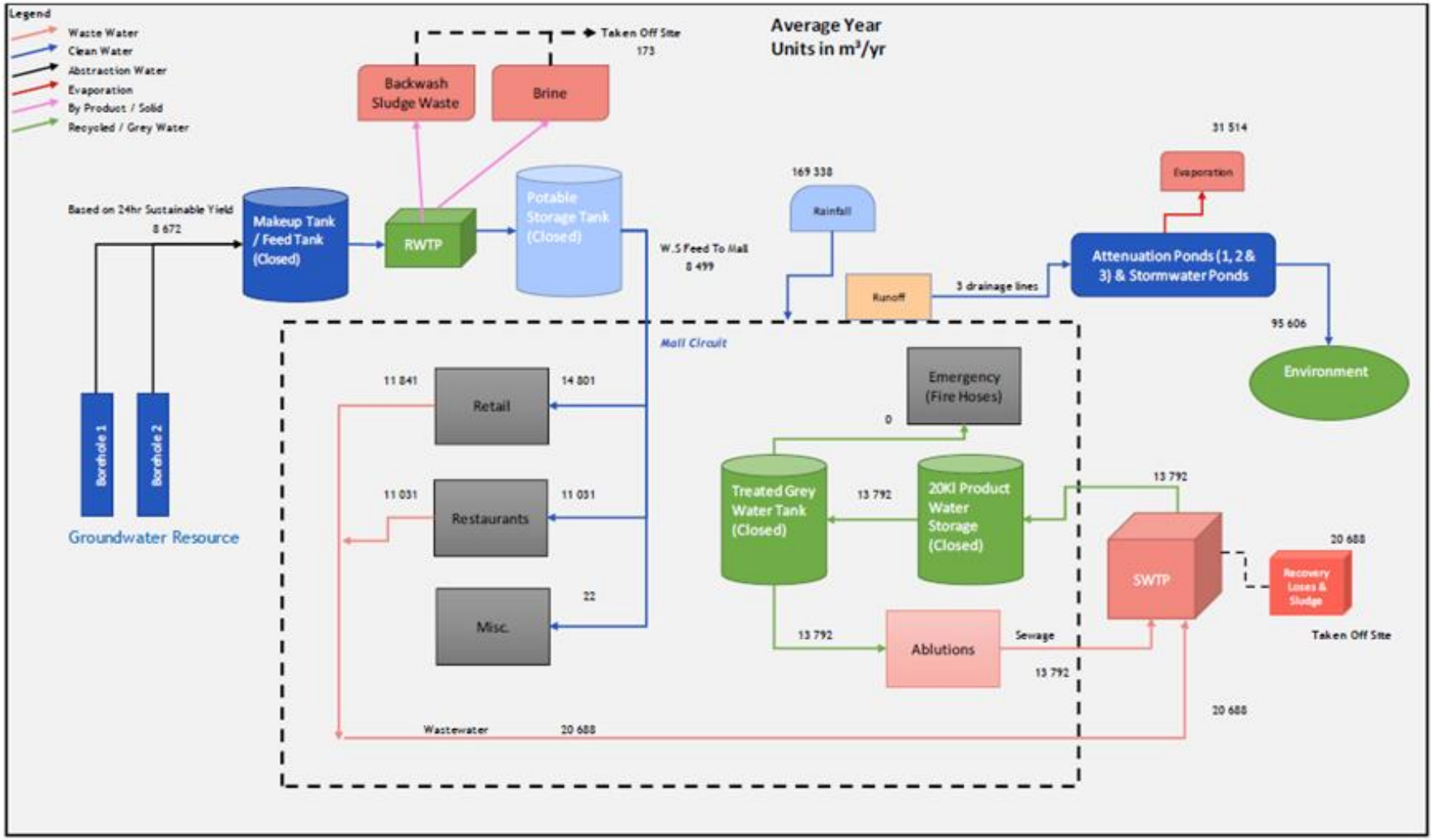

Figure 5.1: Water balance diagram

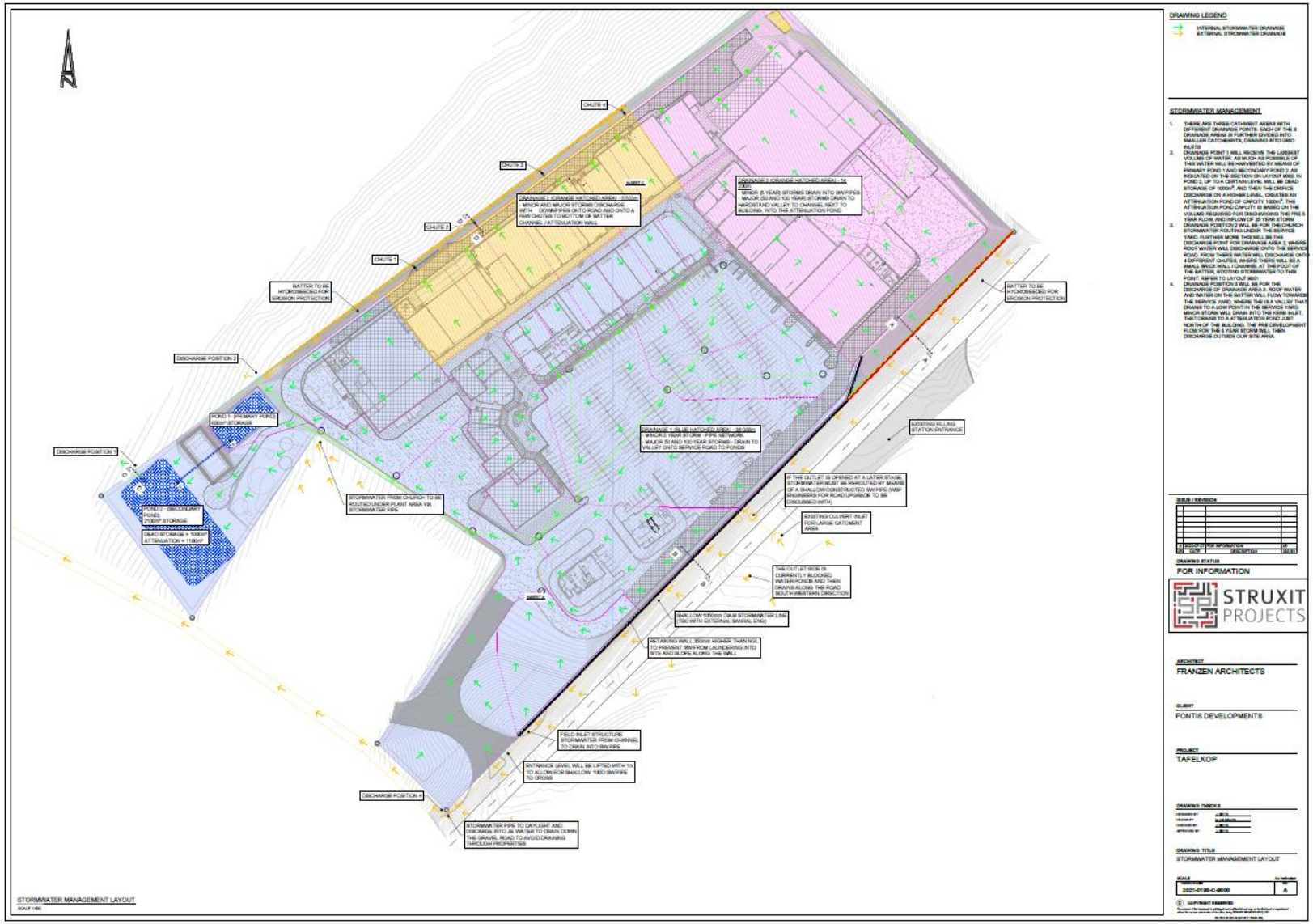

Figure 5.2: Stormwater Management Plan

5.2.3 Groundwater

The sustainable yield for BH01 is recommended at 0.1 l/s over a daily pump schedule of 12 hours to allow for a 12-hour recovery period daily. This equates to 131.4 m3/month and 1 576.8 m3/annum.

