

ASTRON ENERGY (PTY) LTD
INTEGRATED WATER AND WASTE
MANAGEMENT PLAN

February 2026



M²ENCO

**Title:**

Integrated Water and Waste Management Plan for Astron Energy (Pty) Ltd at Milly's Star Stop, Emakhazeni Local Municipality, Mpumalanga Province

Report No:

IWWMP/AST/2026/22

Date:

February 2026

Report Compiled for:

CLIENT:	Astron Energy (Pty) Ltd
Contact:	Mpho Mosima
Address:	5 Century Boulevard Century City
Tel number:	021 508 3838
Mobile number:	068 093 6256
Fax number:	-
Email:	Mpho.mosima@astronenergy.co.za

**Report Compiled by:**

CONSULTANT:	M2 Environmental Connections (Pty) Ltd
Contact:	Jacques Potgieter
Address:	PO Box 2047 Garsfontein East 0060
Tel number:	012 993 2165
Mobile number:	079 517 4497
Fax number:	086 621 0292
Email:	jacques@menco.co.za

**COPYRIGHT WARNING**

This document is privileged and confidential in nature and unauthorised dissemination or copying is prohibited. This document will be updated as required. Astron Energy (Pty) Ltd claims protection of this information in terms of the Promotion of Access to Information Act, (No 2 of 2002) and without limiting this claim, especially the protection afforded by Chapter 4.



Document Control

This document was compiled by the following person:

Jacques Potgieter

(MSc Env. Sciences, Pr.Sci.Nat)

_____	_____ 	<u>3 February 2026</u>
Name	Signature	date

This document was reviewed and approved by the following person :

Reuhl Lombard

(M.Sc. Zoology, Pr.Sci.Nat)

_____	_____ 	<u>3 February 2026</u>
Name	Signature	date



I: EXECUTIVE SUMMARY

Astron Energy (Pty) Ltd (hereafter *Astron Energy*) is one of South Africa's leading suppliers of petroleum products, operating a national network of service stations and associated commercial facilities. Milly's Star Stop, located approximately 4 km south-west of eNtokozeni (Machadodorp) in Mpumalanga, forms part of this national retail footprint and represents a strategically important service node along the N4 corridor.

The Milly's Star Stop property accommodates multiple commercial activities including the Astron Star Stop fuel station, Milly's Restaurant, Milly's Farm Shop, accommodation and conference facilities, and a trout-processing plant. Water-related activities at the facility include the abstraction of water for potable and operational use, water storage within the on-site De Kroon Dam, and the treatment and discharge of wastewater through a Wastewater Treatment Works (WWTW) that discharges final effluent into the Elands River.

M2 Environmental Connections (Pty) Ltd was appointed to compile the Integrated Water and Waste Management Plan (IWWMP) for Milly's Star Stop to support ongoing compliance with the National Water Act (Act 36 of 1998) and all associated regulatory requirements. The IWWMP consolidates current water uses, water management systems, monitoring results, and operational processes into a single management document. It further guides the implementation of measures required to align operations with the Department of Water and Sanitation (DWS) and the Inkomati-Usuthu Catchment Management Agency (IUCMA) regulatory expectations.

Water uses associated with the Milly's Star Stop facility include:

- Section 21(a): Abstraction of water from surface and/or groundwater resources
- Section 21(b): Storage of water in the De Kroon Dam
- Section 21(c) and (i): Activities within/affecting a watercourse, including effluent discharge into the Elands River
- Section 21(f) and (g): Discharge of treated effluent and disposal-related water management activities

The need for the current Water Use License Application (WULA) stems from the omission in the previous WUL regarding the volume of water abstracted for the on-site trout factory. The present application therefore re-applies for all existing water uses while updating abstraction volumes and incorporating additional water uses associated with the proposed Milly's South Development.

Extensive monitoring has been undertaken for surface water, groundwater, and wastewater quality since 2014. Historical challenges associated with the performance of the WWTW—particularly regarding compliance with general and special effluent standards—resulted in the redesign and



upgrade of the plant. Upgrades have included the installation of six mini-treatment trains, improved aeration, corrected pipework, proper sludge return systems, and improved filtration. Recent monitoring reflects marked improvement in effluent quality, with significant reductions in EC, nitrate, COD, E. coli and ammonia levels in comparison to earlier reporting years.

A wetland delineation assessment confirmed the presence of wetland features associated with the De Kroon Spruit. Monitoring of these systems, combined with surface water monitoring upstream and downstream of the discharge point, indicates that external catchment influences remain the primary contributor to fluctuations in certain parameters such as E. coli. The Elands River remains an ecologically important watercourse within Quaternary Catchment X21F, and ongoing compliance with Receiving Water Quality Objectives (RWQOs) remains a central management requirement.

This IWWMP outlines the key water and waste management strategies, monitoring programmes, operational controls and rehabilitation measures necessary to ensure the protection of water resources, to maintain compliance with the conditions of the Water Use License, and to promote responsible and sustainable water management at Milly's Star Stop. It further provides clear performance objectives, identifies operational risks, and sets out the measures required to maintain and continuously improve environmental performance in line with national and catchment-level mandates.



TABLE OF CONTENTS

1	INTRODUCTION	13
1.1	ACTIVITY BACKGROUND	13
1.2	CONTACT DETAILS OF THE APPLICANT	13
1.3	REGIONAL SETTING AND LOCATION OF THE ACTIVITY	14
1.4	PROPERTY DESCRIPTION	15
1.5	PURPOSE OF THIS DOCUMENT	15
1.6	STUDY LIMITATIONS	16
2	CONCEPTUALISATION OF ACTIVITY	16
2.1	DESCRIPTION OF THE ACTIVITY.....	16
2.2	EXTENT OF THE ACTIVITY	1
2.3	KEY ACTIVITY-RELATED PROCESSES AND PRODUCTS.....	1
2.4	ACTIVITY LIFE DESCRIPTION.....	2
2.5	ACTIVITY INFRASTRUCTURE DESCRIPTION	2
2.6	KEY WATER USES AND WASTE STREAMS	3
2.6.1	WATER USES.....	3
2.6.2	WASTE STREAMS	3
2.7	ORGANISATIONAL STRUCTURE	3
2.7.1	BUSINESS AND CORPORATE POLICIES/PROCEDURES RELATED TO THE ENVIRONMENT 4	
2.7.2	OPERATIONAL EXCELLENCE MANAGEMENT SYSTEM	4
2.7.3	ASTRON ENERGY ENVIRONMENTAL STEWARDSHIP	6
2.7.4	ASTRON ENERGY THIRD-PARTY WASTE STEWARDSHIP	7
3	REGULATORY WATER AND WASTE MANAGEMENT FRAMEWORK	9
3.1	SUMMARY OF ALL WATER USES	9
3.1.1	SECTION 21(a).....	9
3.1.2	SECTION 21(b).....	10
3.1.3	SECTION 21(c) AND (i).....	10
3.1.4	SECTION 21(f).....	10
3.1.5	SECTION 21(g).....	11
3.1.6	Location of Water Uses	12
3.2	EXISTING LAWFUL WATER USES	15
3.3	RELEVANT EXEMPTIONS.....	15



3.4	CURRENT AUTHORISED WATER USES AND NEW WATER USES TO BE LICENCED	16
3.5	WASTE MANAGEMENT ACTIVITIES (NEMA/NEMWA)	19
3.5.1	SOLID WASTE	19
3.5.2	WASTE WATER	19
3.6	WASTE-RELATED AUTHORISATIONS	20
3.7	OTHER AUTHORISATIONS	20
4	PRESENT ENVIRONMENTAL SITUATION	21
4.1	CLIMATE	21
4.1.1	RAINFALL.....	21
4.1.2	EVAPORATION.....	22
4.1.3	WIND SPEED & DIRECTION	23
4.2	SURFACE WATER.....	23
4.2.1	WATER MANAGEMENT AREA.....	23
4.2.2	SURFACE WATER QUALITY	26
4.2.3	MEAN ANNUAL RUNOFF (MAR).....	35
4.2.4	RESOURCE CLASS AND RIVER HEALTH, RQOs & RESERVE	37
4.2.5	SURFACE WATER USER SURVEY	37
4.2.6	SENSITIVE AREAS SURVEY & WETLAND DESCRIPTION	37
4.3	GROUNDWATER	42
4.3.1	AQUIFER CHARACTERISATION.....	42
4.3.2	AQUIFER SENSITIVITY.....	45
4.3.3	GROUNDWATER QUALITY.....	47
4.3.4	HYDRO-CENSUS	49
4.3.5	POTENTIAL POLLUTION SOURCE IDENTIFICATION	52
4.4	SOCIO-ECONOMIC ENVIRONMENT.....	52
4.4.1	MUNICIPAL CONTEXT AND POPULATION PROFILE	52
4.4.2	LOCAL ECONOMY AND ECONOMIC STRUCTURE	53
4.4.3	EMPLOYMENT AND LIVELIHOODS.....	53
4.4.4	EDUCATION, SKILLS AND HUMAN CAPITAL	54
4.4.5	TOURISM AND SPATIAL DEVELOPMENT	54
4.4.6	MUNICIPAL DEVELOPMENT PRIORITIES AND ENVIRONMENTAL LINKAGES	54
5	ANALYSES AND CHARACTERISATION OF ACTIVITY	55
5.1	SITE DELINEATION FOR CHARACTERISATION	55
5.2	WATER AND WASTE MANAGEMENT.....	55



5.2.1	PROCESS WATER	55
5.2.2	STORMWATER	55
5.2.3	GROUNDWATER.....	56
5.2.4	SOLID WASTE	56
5.3	OPERATIONAL MANAGEMENT.....	56
5.3.1	ORGANISATIONAL STRUCTURE.....	56
5.3.2	RESOURCES AND COMPETENCIES.....	56
5.3.3	EDUCATION AND TRAINING	57
5.3.4	INTERNAL AND EXTERNAL COMMUNICATION	57
5.3.5	AWARENESS RAISING	57
5.4	MONITORING AND CONTROL	58
5.4.1	SURFACE WATER MONITORING	59
5.4.2	Groundwater Monitoring	60
5.4.3	BIO-MONITORING.....	60
5.4.4	WASTE MONITORING	60
5.4.5	STORMWATER	61
5.5	RISK ASSESSMENT.....	61
5.5.1	IMPACT ASSESSMENT CRITERIA	61
5.5.2	DETERMINATION OF SIGNIFICANCE.....	66
5.5.3	IDENTIFYING THE POTENTIAL IMPACTS.....	66
5.5.4	AREAS OF INFLUENCE	67
5.5.5	AREA OF DIRECT INFLUENCE.....	67
5.5.7	RESULTS OF IMPACT ASSESSMENT	68
5.5.8	WETLAND ASSESSMENT	76
5.5.9	WETLAND DELINEATION RESULTS - PORTIONS 11, 13 AND 14 OF THE FARM DE KROON 363 JT.....	76
5.5.10	WETLAND DELINEATION RESULTS - ERF 3 OF MILLY'S SOUTH TOWNSHIP	77
5.6	MATTERS REQUIRING ATTENTION / PROBLEM STATEMENT	79
5.7	ASSESSMENT OF LEVEL AND CONFIDENCE OF INFORMATION.....	79
6	WATER AND WASTE MANAGEMENT	80
6.1	WATER AND WASTE MANAGEMENT PHILOSOPHY	80
6.2	STRATEGIES (SURFACE WATER, GROUNDWATER, STORMWATER AND WASTE).....	81
6.2.1	WATER MANAGEMENT STRATEGIES	81
6.2.2	WASTE MANAGEMENT STRATEGIES	81



6.3	PERFORMANCE OBJECTIVES / GOALS	81
6.3.1	STORMWATER MANAGEMENT	81
6.3.2	GROUNDWATER MANAGEMENT.....	81
6.3.3	SURFACEWATER MANAGEMENT	82
6.3.4	WASTE MANAGEMENT	82
6.4	MEASURES TO ACHIEVE AND SUSTAIN PERFORMANCE OBJECTIVES.....	82
6.5	OPTIONS ANALYSES AND MOTIVATION FOR IMPLEMENTATION OF PREFERRED OPTION	83
6.5.1	PREFERRED ALTERNATIVE.....	83
6.5.2	INFRASTRUCTURE OR DESIGN ALTERNATIVES	83
6.5.3	LOCATION ALTERNATIVES	84
6.5.4	STATUS QUO/NO-GO ALTERNATIVE	84
6.6	IWWMP ACTION PLAN	84
6.7	CONTROL AND MONITORING	85
6.7.1	MONITORING OF CHANGE IN BASELINE (ENVIRONMENT) INFORMATION.....	85
6.7.2	AUDIT AND REPORT ON PERFORMANCE OF MEASURES.....	85
6.7.3	AUDIT AND REPORT ON RELEVANCE OF IWWMP ACTION PLAN.....	85
7	CONCLUSION	86
7.1	REGULATORY STATUS OF ACTIVITY.....	86
7.2	STATEMENT ON WATER USES REQUIRING AUTHORISATION, DISPENSING WITH THE REQUIREMENT FOR A LICENSE AND POSSIBLE EXEMPTION FROM REGULATIONS.....	86
7.3	MOTIVATION IN TERMS OF SECTION 27(1) OF THE NWA	86
7.4	PROPOSED LICENSE CONDITIONS.....	94
8	REFERENCES.....	96



LIST OF TABLES

Table 1-1: Property Details	15
Table 3-1: TWQR for Domestic Use (DWAF, 1996a).....	9
Table 3-2: Location of Water Uses.....	12
Table 3-3: Waste Water Quality Monitoring Parameters	20
Table 4-1: Locality and description of DWA surface water monitoring point.	26
Table 4-2: Locality and description of DWA surface water Reserve determination point.....	27
Table 4-3: Average Water Quality Comparisons for the Hydrological Years	28
Table 4-4: Water Quality Comparisons of 2024/2025.....	31
Table 4-5: Quantity component for the Rivers which includes the results of the EWR Sites and the biophysical nodes.....	35
Table 4-6: RWQO for the relevant Quaternary Catchment	37
Table 4-7: Ratings – Aquifer System Management and Second Variable Classifications	42
Table 4-8: Ratings - Groundwater Quality Management (GQM) Classification System	43
Table 4-9: GQM Index for the Study Area	43
Table 4-10: Groundwater Quality data for M20A quaternary catchment (DWA 2009).....	48
Table 4-11: Hydrocensus Details.....	50
Table 5-1: Surface Water Quality Monitoring Parameters	59
Table 5-2: Table Explanation of the EIA Criteria.....	63
Table 5-3: Assessment Criteria: Ranking Scales.....	66
Table 5-4: Significance Rating Scales without mitigation	66
Table 5-5: Significance Rating scale With Mitigation	67
Table 5-6: Calculation of severity rating based on the identified impacts.....	69
Table 5-7: Calculated Risk Rating based on Consequences and likelihood.....	70
Table 5-8: Mitigation and Management Plan	71
Table 5-9: Summarised result for the wetland at Milly's Service station	76
Table 5-10: Summary of present wetland health based on the Wet-Health assessment.....	78
Table 6-1: Measures to achieve and sustain performance objectives for Wastewater/Stormwater Management	82
Table 6-2 Measures to achieve and sustain performance objectives for Surface Water Management	83
Table 7-1: Section 27 Motivation Criteria	87
Table 7-2: RWQO for the relevant Quaternary Catchment.....	91
Table 7-3: Treated Effluent Discharge Limits	91
Table 7-4: Required limits set for the X21F Catchment	92
Table 7-5: Management Target Range	92



LIST OF FIGURES

<i>Figure 1-1: Regional setting of the Aston Energy Milly's Star Stop.....</i>	<i>14</i>
<i>Figure 2-1: Currently approved WWTW layout</i>	<i>18</i>
<i>Figure 2-2: Previous approved WWTW sludge flow diagram.....</i>	<i>19</i>
<i>Figure 2-3: Previous approved WWTW piping flow diagram</i>	<i>20</i>
<i>Figure 2-4: New activated sludge flow diagram (phase 2)</i>	<i>1</i>
<i>Figure 2-5: New piping flow diagram (phase 2).....</i>	<i>2</i>
<i>Figure 2-6: Waste Treatment Infrastructure at Astron Energy Milly's Star Stop</i>	<i>8</i>
<i>Figure 3-1: Locality of Water Uses</i>	<i>14</i>
<i>Figure 4-1: Average rainfall for the area in which Milly's Star Stop is situated.....</i>	<i>22</i>
<i>Figure 4-2: Wind rose for the Region of Milly's Star Stop indicating the numbers of hours wind blows from a indicated direction.....</i>	<i>23</i>
<i>Figure 4-3: WMA Boundaries applicable to the study area</i>	<i>25</i>
<i>Figure 4-4: Surface Water Drainage Lines within the Relevant Quaternary Catchment</i>	<i>36</i>
<i>Figure 4-5: Surface Water Features in close proximity to the project site</i>	<i>39</i>
<i>Figure 4-6: Aquatic Ecosystem Classification</i>	<i>40</i>
<i>Figure 4-7: Surface Water Monitoring sites applicable to the study area.....</i>	<i>41</i>
<i>Figure 4-8: Aquifer Classification Map of South Africa</i>	<i>44</i>
<i>Figure 4-9: Aquifer Vulnerability Map of South Africa.....</i>	<i>46</i>
<i>Figure 4-10: Aquifer Vulnerability Map of South Africa</i>	<i>47</i>
<i>Figure 4-11: Hydrocensus Borehole Map.....</i>	<i>51</i>
<i>Figure 5-1: Locality of delineated bottom valley wetland with buffer zone</i>	<i>77</i>



LIST OF ABBREVIATIONS

ABS	Abstraction
AC	Alternating Current
ADI	Area of Direct Influence
AII	Area of Indirect Influence
AIP	Alien Invasive Plants
AIS	Alien Invasive Species
BGIS	Biodiversity GIS
BH	Borehole
BHN	Basic Human Needs
BID	Background Information Document
BPG	Best Practice Guideline
CBA	Critical Biodiversity Area
CMA	Catchment Management Agency
DC	Direct Current
DEAT	Department of Environmental Affairs and Tourism
DFFE	Department of Forestry, Fisheries and the Environment
DLM	Ditsobotla Local Municipality
DMRE	Department of Mineral Resources and Energy
DoE	Department of Energy
DS	Downstream
DWAF	Department of Water Affairs and Forestry
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EC	Electrical Conductivity
ECO	Environmental Control Officer
EcoSpecs	Ecological Specifications
EI	Ecological Importance
EIA	Environmental Impact Assessment
EIS	Ecological Importance and Sensitivity
EISC	Ecological Importance and Sensitivity Category
ELU	Existing Lawful Use
EMC	Ecological Management Class
EMF	Environmental Management Framework
EMP	Environmental Management Plan
EMPR	Environmental Management Programme
EMS	Environmental Management System
EO	Environmental Officer
ER	Ecological Reserve
ERA	Environmental Risk Assessment
ES	Ecological Sensitivity
ESA	Ecological Support Area
EWR	Ecological Water Requirements



FEPA	Freshwater Ecosystem Priority Area
GA	General Authorisation
GDP	Gross Domestic Product
GDPR	General Data Protection Regulations
GIS	Global Information System
GN	Government Notice
GRDM	Groundwater Resource Directed Measures
GW	Groundwater
HPRI	High Potential Risk Incident
HSE	Health, Safety and Environment
I&APs	Interested and Affected Parties
IDP	Integrated Development Plan
IEB	Independent Examination Board
IEM	Integrated Environmental Management
IFR	Instream Flow Requirement
IGRD	Intermediate Groundwater Reserve Determination
IHAS	Invertebrate Habitat Assessment System
ISO	International Organisation for Standardization
ISP	Internal Strategic Perspective
IWWMP	Integrated Water and Waste Management Plan
l/s	Litres per second
m/s	meters per second
m ³ /a	Cubic meters per annum
m ³ /d	Cubic meters per day
m ³ /s	Cubic meters per second
LoI	Letter of Intent
MAE	Mean annual evaporation
masl	Meters Above Sea Level
mamsl	Meters Above Mean Sea Level
MAP	Mean Annual Precipitation
MAR	Mean annual runoff
mbgl	Meters Below Ground Level
MENCO	M2 Environmental Connections
MW	Megawatt
NEMA	National Environmental Management Act, 1998 (Act 107 of 1998)
NEMWA	National Environmental Management: Waste Amendment Act, 2008 (Act 59 of 2008)
NERSA	National Energy Regulator of South Africa
NFEPA	National Freshwater Ecosystem Priority Areas
NMMDM	Ngaka Modiri Molema District Municipality
NQF	National Qualifications Framework
NWA	National Water Act, 1998 (Act 36 of 1998)
NWBSP	North West Biodiversity Sector Plan



NWPBCA	North-West Provincial Biodiversity Conservation Plan
NWRS	National Water Resource Strategy
OHSAS	Occupational Health and Safety Assessment Series
PES	Present Ecological state
PES(C)	Present Ecological State (Class/Category)
PGM	Platinum Group Metals
PPA	Power Purchase Agreement
ppm	Parts per million
PPP	Public Participation Process
PV	Photovoltaic
RE	Remaining Extent
REC	Recommended Ecological Class
REQO	Receiving Environmental Quality Objectives
ROD	Record of Decision
RQO	Resource Quality Objective
RSIP	Rehabilitation Strategic Implementation Plan
RWQO	Resource Water Quality Objective
SA	South Africa
SABS	South African Bureau of Standards
SACNASP	South African Council for Natural Scientific Professions
SAHRA	South African Heritage Resources Agency
SAIIA	South African Institute of International Affairs
SANAS	South African National Accreditation System
SANBI	South African National Biodiversity Institute
SANS	South African National Standard
SAPS	South African Police Services
SASS	South African Scoring System
SDF	Spatial Development Framework
SHE	Safety Health and Environment
SHEQ	Safety, Health, Environment and Quality
SPA	Share Purchase Agreement
SPoA	Special Power of Attorney
SPV	Special Purpose Vehicle
SQR	Sub-Quaternary Reach
SR	Significance Rating
SWM	Significance With Mitigation
SWMP	Stormwater Management Plan
SWOM	Significance Without Mitigation
TC	Total concentration
TDS	Total Dissolved Solids
TSS	Total Suspended Solids
TWQG	Target Water Quality Guideline
TWQR	Target Water Quality Range



US	Upstream
WAR	Water Allocation Reform
WC&DM	Water Conservation and Demand Management
WMA	Water Management Area
WQ	Water Quality
WQOs	Water Quality Objectives
WRC	Water Research Commission
WSDP	Water Service Development Plan
WSP	Water Service Provider
WUA	Water Use Authorisation
WUL	Water Use License
WULA	Water Use License Application
WULAR	Water Use License Application Report
WWTP	Wastewater Treatment Plant
WWTW	Wastewater Treatment Works



II: MAIN DOCUMENT

1 INTRODUCTION

This section provides a background description of the activity, the contact details of the water user/company and person responsible for the implementation of the IWWMP, description of the property and the specific purpose for the development of the IWWMP.

1.1 ACTIVITY BACKGROUND

Astron Energy (Pty) Ltd (hereafter *Astron Energy*) is a leading supplier of petroleum products in Southern Africa, with a vast network of service stations (over 850 being converted in the next 4 years), making them the second-largest petroleum network in the region. *Astron Energy* entered the South African market in 2018 (through a majority acquisition of the former *Chevron South Africa Pty (Ltd)* by *Glencore South Africa Oil Investment (Pty) Ltd*). The *Milly's Star Stop* facility, situated near eNtokozweni (formerly *Machadodorp*) in the *Mpumalanga Province*, forms part of this national retail network.

The property encompasses a *Caltex Star Stop* fuel station, *Milly's Restaurant*, *Milly's Farm Shop*, accommodation and conference facilities, and a trout-processing plant. Water-related activities at the facility include the abstraction of surface and groundwater for operational use, storage of water in the on-site *De Kroon Dam*, and the treatment and discharge of wastewater through an upgraded *Wastewater Treatment Works (WWTW)* that releases final effluent into the *Elands River* via a reed-bed system.