The sustainable yield for BH02 is recommended at 0.45 l/s over a daily pump schedule of 12 hours to allow for a 12-hour recovery period daily. This equates to 591.3 m3/month and 7 095.6 m3/annum.

Do not over abstract from existing or proposed boreholes and ensure that water level monitoring of boreholes within a 1.5km radius of the pumping borehole is undertaken. If a decline in water levels is noted in all boreholes, as a result of pumping, the abstraction rate should be lowered to prevent aquifer depletion.

5.2.4 Waste

5.2.4.1 Domestic (General) Waste

Tafelkop Mall will sub-contract the removal of general waste off their site. Refer to Annexure F for the Kwadi Ya Madiba Proposal for the provision of waste management services.

The preferred waste management practice is to reduce waste at source i.e. to prevent waste from being generated. Where waste generated cannot be prevented other options such as reusing, followed by recycling of the waste should be considered.

5.2.4.2 Sewage

Refer to the GES Environmental Servies Waste Management Services Methodology Statement in Annexure B.

- Sewage water generated at mall ablutions will be routed to a sewerage treatment plant located at the western corner of the site layout via pipelines.
- The sewage will undergo a 5-phase treatment.
- First, the effluent is received via an inlet to a primary settling chamber (an anaerobic phase). Effluent will settle to form three layers.
- Then follows the anoxic phase and secondary settling.
- The third chamber includes aerobic digestion, where water passes through a bio-media housing bacteria that biodegrade the organic matter.
- Final settling takes place in the fourth chamber where cell material and other solids settle to form a “sludge blanket”. This sludge is re-activated and used in the previous phase to optimise the efficiency of the plant.
- The fifth and final phase includes disinfection/sterilisation of the treated water before use or discharge into the environment (or for re-use).

- After treatment is completed, the water will be routed to a product water storage JoJo tank where the water is pumped to a combined fire and greywater storage tank.
- Water is then pumped to the mall ablutions via grey feed pipelines.

5.2.4.3 Sludge

Removal of the sludge from the septic tank via honey suckers is required once a year. This will be undertaken by an approved licensed contractor. The sludge will be transported to the regional sewage works or lagoon disposal site (to accommodate liquid sludge). The following guidelines will be followed:

- Disposal of Wastewater Sludge: Volume 1: Water Research Commission by HG Snyman and JE Herselman Golder Associates Africa;
- Permissible Utilisation and Disposal of Sewage Sludge Edition 1 Department of Agriculture; and
- Department of Health Department of Water Affairs and Forestry Water Institute of Southern Africa Water Research Commission TT 85/97.

5.3 Operational Management

5.3.1 Organisational Structure

Refer to Section 2.7 above for the organisation structure.

5.3.2 Resources and Competence

- Resources essential for the implementation of SHEQ management systems are provided;
- Necessary competency is available for the effective and efficient operation of the organisation; and
- Creates a suitable working environment for employees and contractors to enhance the performance of the organisation.

5.3.3 Education and Training

- Training and Capacity Building – strengthening the Tafelkop Mall and its beneficiaries on waste management through continual reporting, meetings and training (where possible).
- All personnel appointed will be suitably qualified and trained to ensure competence within their position.

5.3.4 Internal and External Communication

Communication is practiced at all functions and levels and is in the form of electronic media (e- mails), audio visual (tapes/videos) and/or traditional correspondence (caucuses, memos, notes, newsletters, periodicals, pamphlets, posters, slogans etc.).

5.3.5 Awareness Raising

The objectives of the environmental awareness plan is:

- To educate employees regarding their role in conserving the environment and the importance of conserving natural resources;
- To identify environmental training needs for employees and contractors at all levels;
- To ensure that employees whose work could cause significant environmental impact identified by the Mall are competent to perform those tasks to which they are assigned;
- To enable employees to identify environmental impacts or non-conformances in their work activities on the environment;
- To familiarise employees with emergency preparedness and response requirements;
- To be aware of the potential consequences of deviation from specified operating procedures; and
- To conduct their work and manage relevant activities in an environmentally responsible manner.