M2 Environmental Connections (Pty) Ltd was appointed to compile this *Integrated Water and Waste Management Plan (IWWMP)* on behalf of *Astron Energy (Pty) Ltd* to ensure ongoing compliance with the *National Water Act (Act 36 of 1998)* and other applicable legislation. The Plan consolidates all water-related management and monitoring information for *Milly's Star Stop* and aligns it with the requirements of the *Department of Water and Sanitation (DWS)* and the *Inkomati-Usuthu Catchment Management Agency (IUCMA)*.

1.2 CONTACT DETAILS OF THE APPLICANT

Details of the Applicant:

CLIENT:	Astron Energy (Pty) Ltd
Contact:	Mpho Mosima
Address:	5 Century Boulevard Century City
Tel number:	021 508 3838
Mobile number:	068 093 6256
Email:	mpho.mosima@astronenergy.co.za





1.3 REGIONAL SETTING AND LOCATION OF THE ACTIVITY

Milly's Star Stop is located approximately 4 km south-west of eNtokozweni (Machadodorp) along the N4 Highway within the Emakhazeni Local Municipality (MP314) and the Nkangala District Municipality (DC31) of Mpumalanga Province.

The facility lies within Quaternary Catchment X21F of the Inkomati-Usuthu WMA, administered by the IUCMA. The Elands River flows to the north of the site in a north-easterly direction, while the De Kroon Spruit – which feeds the on-site dam – flows west of the facility and joins the Elands River further downstream.

The surrounding area forms part of the Steenkampsberg Plateau, a high-altitude landscape characterised by rolling grasslands, trout-fishing tourism, and mixed agricultural land use. The region's mean annual precipitation ranges from 600 to 700 mm, with rainfall concentrated in the summer months (October to March). Mean annual evaporation is between 1 300 and 1 400 mm.

Administratively, the site falls under the Mpumalanga Province's Nkangala District Municipality, and local planning is guided by the Emakhazeni Local Municipality's Integrated Development Plan (IDP) and Spatial Development Framework (SDF). The nearest towns are eNtokozweni (Machadodorp), Belfast, and Dullstroom.

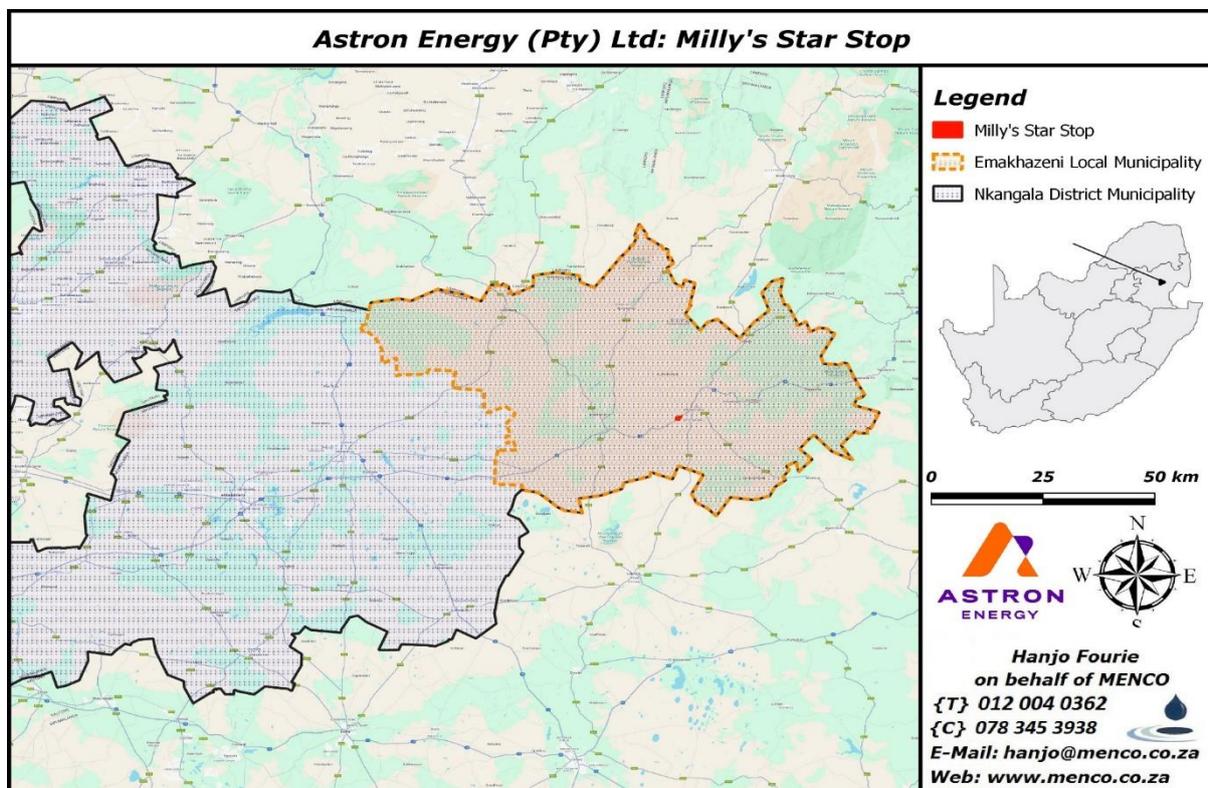


Figure 1-1: Regional setting of the Aston Energy Milly's Star Stop



1.4 PROPERTY DESCRIPTION

Water use at Milly's Star Stop currently takes place on the Remaining Extent of Portion 11, on Portion 13 and on Portion 14 of the Farm De Kroon 363 JT on which all infrastructures is located. The property details for the relevant farm portions are depicted in Table 1 1 below.

Table 1-1: Property Details

Register Description	Land Owner	Title Deed Number	Surveyor-General Cadastral Code
Remaining Extent of Portion 11 of the Farm De Kroon 363 JT	Leroma Investments (Pty) Ltd	T3250/2023	TOJT00000000036300011
Portion 13 of the Farm De Kroon 363 JT	Leroma Investments (Pty) Ltd	T3251/2023	TOJT00000000036300013
Portion 14 of the Farm De Kroon 363 JT	Leroma Investments (Pty) Ltd	T3254/2023	TOJT00000000036300014
Erf 3 Milly's South Township	Leroma Investments (Pty) Ltd	T10959/2022	TOJT00750000000300000

1.5 PURPOSE OF THIS DOCUMENT

This report has been compiled for use by all parties involved in the Water Use License Application (WULA) as per Section 40 of the National Water Act (Act No. 36 of 1998).

The document aims to:

- Give an overview of the activities for which a WULA is being applied for;
- Provide an overview of the surrounding environment;
- Identify the current water uses as defined in Section 21 of the National Water Act, 1998 (Act 36 of 1998) applicable to the Applicant;
- Identify and define issues of concern;
- Determine the possible impacts that the activities of the Applicant might have on other users; and
- Define management commitments from the Applicant to mitigate possible impacts.

This report should, therefore, assist in the WULA process to streamline the route and ensure compliance with the following criteria:



- The report must be acceptable to the State and other stakeholders;
- Measures proposed and committed to must be practical and affordable to implement with the available resources and technology within a reasonable time schedule;
- It must be consistent with environmental management initiatives at national, provincial and regional level; and
- It should highlight sustainable development.

1.6 STUDY LIMITATIONS

This Integrated Water and Waste Management Plan (IWWMP) was compiled using information obtained from the approved Water Use License (2018), subsequent amendments, monitoring data collected by M2 Environmental Connections between 2014 and 2025, and the April 2024 Water Use License Application Report (WULAR) for Milly's Star Stop.

The study was undertaken with the best available information; however, the following limitations apply:

- Certain historical monitoring data predating 2014 were not available for review.
- Climatic and hydrological datasets from long-term weather stations contain intermittent recording gaps.
- Engineering drawings of the original stormwater and wastewater systems were not available, requiring reliance on recent site inspections and updated designs.
- Groundwater yield and quality assessments are based on limited pumping tests and will require ongoing confirmation during operation.
- Portions of the Milly's South Development remain under planning and may require future amendments once final engineering designs are complete.

Despite these limitations, the available information is considered sufficient to inform a comprehensive, accurate, and site-specific IWWMP for Milly's Star Stop.

2 CONCEPTUALISATION OF ACTIVITY

This section provides a very broad description of the activity, its processes, and products. It also provides the background information on the organizational structure of Astron Energy and all the business and corporate policies related to the environment. It also lists the various water uses and waste streams generated by the particular activity.

2.1 DESCRIPTION OF THE ACTIVITY

EXISTING WASTE WATER TREATMENT WORKS

The Elands River (recipient of treated effluent) is a listed water resource in terms of the General Authorisations (GA's) which means that waste water needs to meet special standards in terms of GN 399 of 26 March 2004 and GN 665 of 6 September 2013,



before it is discharged into the environment. These special standards have been set by the Department of Water and Sanitation to protect sensitive water resources.

The Milly's wastewater treatment plant was constructed in 2018 and the plant was commissioned in December of 2018. From the outset the plant did not comply to special standards and in certain cases, not general standards. The plant has been redesigned, refurbished, and is currently operational.

Figure 2-1 indicates the plant process flow diagram as designed, constructed, and commissioned back in 2018. In essence the designers of the as built system sought to emulate the process conditions that one would find in a three in series large tank system viz an Anoxic section, an Aerobic (Aerator) section and a clarification section by coupling 24 small JOJO type tanks in series.

Following the non-performance of the plant i.e. not meeting the licensing conditions and the Water Act specified special standards nor the less onerous conventional standards a specialist consultant was approached. The proposal was to construct six small mini process flow plants each comprising 4 tanks in series. The proposals were only partly implemented. Many of these proposals were also implemented incorrectly to the extent that not even conventional standards could be met. The concept was abandoned for the wrong reasons. See **Figure 2-2** indicating the as built process flow diagram of the six mini plants.

The current plan of action is to complete the proposals from the specialist consultant in full. See **Figure 2-3** indicating the process flow diagram.