5.4 Monitoring and Control

5.4.1 Surface water monitoring

No surface water monitoring has been investigated due to the lack of surface water resources in relation to the project.

5.4.2 Groundwater monitoring

To monitor groundwater impacts, groundwater management procedures and practices have to be implemented that are in line with accepted practices and in accordance with the requirements of the Water Use Licence. The key objectives of the groundwater monitoring programme are to:

- Detect short and long-term trends;
- Recognise changes in groundwater quality and levels;
- Measure impacts and define mitigation measures; and
- Develop improved monitoring systems.

Groundwater monitoring must be undertaken to establish the extent of negative impacts in the weathered and fractured aquifers, during groundwater abstraction.

5.4.2.1 Monitoring locations

Boreholes as listed in Table 4-2 that have been identified within a 1km radius, must be included in the monitoring programme.

5.4.2.2 Monitoring requirements

Per Section 21(a) of the NWA, the DWS guidelines indicate that groundwater monitoring should be conducted every quarter.

The monitoring requirements are presented in Table 5.2

Table 5.2: Groundwater monitoring requirements

Monitoring parameter	Element for analysis	Monitoring frequency
Depth to groundwater	Groundwater level	Monthly
Water quality	A full spectrum of heavy metals and salts	Quarterly

All monitoring information must be entered into a spreadsheet for record keeping and analysis. Copies of the certificates of analyses must be kept on file for inspection.

If a significant exceedance is recorded during the monitoring programme, the following actions should be taken:

- Log the exceedances in the incident reporting system within 24-hours of it occurring;
- Report the exceedances to the Environmental and General Managers, as well as to the regulatory authority;
- Identify causes of the exceedances; and
- Implement the necessary remedial actions according to the outcome of the investigation.

Regular monitoring reports must be prepared for internal use, as well as for submission to the authorities.

5.4.2.3 Groundwater monitoring reports

Monitoring reports must contain the following information:

- Monitoring borehole location map;
- Geology map;
- All coordinates of the groundwater sampling sites;

- Certificates of analysis must be included for quality assurance. Monitoring results will be compared to South African National Standards (SANS241) and the Klip River catchment guideline limits;
- Time-series graphs for key indicator elements (e.g., pH, EC, TDS, Fe, Mn, Al and SO_4);
- Trilinear or other analytical groundwater plots;
- A discussion regarding observed trends and potential groundwater contamination; and
- Recommendations regarding possible amendments or additions to the groundwater monitoring programme, based on trends and other information observed.

5.4.3 Bio-monitoring

Tafelkop Mall is located in a fully urbanised catchment with no surface water features falling within 500m of the shopping centre.

5.4.4 Waste Monitoring

Waste monitoring allows for the control of wastage and enhances the possibilities of waste recovery and reduction. Management of waste will occur as described in Section 5.2.4 above. Monitoring of wastes should include the following:

- Identification and classification of waste into definite categories;
- Ensure awareness and training of employees regarding waste management;
- Measuring the amount of each type of waste that is produced within a specific time period;
- Separation of different waste types to prevent cross-contamination and ensure proper disposal to the correct landfill sites;
- Ensuring that each waste type is correctly managed according to specifications;
- Monitor the removal and disposal of waste – frequency and place of disposal; and
- Regularly ensure that all waste related contractors are licensed and competent.

5.5 Risk Assessment/ Best Practice Assessment

5.5.1 Impact Assessment Methodology

To ensure uniformity, the assessment of potential impacts derived from each activity associated with the proposed development is addressed in a standard manner so that a wide range of impacts are comparable. For this reason, a clearly defined rating methodology has been used to assess the impacts identified.

Each impact identified must be assessed in terms of probability (likelihood of occurring), scale (spatial scale), magnitude (severity) and duration (temporal scale). To enable a scientific approach to the determination of the environmental significance (importance), a numerical value is linked to each rating scale; refer to Table 5-3.