Figure 2-1: Currently approved WWTW layout

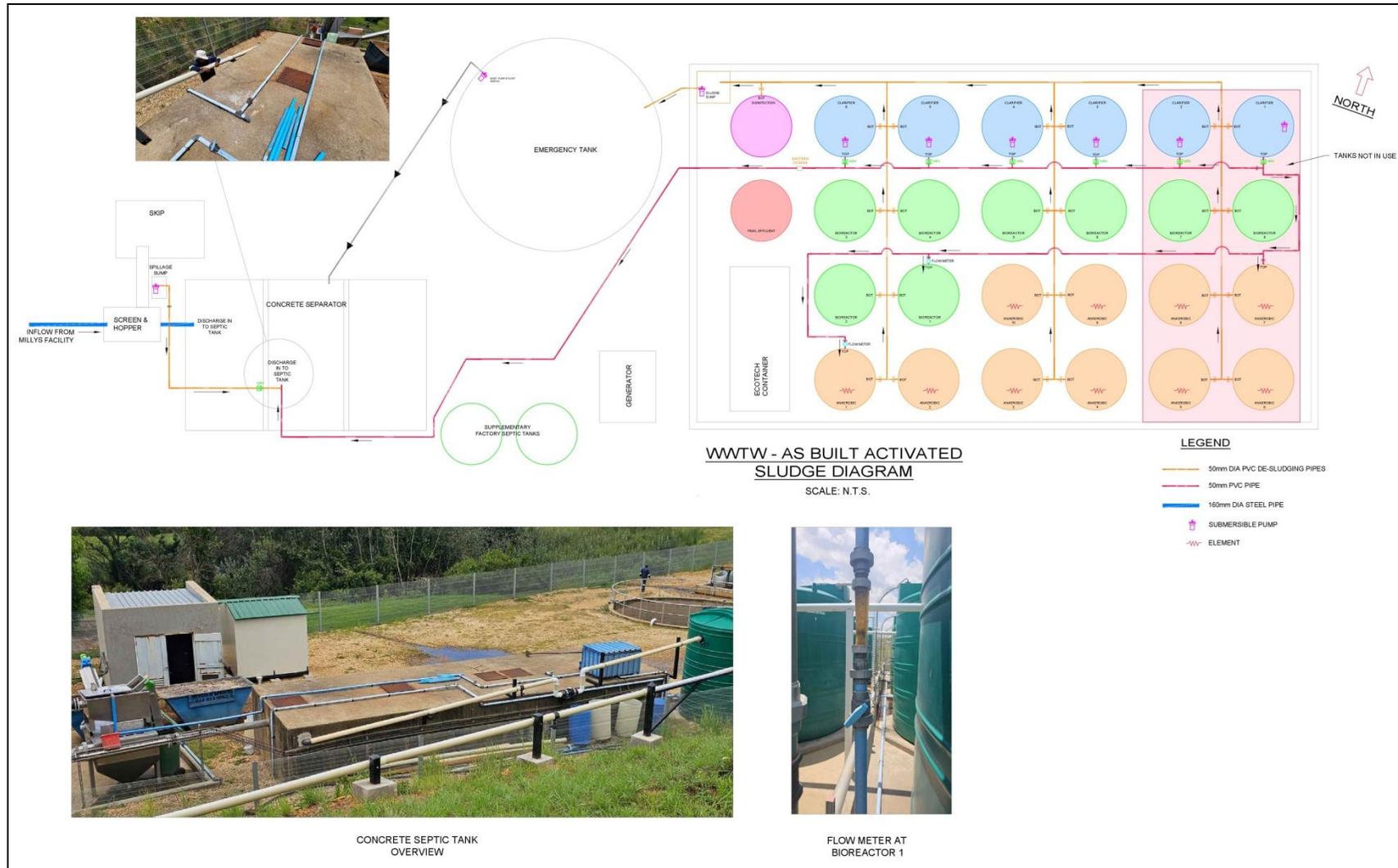


Figure 2-2: Previous approved WWTW sludge flow diagram

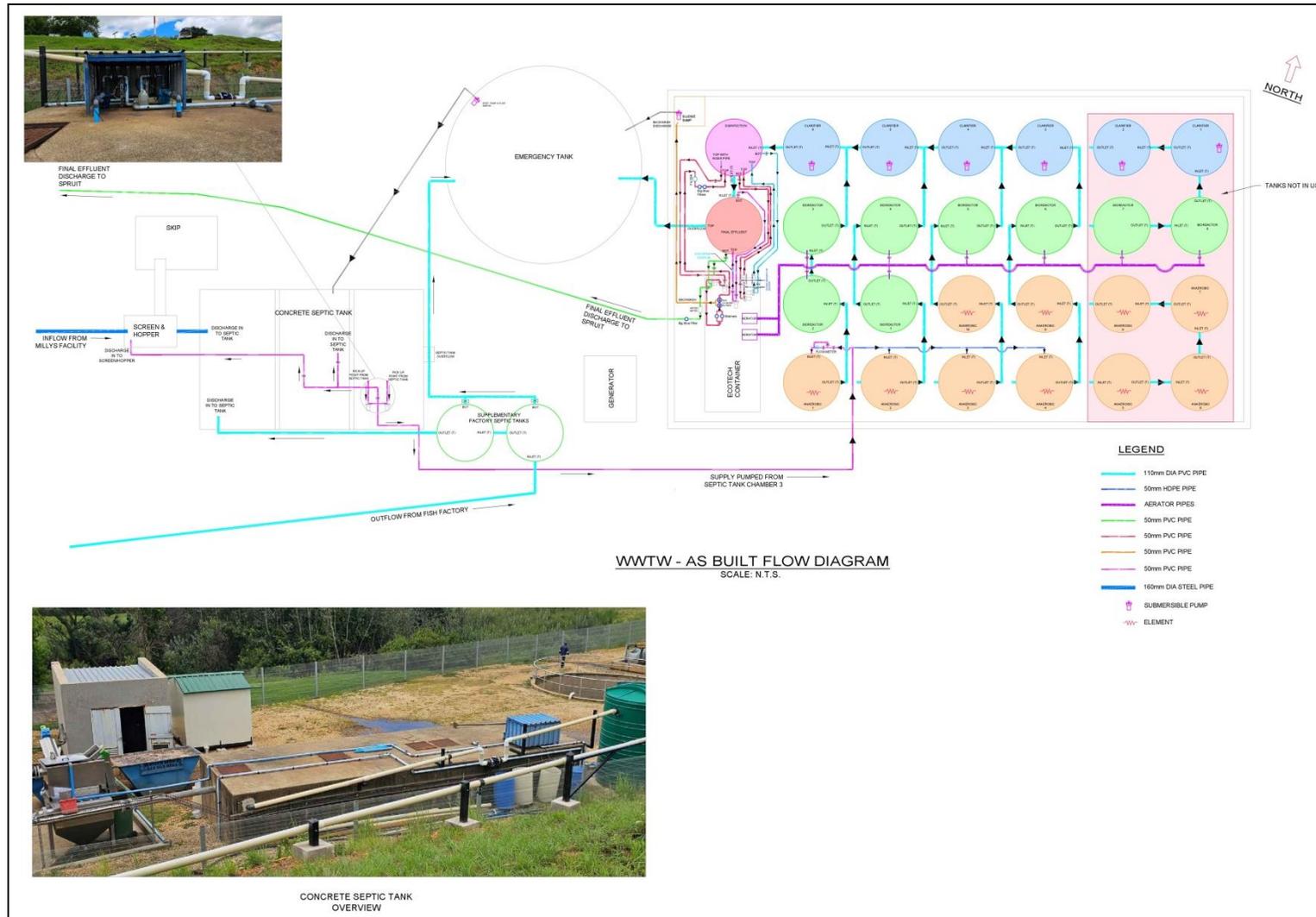


Figure 2-3: Previous approved WWTW piping flow diagram

**IMPLEMENTED WWTW IMPROVEMENTS**

Phase 1 and 2 is to affect the necessary changes so that the plant consistently meets general standards. Some of the construction necessary to affect these changes are currently underway or already completed.

Phase 3 is to affect the necessary changes to get the plant to meet special standards and this would require further investigation and or design work which can only be fully scoped once phase 1 and 2 is completed, commissioned and optimised.

The main reasons for the plant not meeting general standards:

1. Inconsistent flow into the plant.
2. Flow was not distributed evenly over the six off mini plants.
3. Incorrect pipe work that meant that raw sewerage was by passing the tanks.
4. Aeration did not take place and the aeration was not distributed evenly over all six mini plants.
5. Sludge return is not taking place.
6. No filtration taking place.
7. Miss management of the operational activities at the plant.
8. No maintenance taking place.

The following is a brief work scope description of phase 1 and 2:

Construct and commission 6 off small mini plants (refer Figure 2-4 and Figure 2-5)

1. Install a manifold system, with flow meters to ensure equal distribution of flow through each of the six mini plants.
2. Install a new piping and a pumping system to ensure constant flow of effluent from the septic tank into the six mini plants.
3. Correct the piping of the plant i.e. correct the bypass of effluent at mini plant no. 1 and the piping after the final clarifiers.
4. Repair the aeration system by, a) repairing broken/disconnected pipes, b) install flow meters to each bioreactor tank, c) converting anoxic tanks to bioreactor tanks, d) repairing and or installing diffusers etc.
5. Installing packing for the growth of bacteria in the bioreactor tanks and the anoxic tanks.
6. Correct the activated sludge return lines.
7. Correct the filtration system.

Operational requirements needed:

As mentioned above miss management has contributed to the lack of performance of the plant. The appointed a company by the name of Regen Waters has the necessary skills and expertise to perform the work.

**Daily Maintenance:**

- Screen waste containers to be checked and removed if full.
- Check that all mechanical Equipment is operational.
- Check bacteria level in bacteria holding tank and mix bacteria.
- Check chlorine level in holding tank and replace if needed.

The above can be performed by the current plant operator (Robert), with the necessary supervision and input from a company like Regen Waters.

Weekly Maintenance:

- Check that all mechanical Equipment is operational.
- Check the timers to ensure that the timing has not changed due to electrical failure.
- Screen waste containers to be checked and removed if full.
- Ensure that flow meters are set to prescribed flow rate.
- Sampling for analysis
- Mechanical/Automated screen – Clean, check and service as required.
- Ensure all mechanical equipment is operational.
- Aerators – Verify that aerators are clear of obstruction and are functioning.
- Ozone Equipment - Measure & record Ozone Generation is to design specifications.
- Dosing Equipment - Measure & record dosing ratio & check bacteria level in bacteria holding tank and mix bacteria.
- Chlorine Dosing Equipment - Measure & record dosing ratio and adjust as required.
- Report back to Astron Energy, Specialist Consultant (Brett Keyser) and Sitanani Energy (Marketer) re operations on site, sampling results, breakages, and any incidents.
- Sludge ratio's - Measure & record sludge levels (both top & bottom Blanket) in each tank.
- Electrical - Check timers are set to correct intervals for the clarifier pumps and test & ensure time is accurate.
- Post maintenance procedures - House Keeping of immediate plant area and control room & dispose of hazardous waste materials.

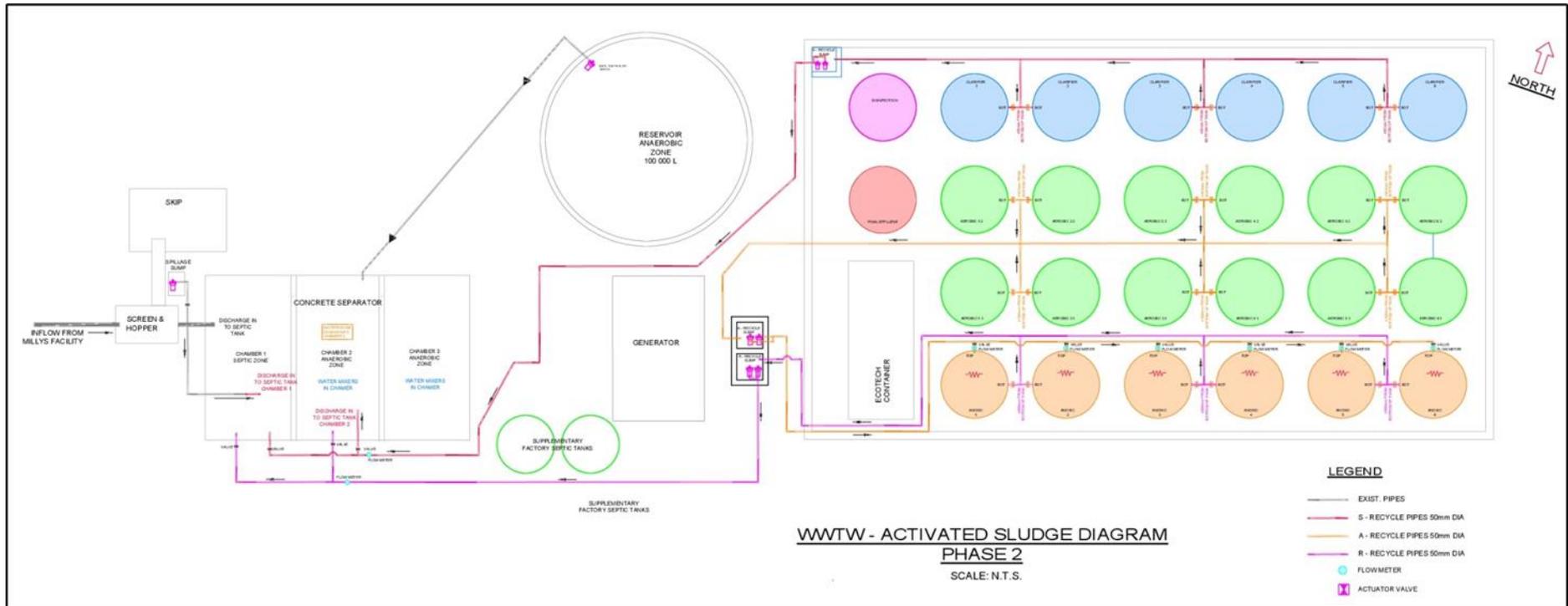


Figure 2-4: New activated sludge flow diagram (phase 2)

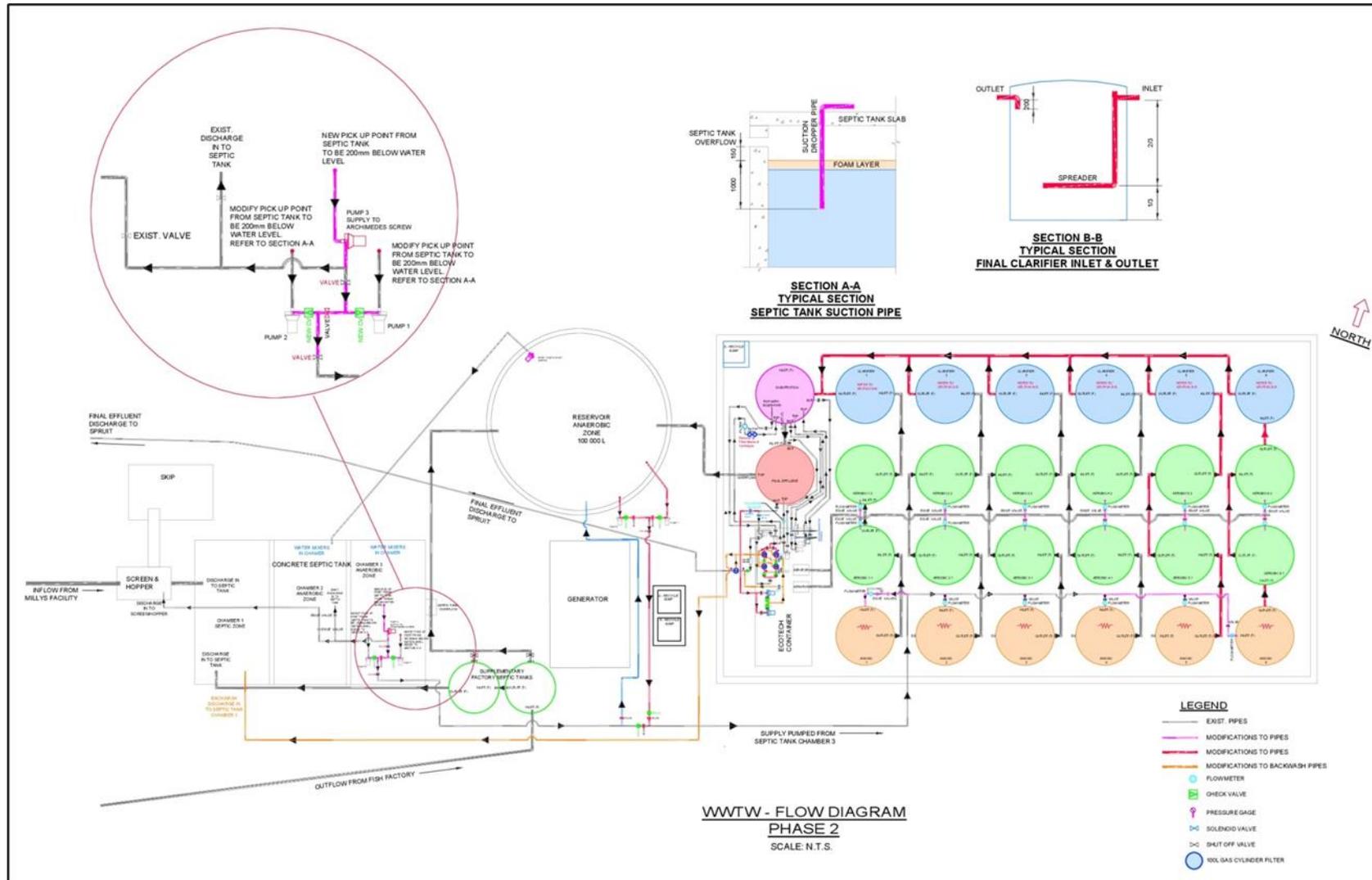


Figure 2-5: New piping flow diagram (phase 2)



2.2 EXTENT OF THE ACTIVITY

The primary activities conducted at Milly's Star Stop include:

- Operation of an Astron service station, associated retail facilities, and food service activities.
- Operation of a trout-processing plant requiring consistent water supply for cleaning, processing, and cooling.
- Abstraction of water from authorised surface and/or groundwater sources.
- Storage of water within the De Kroon Dam.
- Treatment and disposal of wastewater via the on-site WWTW.
- Discharge of treated effluent to the adjacent Elands River.
- Management of stormwater across a mixed-use commercial site.
- Development planning for the proposed Milly's South Development, including an additional service station and truck-parking facility.

All activities take place on the Remaining Extent of Portion 11, Portion 13, Portion 14 of the Farm De Kroon 363 JT, and Erf 3 of Milly's South Township.

2.3 KEY ACTIVITY-RELATED PROCESSES AND PRODUCTS

Key processes occurring at the facility include:

Fuel Retail Activities

Storage and dispensing of petroleum products under the Astron brand, supported by spill-prevention and stormwater-hydrocarbon separation controls.

Hospitality and Retail Services

Restaurant, farm shop, and accommodation facilities generating domestic wastewater and general solid waste.

Trout Processing Operations

Water-intensive processes involving washing, processing and cleaning, generating process water discharged to the WWTW.

Wastewater Treatment

The WWTW comprises six mini-treatment trains incorporating anoxic, aeration, clarification and filtration stages. Treated effluent is discharged into the Elands River in accordance with WUL conditions.

Stormwater Management

Hardstand areas drain to a structured stormwater system designed to reduce sediment and hydrocarbon loads.

Water Storage and Supply



Water is stored in the De Kroon Dam and distributed for facility use, including trout processing. Products and services generated on site include fuel, food and hospitality services, freshwater trout products, and tourism-orientated retail services.

2.4 ACTIVITY LIFE DESCRIPTION

Milly's Star Stop is a long-term operational facility forming part of Astron Energy's national service-station network and local tourism economy. Operations are ongoing and indefinite in lifespan.

The WWTW, water abstraction system, and associated infrastructure are expected to remain operational for the full duration of the facility's service life. Periodic upgrades and maintenance will continue to be implemented as needed to ensure compliance with water resource protection requirements.

The proposed Milly's South Development will extend the operational footprint and associated water management requirements.

2.5 ACTIVITY INFRASTRUCTURE DESCRIPTION

Infrastructure relevant to water and waste management includes:

Astron Fuel Retail Infrastructure:

Underground storage tanks, forecourt drainage, spill containment measures, and hydrocarbon interceptors.

Commercial Buildings:

Restaurant, retail shop, accommodation units, conference facilities, and associated ablution infrastructure.

Trout-Processing Facility:

Processing floors, cleaning and wash-down areas, and process-water discharge infrastructure.

Wastewater Treatment Works:

Six mini-treatment plants with anoxic, aerobic, clarification and filtration components; sludge-handling systems; pumps and aeration lines; effluent discharge pipeline to reed-bed system.

Stormwater Infrastructure:

Hardstand drainage channels, culverts, energy dissipaters, and separation points.

De Kroon Dam:

On-site water storage facility receiving abstracted water and supporting operational needs.

Monitoring Network:



Upstream and downstream surface water monitoring points, effluent sampling locations, groundwater abstraction points, and wetland delineation sites.

Infrastructure continues to evolve with planned upgrades associated with WWTW optimisation and the Milly's South Development.

2.6 KEY WATER USES AND WASTE STREAMS

2.6.1 WATER USES

Water uses applied for as part of the WUL application were identified by the DWS and are as follows:

- 21(a): Water abstraction for operational use, including trout processing.
- 21(b): Storage of water in the De Kroon Dam.
- 21(c) and (i): Activities within/affecting a watercourse due to effluent discharge and infrastructure interaction with wetlands.
- 21(f): Discharge of treated effluent into the Elands River.
- 21(g): Disposal-related water management, including sludge handling.

2.6.2 WASTE STREAMS

- **Domestic Wastewater**
 - Generated by the restaurant, accommodation, and retail operations.
- **Process Wastewater**
 - Generated primarily from the trout-processing plant.
- **Stormwater Runoff**
 - Potentially containing hydrocarbons and sediments from paved areas and traffic.
- **Solid Waste**
 - Including food waste, general refuse, packaging, sludge from WWTW processes, and maintenance waste.

2.7 ORGANISATIONAL STRUCTURE

Astron Energy maintains a national organisational structure that integrates environmental management into its operational and compliance systems. For Milly's Star Stop, responsibilities include:

- Astron Energy (Applicant/Owner): Overall accountability for water and environmental compliance.
- M2 Environmental Connections: Compilation of IWWMP, monitoring oversight, and specialist input.
- WWTW Operator (on-site personnel): Daily management of the treatment plant, routine inspections, and basic maintenance.
- Regen Waters (or designated contractor): Technical oversight, maintenance support, troubleshooting, and optimisation of the WWTW.
- Astron Regional Operations Team: Corporate-level operational support and compliance oversight.



Lines of reporting are clearly defined to ensure effective implementation of water and waste management responsibilities.

2.7.1 BUSINESS AND CORPORATE POLICIES/PROCEDURES RELATED TO THE ENVIRONMENT

Astron Energy (Pty) Ltd is committed to top health, environment, and safety standards so as to conduct business in a socially responsible and ethical manner. The company's foundation is built on values such as integrity, trust, diversity, ingenuity, partnership, and high performance. Astron Energy invests in people, partnerships, and performance in order to promote sustained economic growth through education, health awareness, and supporting community and economic development. All business and Corporate Policies can be obtained from the applicant.

2.7.2 OPERATIONAL EXCELLENCE MANAGEMENT SYSTEM

Operational excellence at Astron Energy includes the systematic management of process safety, personal safety and health, environment, reliability, and efficiency to achieve world-class performance. Astron Energy's vision for operational excellence directly supports their corporate vision to "be customer-focused and build human capital that generates superior value by leading in customer experience, engaged, inclusive, diverse and high-performance organisation as well as realize full earning potential." With respect to operational excellence, their vision is to be recognised and admired by the industry and the communities in which they operate.

Operational Excellence will be systematically managed by Astron Energy in order to meet the following objectives:

- Achieve an incident- and injury-free workplace
- Promote a healthy workforce and mitigate significant workplace health risks
- Identify and mitigate environmental and process safety risks
- Operate with industry-leading asset integrity and reliability
- Efficiently use natural resources and assets

The Operational Excellence Management System consists of three parts:

Leadership Accountability: Leadership is the single largest factor for success in operational excellence. Leaders establish the vision and set objectives that challenge the organisation to achieve world-class results. They direct the Management System Process, setting priorities and monitoring progress on plans that focus on the highest-impact items. Leaders visibly demonstrate their commitment through personal engagement with the workforce and by showing concern for the health and safety of every individual. They demonstrate the same commitment to process safety risk mitigation.

Management System Process: The Management System Process is a systematic approach used to drive progress toward world-class performance. It is linked to the business planning process and begins with defining a vision of success and setting objectives. Gaps between current



performance and these objectives are uncovered during the assessment phase. Plans are developed to close the gaps, the plan is implemented and a review of plan implementation and performance is completed.

OE Expectations:

Corporate Expectations for Operational Excellence are detailed under 13 elements. The OE Expectations are met through processes and standards put in place by local management.

Listed below are the 13 elements of OE Expectations:

- Provide a secure environment for business operations;
- Design and construct facilities to prevent injury, illness, and incidents and to operate reliably, efficiently and in an environmentally sound manner;
- Develop safe operations for each location, including an occupational health program, maintenance procedures and process safety information, training program for all employees to prevent injuries, illness and incidents;
- Manage changes to facilities, operations, products or the organisation;
- Operate and maintain facilities to sustain mechanical integrity and prevent incidents while maximising efficiency of operations and conserving natural resources;
- Systematically improve Third party service performance including implementing a contractor safety management process that clearly establishes accountabilities;
- Strive to continually improve environmental performance and reduce impacts from operations;
- Manage potential health, environmental, safety and integrity risks of products from cradle to grave;
- Investigate and identify the root causes of incidents to reduce or eliminate systematic causes and to prevent future incidents;
- Reach out to the community and engage in open dialogue and build trust;
- Emergency Management for Astron Energy wholly-owned or operated assets and be prepared to monitor and respond to other carriers, vessels and facilities operated by others carrying Astron Energy products;
- Compliance assurance against company policy and government regulations; and
- Work ethically and constructively to influence proposed laws and regulations, and debate on emerging issues.