The following criteria must be applied:

Occurrence

- Probability of occurrence (how likely is it that the impact may occur); and
- Duration of occurrence (how long the impact may last).

Severity

- Magnitude (severity) of impact (will the impact be of high, moderate or low severity); and
- Scale/extent of impact (will the impact affect the national, regional or local environment, or only that of the site).

Table 5-3: Impact Assessment Scoring

Probability (P)	**Duration (D)**
5 – Definite / Don't know	5 – Permanent
4 – Highly probable	4 – Long-term (ceases with operational life)
3 – Medium probability	3 – Medium-term (5 – 15 years)
2 – Low probability	2 – Short-term (0 – 5 years)
1 – Improbable	1 – Immediate
0 – Not applicable/None/Negligible	0 – Not applicable/None/Negligible
Scale (S)	**Magnitude (M)**
5 – International	10 – Very high / Don't know
4 – National	8 – High
3 – Regional	6 – Moderate
2 – Local	4 – Low
1 – Site only	2 – Minor
0 – Not applicable/None/Negligible	0 – Not applicable/None/Negligible

Status of Impact

Positive: + (A benefit to the receiving environment)

Negative: - (A cost to the receiving environment)

Neutral: N (No cost or benefit to the receiving environment)

The following formula was applied to calculate the impact significance after the factors were ranked for each impact:

$$SP = (\text{magnitude} + \text{duration} + \text{scale}) \times \text{probability}$$

The maximum value that can be achieved is 100 Significance Points (SP). The Impact significance rating is provided in Table 5-4.

Table 5-4: Impact Ratings

Significance	Environmental Significance Points	Colour Code
High (positive)	>60	H
Medium (positive)	30 to 60	M
Low (positive)	<30	L
Neutral	0	N
Low (negative)	<-30	L
Medium (negative)	-30 to -60	M
High (negative)	>-60	H

The significance of an impact gives one an indication of the level of mitigation measures required to minimise negative impacts and reduce environmental damage during the construction, operational and decommissioning / closure phases. Suitable and appropriate mitigation measures were identified for each of the potential impacts based on specialist recommendations and GCS expertise.

5.5.2 Impacts Identified

The impacts identified for Tafelkop Mall are shown in Table 5-5.

Table 5-5: Impact descriptions for Tafelkop Mall

Impact description					Impact before mitigation	Impact after mitigation	Mitigation measures	Action plan	Responsible person
No	Phases	Activity	Aspect (cause of the impact)	Impact	Risk Rating	Risk Rating			
1	Operation	Groundwater abstraction	Abstraction of Groundwater	Lowering of the water table and reduce the amount of groundwater reserved for the sub-catchment. Over production can cause collapse of water bearing fissures/cracks, or if honey comb matrix rock exist can cause collapse of aquifer zones.	M	M	• Abstract groundwater at a calculated abstraction rate. • Do not over produce the aquifer, and manage abstraction as per the recommendations in the geohydrology report. • Have the abstraction borehole tested every 5 to 10 years to determine the abstraction rate. • Have monitoring of abstraction volumes from boreholes, with installed flow meters. • Monitor of water level responses (water level devices or permanently installed data logger). If there are monitoring boreholes in the vicinity, the water levels should be monitored from the existing monitoring borehole.	Refer to the groundwater monitoring section (Section 7 in the Hydrogeological Assessment report)	Operational or Site manager

5.6 Issues and Responses from Public Consultation Process

Public participation is an essential and legislative requirement for any environmental authorisation process. The principles that demand communication with society at large are best embodied in the principles of the National Environmental Management Act 1998 (Act No. 107 of 1998) (NEMA), South Africa's overarching environmental law.

Section 41 (4) of the NWA provides that the competent authority, the DWS, may, at any stage of the application process, require the applicant to place a suitable notice in newspapers and other media, and to take other reasonable steps as directed by the competent authority to bring the application to the attention of relevant organs of state, interested persons and the general public. The required Public Participation Process (PPP) is outlined in the Government Notice Regulation 267, Regulations Regarding the Procedural Requirements for Water Use Licence Applications and Appeals published in Government Gazette 40713 on 24 March 2017.