To achieve and sustain their objectives, Astron Energy believes in the development of a culture where everyone considers all incidents and operating disruptions preventable and that "zero incidents" is possible. The Tenets of Operation at Astron Energy are based on two key principles, namely (1) do it safely or not at all and (2) there is always time to do it right. Tents of Operation at Astron Energy are summarised below.

Always:

- Operate within design and environmental limits
- Operate in a safe and controlled condition
- Ensure safety devices are in place and functioning



- Follow safe work practices and procedures
- Meet or exceed the customer's requirements
- Maintain integrity of dedicated systems
- Comply with all applicable rules and regulations
- Address abnormal conditions
- Follow written procedures for high-risk or unusual situations
- Involve the right people in decisions that affect procedures and equipment

2.7.3 ASTRON ENERGY ENVIRONMENTAL STEWARDSHIP

The Environmental Stewardship (ES) Process is designated to consistently identify and manage potentially significant environmental impacts over an asset's lifecycle and forms part of Astron Energy's Operational Excellence Management System (OEMS).

The ES Process is designed to identify, assess, and manage potentially significant environmental impacts in a consistent manner and continually improve environmental performance. The business value objectives are:

- Connect the Corporate Core Environmental Aspects with the ES processes and standards, and then the Business Plan;
- Provide a consistent approach to Environmental Stewardship;
- Reduce the potential for environmental impacts; and
- Support continual improvement in environmental performance throughout the lifecycle of Astron Energy's assets

To comply with this Process, the following requirements must be adhered to:

- Develop and maintain a register of environmental aspects relating to a facility or business organisation, including evaluating and addressing, if applicable, the Corporate Core Environmental Aspects;
- Conduct an assessment to identify significant environmental aspects and improvement opportunities and review annually;
- Select appropriate improvement opportunities, establish objectives and targets, and develop improvement plans;
- Include environmental stewardship improvement opportunities in business planning cycles;
- Implement the Corporate Environmental, Social and Health Impact Assessment (ESHIA) Process;
- Meet all of the requirements in the Corporate HES Property Transfer (HES PT) Standard;
- Meet all of the requirements in the Corporate Third-Party Waste Stewardship (TWS) Standard; and
- Report on metrics as defined in the ES Process.



2.7.4 ASTRON ENERGY THIRD-PARTY WASTE STEWARDSHIP

The Third-Party Waste Stewardship Corporate Standard (TWS Standard) forms part of Astron Energy's Environmental stewardship efforts and was created to standardise the selection of third-party-owned facilities that manage wastes generated from in-scope Astron Energy operations by:

- a) evaluating third-party waste facilities before use by Astron Energy and its subsidiaries and affiliates; and
- b) managing the potential environmental liabilities, safety and health issues associated with the disposal of waste generated from Astron Energy operations

The TWS Standard is designed to achieve minimum environmental impact through responsible waste management; it is not intended to fully eliminate the generation, treatment, or disposal of waste materials from Astron Energy's operations.

The purpose of the TWS Standard is to evaluate third-party-owned facilities receiving waste generated by in-scope Astron Energy operations to determine whether these facilities meet Astron Energy's criteria to be Selected-For-Use for waste management. Objectives of the TWS Standard are as follows:

- Apply a standard protocol for evaluating third-party waste facilities
- Use a standardised contracting strategy with third-party waste facilities
- Define in- and out-of-scope waste and waste facilities for the purpose of this Standard

Selected-for-Use represents a waste facility that meets the evaluation criteria set forth in Astron Energy's internally developed TWS Evaluation Procedure.

To comply with this Standard, the following requirements must be adhered to:

- All waste facilities used by Astron Energy shall have the required operating permits, as identified as Selected-for-Use and verified during the evaluation process;
- An annual Evaluation Plan shall be developed and maintained;
- A facility that does not meet the evaluation criteria shall not be used unless an exemption is granted in accordance with the TWS Standard.
- All waste facility evaluations shall be undertaken by personnel certified as TWS Facility Evaluators;
- All in-scope wastes shall be tracked and documented to verify the usage of Selected-for-Use waste facilities; and
- A contract with the waste facility shall be in place prior to sending any waste to the waste facility.

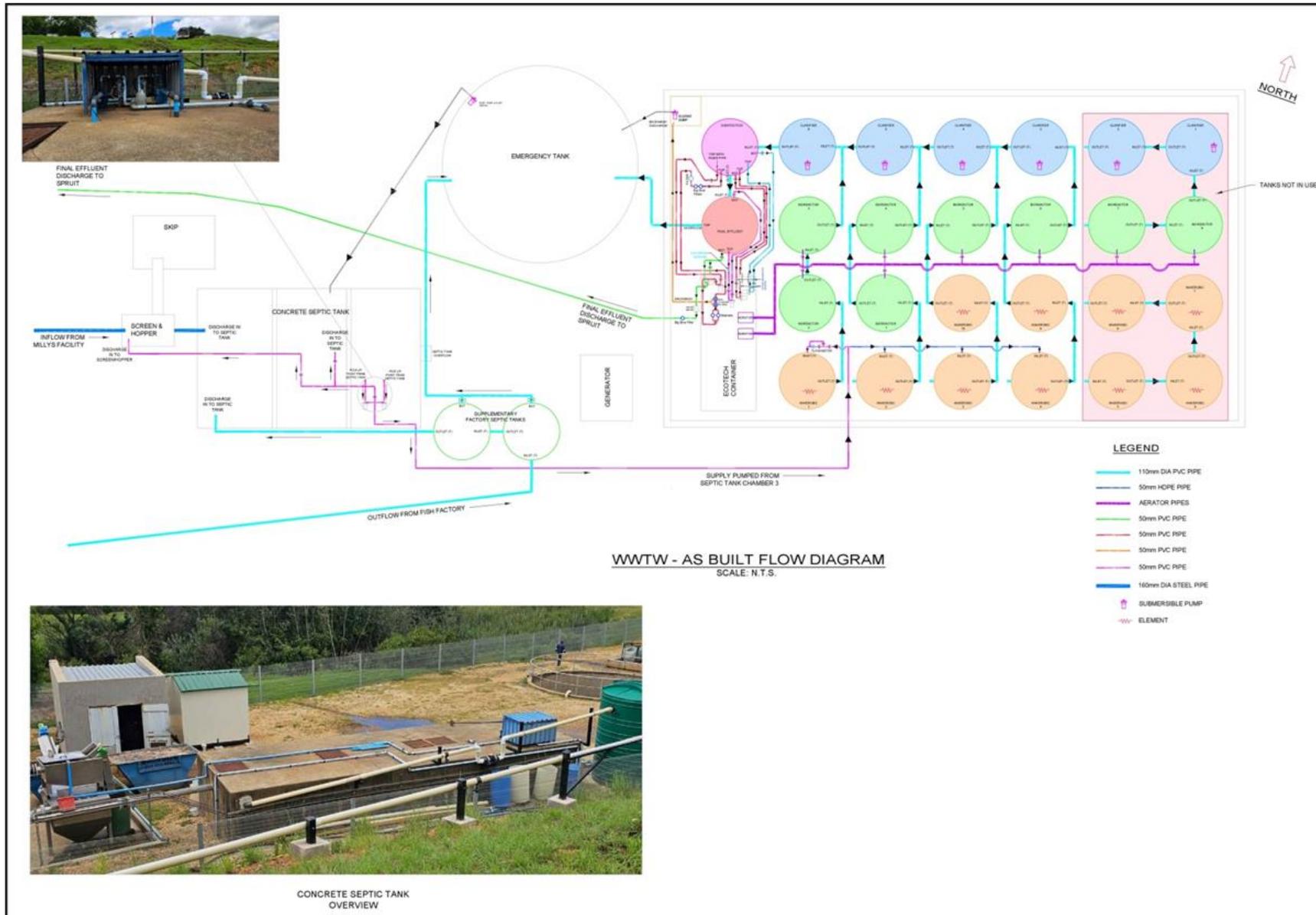


Figure 2-6: Waste Treatment Infrastructure at Astron Energy Milly's Star Stop



3 REGULATORY WATER AND WASTE MANAGEMENT FRAMEWORK

This section contains a legal assessment of all the water uses as an activity in terms of existing lawful use, current permits or exemptions, summary of water uses (potentially illegal water uses) and water uses considered to be generally authorized. It also covers the waste management activities authorized under Section 20 of the Environmental Conservation Act, 1989 (Act 73 of 1989) and the current National Environmental Management Waste Act, 2008 (Act 59 of 2008).

3.1 SUMMARY OF ALL WATER USES

3.1.1 SECTION 21(a)

The taking of raw surface water from the De Kroon Dam at Milly's has previously been registered under Water Use License 05/X21F/CFICCIIGAI/7130. However, as result of the site's increasing popularity amongst travellers and subsequent increase in water abstraction the applicant is applying to abstract an increased volume of water equating to 69 350 m³/a (currently authorised volume is 36 500 m³/a).

Table 3-1 indicates the Target Water Quality Range (TWQR) for domestic use as indicated by DWAF (1996a).

Table 3-1: TWQR for Domestic Use (DWAF, 1996a)

Parameter	Target Water Quality Range
pH	6.0 – 9.0
Electrical Conductivity mS/m	0 – 70
Sodium as Na in mg/l	0 – 100
Magnesium as Mg in mg/l	0 – 30
Sulphate as SO ₄ in mg/l	0 – 200
Chloride as Cl in mg/l	0 – 100
Nitrate/Nitrite as N in mg/l	0 – 6
Fluoride as F in mg/l	0 – 1
Feacal coliforms counts/ 100ml	0
E-coli counts/100ml	0 – 1.0
Ammonia as N in mg/l	0 – 1.0

The current and active Water Use License does not include the authorisation of groundwater. As part of the new development, Milly's Star Stop is also applying for the abstraction of groundwater to a maximum volume of 25 638 m³/a from a single borehole (RED 228). To this end, NOA8 Pty Ltd (NOA8) was commissioned by M2 Environmental Connections on behalf of Astron Energy to conduct a hydrogeological assessment. The assessment was completed in June 2025 had the following recommendations to ensure sustainable water management practices:



- The recommended yield is 70 m³ in a 16-hr pumping cycle, which equates to 25 638 m³/a. The borehole should be allowed to recover for at least 8 hours after a 16-hour pumping schedule.
- To protect borehole failure and dewatering, water level should not reach a maximum allowable drawdown of 30 metres.
- If the maximum allowable drawdown is reached, the pumps should be switched off and allowed to recover to 90 % of the static ground water level.
- Daily monitoring of abstraction volumes (preferably with automated flow meters)
- Monthly capturing of groundwater levels in an electronic database, for long-term trend analysis)
- It is recommended to do a comprehensive bi-annual analysis at an accredited laboratory for parameters pH, Electrical Conductivity, total dissolved solids, major anions and cations (Ca, Mg, Na, NO₃, Cl, SO₄,) as well as Total Petroleum Hydrocarbons, Benzene, Toluene, Ethylbenzene and Xylene.

3.1.2 SECTION 21(b)

The storage of water in the De Kroon Dam at Milly's has been active since 1983 and has been verified and validated by the IUCMA under Ref: 363JT/11 with the issuance of a Lawful Water Use Certificate. The current maximum capacity of the De Kroon Dam is listed as 392 519 m³.

3.1.3 SECTION 21(c) AND (i)

The current and active Water Use License (05/X21F/CFICCIIGAI/7130) covers several section 21 (c&i) water uses including:

- The existing WWTW located 40m from the Elands River; and
- The De Kroon Dam wall itself;

However, the Existing Service Station Facilities within a surface water regulated area was not included in the previous application and is therefore applied for under the current application.

Additionally, the newly proposed development to be located on Erven 3 Milly's South Township has been found to impede on the 500m regulated area surrounding a wetland and therefore also triggers Section 21 (c&i) water uses.

3.1.4 SECTION 21(f)

The WWTW at Milly's Star Stop currently discharges treated waste water into the Elands River through a reed bed system under Water Use License 05/X21F/CFICCIIGAI/7130 Section 21 (f). The current active license allows for discharge up to a maximum volume of 36 500 m³/a. As with the Section 21 (a) abstraction aspect discussed earlier in this report, and additional 25 915 m³/a is applied for (thus total discharge volume applied for is 62 415 m³/a).



3.1.5 SECTION 21(g)

The current active license allows for disposal up to a maximum volume of 43 800 m³/a of treated effluent into a reed system adjacent of the Elands River. As with the Section 21 (a) abstraction aspect discussed earlier in this report, and additional 18 615 m³/a is applied for (thus total discharge volume applied for is 62 415 m³/a).

In addition the previously authorised disposal of sludge into the Emergency Holding Tank with a 150 m³ capacity is re-applied for in this current application.



3.1.6 Location of Water Uses

Table 3-2: Location of Water Uses

Water Use Number	Section 21 Water Use	Description	Location	Property
n/a	(b)	Storage of water in De Kroon Dam	25°41'15.90"S 30°12'37.70"E	Remaining Extent of Portion 11 of the Farm De Kroon 363 JT
1	(a)	Abstraction from the De Kroon Dam	25°41'14.46"S 30°12'44.00"E	Abstraction point on Remaining Extent of Portion 11 of the Farm De Kroon 363 JT Water used on Portion 14 of the Farm De Kroon 363 JT and will also be used on Erf 3 Milly's South Township
2	(a)	Groundwater abstraction for borehole (REB 228)	25°41'18.78"S 30°13'1.16"E	Erf 3 Milly's South Township
3	(c) & (i)	Existing Waste Water Treatment Works	25°41'12.41"S 30°12'54.92"E	Portion 13 of the Farm De Kroon 363 JT
4	(c) & (i)	De Kroon Dam, Storage within 500m of wetland area	25°41'15.90"S 30°12'37.70"E	Remaining Extent of Portion 11 of the Farm De Kroon 363 JT
5	(c) & (i)	Existing Service Station Facilities within surface water regulated area	25°41'18.68"S 30°12'44.13"E	Remaining Extent of Portion 14 of the Farm De Kroon 363 JT
6	(c) & (i)	Newly proposed Service Station Facilities within wetland regulated area	Start: 25°41'24.71"S 30°12'49.88"E End: 25°41'18.99"S	Erven 3 Milly's South Township



Water Use Number	Section 21 Water Use	Description	Location	Property
			30°12'57.33"E Center: 25°41'21.71"S 30°12'53.19"E	
7	(f)	Discharging treated Waste Water into the Elands River through a reedbed system	25°41'14.16"S 30°12'50.78"E	Remaining Extent of Portion 11 of the Farm De Kroon 363 JT
8	(g)	Disposal of sludge into Emergency Holding Tank	25°41'12.2"S 30°12'53.9"E	Remaining Extent of Portion 11 and 13 of the Farm De Kroon 363 JT
9	(g)	Disposal of treated waste water into a reed bed system	25°41'13.1"S 30°12'49.9"E	Remaining Extent of Portion 11 and 13 of the Farm De Kroon 363 JT

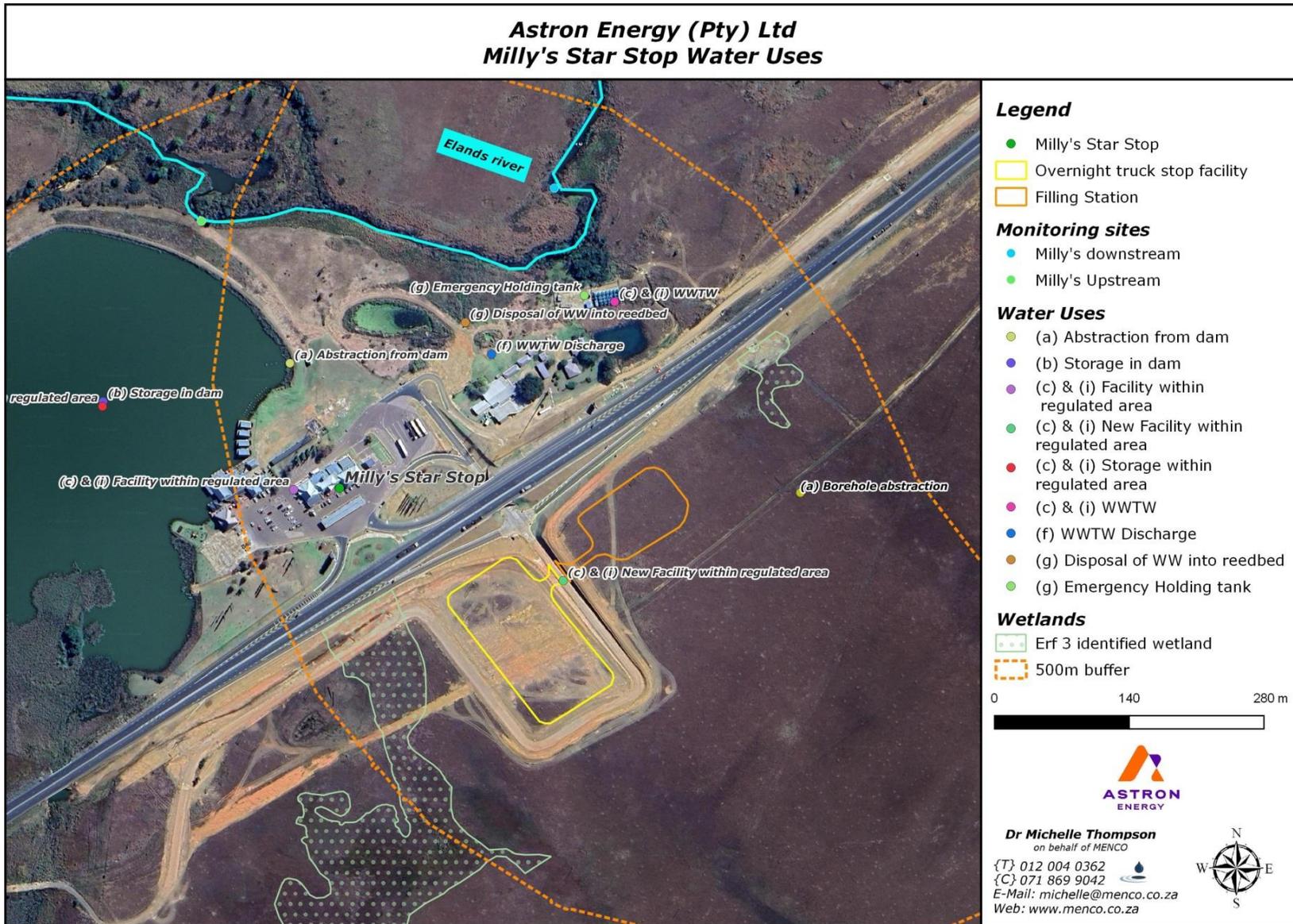


Figure 3-1: Locality of Water Uses



3.2 EXISTING LAWFUL WATER USES

An Existing Lawful Water Use as defined by Section 32 of the National Water Act, 1998 (Act 36 of 1998) as a water use that has taken place at any time during a period of two years immediately before the date of commencement of the Act and was authorised by a law before the date of commencement.

Existing lawful water uses at Milly's Star Stop include the following:

- The storing of water in the De Kroon Dam (Section 21(b) water use).

3.3 RELEVANT EXEMPTIONS

Astron is currently applying for the parameters as the current active licence with regards to the treated effluent discharge limits(refer to the table below).

Variable (s)	Treated effluent discharge limits
pH	5.5-7.5
Electrical Conductivity	50 mS/m above background receiving water
Nitrates (as N)	1.5 mg/1
Ammonia (as N)	2 mg/1
Chemical Oxygen Demand (COD)	30 mg/1
E-coli (counts/100mf)	0
Orthophosphate (as P)	1.0 mg/1
Suspended solids	10mg/l



3.4 CURRENT AUTHORISED WATER USES AND NEW WATER USES TO BE LICENCED

The current application is for an update for a WULA. Currently, the following water uses are on site.

Water Use Number	Section 21 Water Use	Description	Volume / Length	Location	Property	Notes
Lawful Use – Ref 363JT/11.						
n/a	(b)	Storage of water in De Kroon Dam	392 519 m ³ Capacity	25°41'15.90"S 30°12'37.70"E	Remaining Extent of Portion 11 of the Farm De Kroon 363 JT	Covered under Existing Lawful Use – Ref 363JT/11.
New and additional water uses						
1	(a)	Abstraction from the De Kroon Dam	69 350 m ³ /a	25°41'14.46"S 30°12'44.00"E	Abstraction point on Remaining Extent of Portion 11 of the Farm De Kroon 363 JT Water used on Portion 14 of the Farm De Kroon 363 JT and will also be used on Erf 3 Milly's South Township	Current water use license (05/X21F/CFICCIIGAI/7130) allows for 36 500 m ³ /a. Additional 32 850 m ³ /a applied for.
2	(a)	Groundwater abstraction for borehole (REB 228)	25 638 m ³ /a	25°41'18.78"S 30°13'1.16"E	Erf 3 Milly's South Township	New application
3	(c) & (i)	Existing Waste Water Treatment Works	40 meters	25°41'12.41"S 30°12'54.92"E	Portion 13 of the Farm De Kroon 363 JT	Covered under current water use license (05/X21F/CFICCIIGAI/7130) and re-applied for.



Water Use Number	Section 21 Water Use	Description	Volume / Length	Location	Property	Notes
4	(c) & (i)	De Kroon Dam, Storage within 500m of wetland area	300 meters	25°41'15.90"S 30°12'37.70"E	Remaining Extent of Portion 11 of the Farm De Kroon 363 JT	Covered under current water use license (05/X21F/CFICCIIGAI/7130) and re-applied for.
5	(c) & (i)	Existing Service Station Facilities within surface water regulated area	100 meters	25°41'18.68"S 30°12'44.13"E	Remaining Extent of Portion 14 of the Farm De Kroon 363 JT	New application as ELU cannot be confirmed
6	(c) & (i)	Newly proposed Service Station Facilities within wetland regulated area	300 meters	Start: 25°41'24.71"S 30°12'49.88"E End: 25°41'18.99"S 30°12'57.33"E Center: 25°41'21.71"S 30°12'53.19"E	Erven 3 Milly's South Township	Entire site within regulated area
7	(f)	Discharging treated Waste Water into the Elands River through a reedbed system	85 489.2 m ³ /a	25°41'14.16"S 30°12'50.78"E	Remaining Extent of Portion 11 of the Farm De Kroon 363 JT	Current water use license (05/X21F/CFICCIIGAI/7130) allows for 36 500 m ³ /a. Additional 48 989.2 m ³ /a applied for.
8	(g)	Disposal of sludge into Emergency Holding Tank	150 m ³ capacity	25°41'12.2"S 30°12'53.9"E	Remaining Extent of Portion 11 and 13 of the Farm De Kroon 363 JT	Covered under current water use license (05/X21F/CFICCIIGAI/7130)



Water Use Number	Section 21 Water Use	Description	Volume / Length	Location	Property	Notes
						and re-applied for.
9	(g)	Disposal of treated waste water into a reed bed system	0.49 Ha; 85 489.2 m ³ /a	25°41'13.1"S 30°12'49.9"E	Remaining Extent of Portion 11 and 13 of the Farm De Kroon 363 JT	Current water use license (05/X21F/CFICCIIGAI/7130) allows for 43 800 m ³ /a. Additional 41 689.2 m ³ /a applied for.



3.5 WASTE MANAGEMENT ACTIVITIES (NEMA/NEMWA)

3.5.1 SOLID WASTE

In accordance with the Astron Waste Management Procedure the volume of waste produced at the terminal shall be recorded on a monthly basis or as waste is generated. Terminal waste tracking logs shall be kept for this purpose.