As such, the following PPP will be undertaken for this IWULA in accordance with GNR.267:

- Erecting of Site Notices;
- Distribution of Background Information Documents (BIDs) to adjacent landowners, the respective local governments and any other Interested and Affected Party (I&AP) that requested said document; and
- Placement of an advertisement in the local newspaper.

5.7 Matters Requiring Attention/ Problem Statement

To be completed after public consultation.

5.8 Assessment of Level and Confidence of Information

All information contained in this IWWMP was sourced from the specialist studies conducted for the project area. The specialists appointed to undertake the various investigations are considered to be competent in their particular fields. In light of the above, the level of confidence with regards to the information and reports used to compile this document is high.

6 WATER AND WASTE MANAGEMENT

6.1 Water and Waste Management Philosophy

Several key principles apply to all aspects of water management at Tafelkop Mall:

- The water management hierarchy approach as proposed by the DWS (Best Practice Guidelines for the Protection of Water Resources in the South African Mining Industry) is applied;
- Tafelkop Mall is the responsible steward of water at the mall, and shall not cause harm or adverse social conditions through the use of this resources;
- Tafelkop Mall shall endeavor to optimally use water for business to generate value, both in the long and short term (within the concept of sustainable development- to meet the needs of the present generation without compromising the ability of the future generation to meet their own needs). Thus, the hierarchy of decision making is applied to best manage water and waste at the mall;
- Tafelkop Mall considers the quantity and quality aspect of water resources (both surface and groundwater); and
- Tafelkop Mall considers and acknowledges access to water as a basic human right.

The following objectives/goals will be put into place to ensure the correct management of the water and waste at Tafelkop Mall.

6.1.1 Process Water

The following objectives/goals relate to process water:

- Optimise the re-use of process water;
- Ensure water is not unnecessarily abstracted or wasted;
- Manage water quality according to the performance objectives included in the conditions of all the environmental authorisations;
- Ensure that water quality remains within the requirements set by DWS; and
- Management of the process water infrastructure in such a manner that risk will be avoided.

6.1.2 Stormwater

The following objectives/goals relate to stormwater:

- To ensure at all times the effective separation of clean and dirty water and the protection of clean water;
- Ensure that dirty water footprints are reduced to the smallest possible catchment size;
- Implement a storm water management plan on site based on best practice principles;
- Effective maintenance of all stormwater structures and infrastructure; and
- Containment and re-use of dirty water in the process.

6.1.3 Groundwater

The following objectives/goals relate to groundwater:

- Conduct all activities in such a manner that it will not pose unnecessary threats to the groundwater resources in terms of quality and quantity;
- To ensure that all liners remain intact to protect the groundwater environment;
- Conduct groundwater monitoring to assist in identifying risks early so that management measures can be implemented timeously; and
- Inspect and monitor all aspects that lead to the protection of the groundwater regime on a regular basis.

6.1.4 Waste

A risk assessment approach should be adopted for the waste management philosophy on site. The normal sequence of controlling the source of waste management will be followed and includes the following steps.

- Eliminate:
    - Remove the waste source;
    - Substitute for less waste; and
    - Stop waste practices.
- Control at the source:
    - Restrict waste: Contain or attenuate the waste source; and
    - Proper maintenance and good housekeeping of plant, equipment and machinery.
- Minimise.
    - Restrict waste. (Admin. controls); and
    - Competent ongoing supervision is needed to ensure compliance.

Sewage water treatment plant (SWTP):

- Sewage water generated at mall ablutions will be routed to a sewerage treatment plant located at the western corner of the site layout via pipelines.
- The sewage will undergo a 5-phase treatment.
- First, the effluent is received via an inlet to a primary settling chamber (an anaerobic phase). Effluent will settle to form three layers.
- Then follows the anoxic phase and secondary settling.
- The third chamber includes aerobic digestion, where water passes through a bio-media housing bacteria that biodegrade the organic matter.

- Final settling takes place in the fourth chamber where cell material and other solids settle to form a "sludge blanket". This sludge is re-activated and used in the previous phase to optimise the efficiency of the plant.
- The fifth and final phase includes disinfection/sterilisation of the treated water before use or discharge into the environment (or for re-use).
- After treatment is completed, the water will be routed to a product water storage JoJo tank where the water is pumped to a combined fire and greywater storage tank.
- Water is then pumped to the mall ablutions via grey feed pipelines.

6.2 Strategies

6.2.1 Process Water

Process water management will consist of:

- Investigating new alternatives for process water treatment and re-use; and
- Continued, regular monitoring of dirty water dams which contain process water to ensure that the water quality is appropriate for re-use.

6.2.2 Stormwater

A stormwater management plan has been developed for Tafelkop Mall. Stormwater management will comprise of:

- Regular monitoring of surface water quality; and
- Regular monitoring and maintenance of stormwater control structures.

6.2.3 Groundwater

Groundwater management strategies will comprise of:

- Continued, regular monitoring of groundwater levels and quality; and
- Annual compliance audits.

6.2.4 Waste

Waste management strategies will consist of:

- Implementation of good housekeeping and best practises;
- Investigating new, cleaner and more cost-effective technologies to reduce and manage waste;
- Monitor compliance with best practises; and
- Creating environmental awareness and sensitivity through improvements to the induction programme for employees.

6.3 Performance Objectives/ Goals

The following objectives and strategies are followed in order to achieve the Safety, Health, Environment and Quality Policy:

- Compliance:
    - Identify all applicable legislation and other applicable requirements to the identified environmental aspects and will ensure that the operations remain in compliance with such legislation and requirements.
- Pollution Prevention:
    - Identify the impacts that all operations, processes and products have on the environment and will ensure that pollution on the environment is prevented or minimised.
- Improvement:
    - Set objectives and targets to improve environmental performance and the Environmental Management System and will continually strive to find even better sustainable solutions to problems.
- Competence:
    - Ensure that all people who perform work for or on behalf of Tafelkop Mall are competent and understand the impact of their activities on the environment, and their role in the prevention of pollution and the maintenance of the Environmental Management System.
- Communication:
    - Actively communicate this policy to persons working for and on behalf of Tafelkop Mall and that Tafelkop Mall ensure that they understand the content intent and will make it available to the public.
- Review:
    - Review the continued sustainability and adequacy of this policy at least annually to ensure it remains valid at all times.

6.4 Measures to Achieve and Sustain Performance Objectives

The IWWMP must clearly demonstrate that they have incorporated all of the above objectives/principles or, alternatively, must clearly motivate why any of the above principles are not relevant.

The water resource can be protected in the following ways by applying water conservation, pollution prevention and minimisation of impacts principles:

- Reduction in the level of contamination of water through implementation of pollution prevention strategies thereby increasing the economic reuse of the water without treatment; and

- Minimisation of impacts through capture, containment, reuse & reclamation of contaminated water thereby preventing discharges/releases.

6.5 Option Analyses and Motivation for Implementation of Preferred Options

A catchment area was defined for the purpose of this study to quantify the market that is more likely to sustain the planned retail centre in Tafelkop. Physical and psychological barriers for retail development as well as drive distances were taken into consideration when delineating the catchment area. Proximity to Moratiwa Crossing limited the catchment area to the East and mountainous terrain to the South. Groblersdal retail influenced the western boundary of the catchment area. Complicated access and increasing travel distance from the site restricted the catchment area to the North.

6.6 IWWMP Action Plan

An Action Plan provided herein shall provide water and waste management options for issues requiring immediate attention at Tafelkop Mall. The broad objective of the Action Plan is to provide robust and sustainable water and waste management practice for the mall. The following aspects will be addressed as part of the Action Plan:

- Objectives;
- Roles and responsibilities; and
- Timeframes.

The compilation of an IWWMP is a long-term commitment in terms of resources requirements including technical investigations that are conducted. These also require disbursing financial resources to implement management measures which can in most cases take months. With this in mind, this IWWMP has been developed for medium term (i.e. first 5 years of operation of the mall), with the Action Plan herein reviewed and updated every year. It is thus the intention of the mall to have yearly interaction with DWS and update the Action Plan accordingly. The Action Plan for Tafelkop Mall is stipulated in Table 6-1.

Table 6-1: IWWMP Action Plan

	Action	Implementation Date	Person Responsible
1	Weekly Site Inspections	Weekly	Environmental Officer
2	Monthly management inspections	Monthly	Environmental Manager
3	Groundwater Monitoring	Quarterly	Contractor
4	Surface Water Monitoring	Monthly	Contractor

	Action	Implementation Date	Person Responsible
6	WUL Audits (Internal)	Annually	Environmental Officer
7	WUL Audits (External)	Annually	Contractor
8	Environmental Site Audits	Weekly	Contractor
9	Employee Training	New employees and after employees return from leave	Environmental Officer

6.7 Control and Monitoring

6.7.1 Monitoring of Change in Baseline (Environment) Information

6.7.1.1 Groundwater

Refer to Section **Error! Reference source not found.** for monitoring undertaken for g roundwater resources at Tafelkop Mall.

6.7.2 Audit and Report on Performance Measures

Each component within the IWUL (when issued) will have an associated audit and performance review component. Regular review and auditing is important to ensure systems are up-to-date and still relevant for current situations. Evaluation is required to verify its appropriateness and suitability by comparing performance to objectives set. Changes or adjustments to systems are required where review/auditing highlights shortcomings or gaps. Performance should be measured against:

- Internal audit (conducted annually);
- External audit (conducted annually); and
- DWS reporting (conducted bi-annually).

6.7.3 Audit and Report on Relevance of IWWMP Action Plan

All existing and new systems need to be reviewed and modified to ensure continual improvement. It is considered good practice to review or audit all systems at least annually and to update the IWWMP as required in the IWUL.

7 CONCLUSION

7.1 Regulatory Status of Activity

Tafelkop Mall was granted an Environmental Authorisation (Ref No. 12/1/9/1-GS20) in terms of the NEMA by LEDET on 27 March 2014.

7.2 Statement of Water Uses Requiring Authorisation

In compliance with the requirements of the NWA, Tafelkop Mall is in the process of applying for a WUL from the DWS for water uses triggered in terms of Section 21 of the NWA. The following water uses have been identified and are being applied for as part of the IWULA:

- Section 21(a): Taking of water;
- Section 21(b): Storing water; and
- Section 21(g): Disposing of waste in a manner which may detrimentally impact on a water resource.

7.3 Section 27 Motivation

Refer to Annexure G for the Section 27 Motivation report.

7.4 Proposed License Conditions

It is proposed that the license include the recommended conditions stated in the specialist investigations:

7.4.1 Water Balance Assessment:

It is proposed that flow meters be installed in several of the water circuits to enable future calibration of the water balance. The following circuits are poorly understood, and water use volumes would need to be confirmed once the mall is operational:

- Attenuation and stormwater pond volumes to the environment;
- Volumes of water used during the operational phase of the mall;
- Volumes of wastewater are generated during the operational phase that flows to the sewerage treatment plant; and
- Final output volumes treated sewerage water.

7.4.2 Hydrogeological Assessment:

- The sustainable yield for BH01 is recommended at 0.1 l/s over a daily pump schedule of 12 hours to allow for a 12-hour recovery period daily. This equates to 131.4m^3/month and 1 576.8m^3/annum;
- The sustainable yield for BH02 is recommended at 0.45 l/s over a daily pump schedule of 12 hours to allow for a 12-hour recovery period daily. This equates to 591.3m^3/month and 7 095.6m^3/annum; and
- Do not over abstract from existing or proposed boreholes and ensure that water level monitoring of boreholes within a 1km radius of the pumping borehole is

undertaken. If a decline in water levels is noted in all boreholes, as a result of pumping, the abstraction rate should be lowered to prevent aquifer depletion.

8 REFERENCES

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