All disposal sites should be inspected twice yearly to ensure the correct disposal and adherence to all legal requirements. Furthermore all contractors and disposal agents, premises and sites should be inspected twice yearly to ensure that all environmental and legal requirements are adhered to. This procedure should be reviewed annually, for efficiency and compliance and updated if required. The Millys Wastewater Treatment Plant sewage sludge classification report, completed in April 2025 by AquiScience, presents laboratory analyses conducted in accordance with South African Department of Water and Sanitation guidelines and Water Research Commission standards. The sludge has been classified as A2a, indicating it meets high quality standards suitable for beneficial reuse. The microbiological classification of Class A demonstrates very low pathogen content, with no helminth ova detected and faecal coliform levels of 8,600 CFU per gram dry weight, well within the maximum allowable limit of 10,000 for unrestricted use in agriculture and public contact applications. All heavy metal concentrations including arsenic, cadmium, chromium, copper, lead, mercury, nickel, and zinc tested significantly below the thresholds for Class 'a' pollutant status, allowing unrestricted land application without concerns about metal accumulation in soils or crops. The stability classification of Class 2 indicates moderate biological stability, meaning the organic matter has been partially stabilized though some residual odour and potential for further decomposition may remain. This classification is contingent upon implementing appropriate vector attraction reduction measures on at least a 75th percentile basis, with the report noting that stability issues can be addressed through subsequent management practices. The report highlights that this sludge is appropriate for agricultural use at agronomic rates, land rehabilitation, forestry, composting, and soil conditioning. However, the laboratory analysis identified a chloride concentration of 2.69 percent, which, while not affecting the core classification, warrants consideration in site-specific applications near salt-sensitive crops or in areas where soil salinization is a concern. Overall, the A2a classification confirms this is a high-quality biosolid suitable for beneficial reuse rather than disposal, representing an opportunity for resource recovery from the wastewater treatment process.

3.5.2 WASTE WATER

It is proposed that waste water be monitored on a monthly basis or in accordance with the WUL for the parameters listed below. Samples should be taken of the final waste water at the point of discharge into the environment.

**Table 3-3: Waste Water Quality Monitoring Parameters**

Variable	Unit
Chemical Oxygen Demand	mg/L
pH	
Ammonia (ionised and un-ionised) as Nitrogen	mg/L
Nitrate/Nitrite as Nitrogen	mg/L
Electrical Conductivity	mS/m
Ortho-Phosphate as phosphorous	mg/L
E-Coli (per 100ml)	mg/L
Suspended Solids	mg/L
Chlorine as Free Chlorine	mg/L
Soap, oil or grease	mg/L

3.6 WASTE-RELATED AUTHORISATIONS

The current active license allows for disposal up to a maximum volume of 43 800 m³/a of treated effluent into a reed system adjacent of the Elands River. As with the Section 21 (a) abstraction aspect discussed earlier in this report, and additional 18 615 m³/a is applied for (thus total discharge volume applied for is 62 415 m³/a).

In addition the previously authorised disposal of sludge into the Emergency Holding Tank with a 150 m³ capacity is re-applied for in this current application.

3.7 OTHER AUTHORISATIONS

None.



4 PRESENT ENVIRONMENTAL SITUATION

This section provides an overview of the climatic, hydrological, ecological, groundwater and socio-economic conditions relevant to Milly's Star Stop. The information presented herein has been sourced from the WULAR (2024), monitoring programmes (2014–2025), national datasets, and site-specific assessments undertaken by M2 Environmental Connections.

4.1 CLIMATE

Milly's Star Stop is situated on the Steenkampsberg Plateau, an elevated grassland region characterised by cool, wet summers and cold, dry winters. The climate plays a significant role in water availability, stormwater behaviour, and effluent dilution capacity in the Elands River.

The slope of the municipal area displays a gradual decline from south to north and from west to east with the highest point in the south being 1645 m above sea level and the lowest point at 1585 m above sea level. Average midday temperatures for eNtokozweni range from 15.7°C in June to 23.3°C in January. The region is coldest during June when minimum temperatures can reach -1°C.

4.1.1 RAINFALL

The site experiences a Mean Annual Precipitation (MAP) of approximately 600–700 mm, with rainfall concentrated between October and March.

Summer rainfall typically occurs as convective thunderstorms, contributing to high runoff rates in local streams such as the De Kroon Spruit and the Elands River. Winter months are predominantly dry with low rainfall events.

Two long-term rainfall monitoring stations influence the rainfall interpretation for the site:

Station	Place	Latitude	Longitude
X2E002	Machadodorp	25°40'02"S	30°16'59"E
X2E013	Elandspruit@Kwena Dam	25°21'17"S	30°22'44"E

Although both stations contain historical data gaps, their long-term datasets show consistent rainfall patterns with regular interannual variability typical of the Highveld interior.



25.69°S 30.21°E
 25.69°S, 30.21°E (1583 m asl).
 Model: ERA5T.

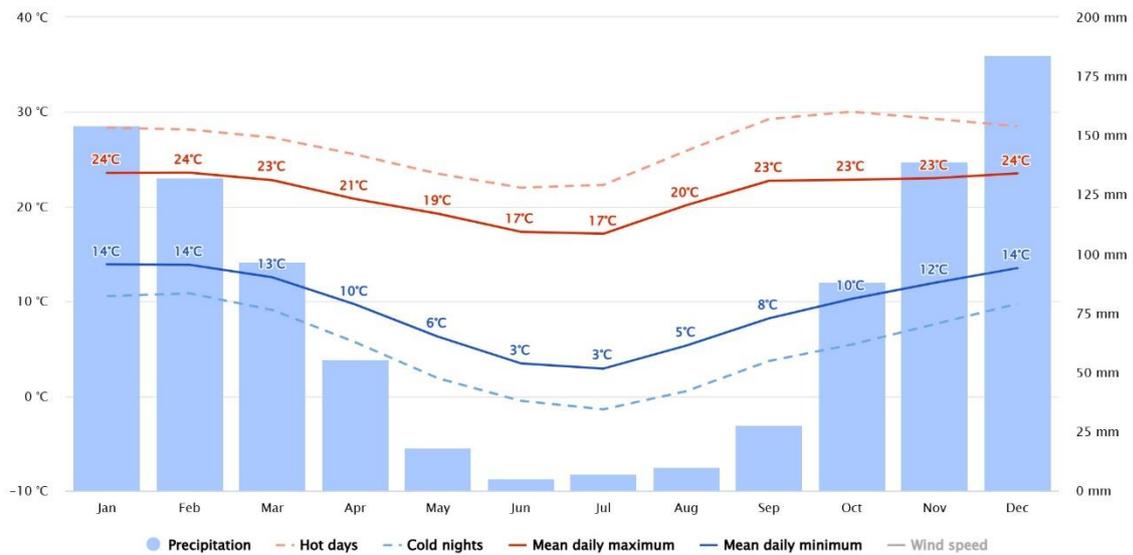


Figure 4-1: Average rainfall for the area in which Milly's Star Stop is situated.

4.1.2 EVAPORATION

Mean Annual Evaporation (MAE) in the region ranges between 1 300–1 400 mm per annum, significantly exceeding annual rainfall.

This results in:

- Higher evaporative loss from the De Kroon Dam.
- Limited contribution to aquifer recharge during dry seasons.
- Increased concentration of pollutants during low-flow periods in the Elands River.

Year	Evaporation (mm) for the month of February	Evaporation (mm) for the month of May	Evaporation (mm) for the month of July	Evaporation (mm) for the month of October
2005	---	119.5	117.0	226.9
2006	147.2	107.6	---	203.3
2007	225.3	129.0	118.6	160.0
2008	204.2	105.8	102.5	206.2
2009	154.6	109.7	96.5	198.3
2010	185.3	110.9	93.2	198.6
2011	203.1	114.0	94.4	180.2
2012	225.8	123.0	101.5	182.0
2013	192.6	107.3	99.5	187.3
2014	184.2	113.5	---	---



Evaporation peaks during late spring and summer, coinciding with periods of high operational water demand at Milly's Star Stop.

4.1.3 WIND SPEED & DIRECTION

The region is influenced by prevailing north-easterly and north/south-westerly winds, with moderate wind speeds typical of the interior plateau.

Seasonal wind patterns influence:

- The dispersion of dust particulates
- Potential cross-contamination of exposed stormwater features
- The movement of fine organic material around the WWTW

Wind exposure is generally moderate and does not pose significant environmental risk to water infrastructure.

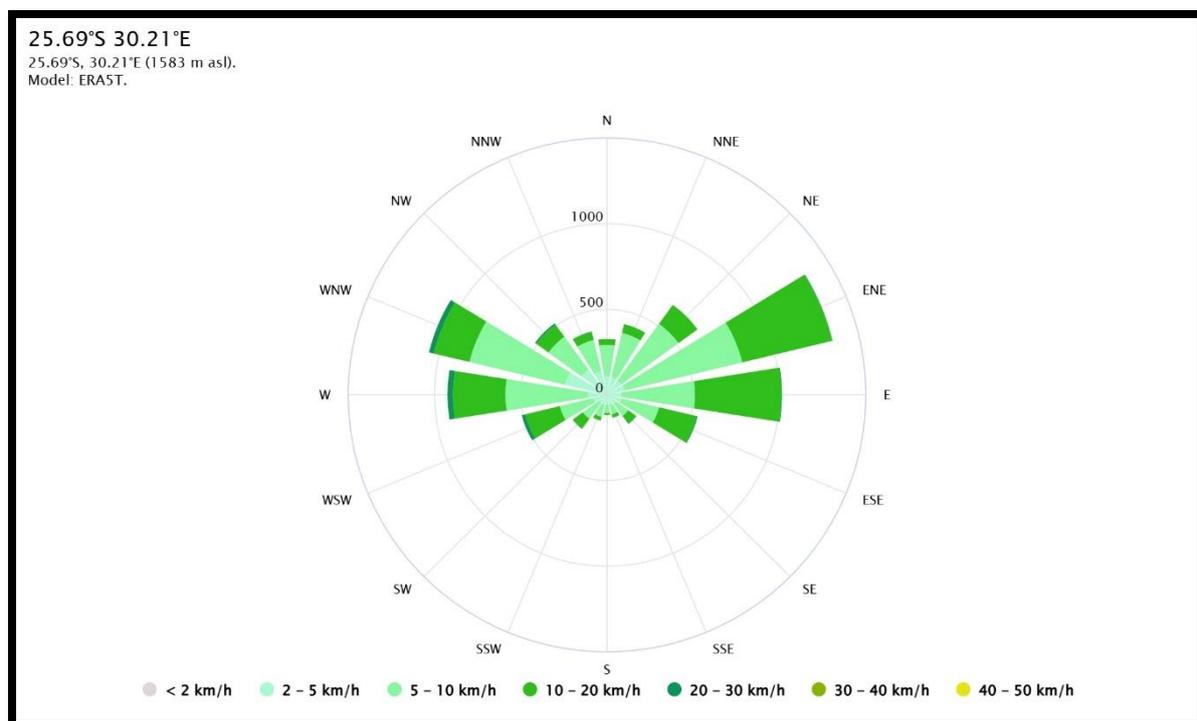


Figure 4-2: Wind rose for the Region of Milly's Star Stop indicating the numbers of hours wind blows from a indicated direction.

4.2 SURFACE WATER

Milly's Star Stop falls within Quaternary Catchment X21F, which forms part of the Inkomati-Usuthu Water Management Area (WMA). The catchment is overseen by the Inkomati-Usuthu Catchment Management Agency (IUCMA).

4.2.1 WATER MANAGEMENT AREA

The study area falls within the boundaries of the Crocodile Sub-Catchment, which together with the Sabie-Sand, Upper Komati, Lower Komati, and Usuthu Sub-Catchments form the Inkomati-Usuthu Water Management Area (WMA). This WMA is situated in the north-eastern part of South Africa, primarily in Mpumalanga Province with a small portion in Limpopo Province, and borders Mozambique in the east and Eswatini in the south-east, with which it shares river systems. The



WMA is managed by the Inkomati-Usuthu Catchment Management Agency (IUCMA), established in terms of Section 78 of the National Water Act (Act 36 of 1998).

The Crocodile River forms the southern boundary of the world-renowned Kruger National Park, while the ecologically significant Sabie River flows through the park and is considered one of the most important rivers in the country. The Komati River flows from the Upper Komati Sub-Catchment into Eswatini and re-enters South Africa at the Lower Komati Sub-Catchment before flowing into Mozambique where it joins with the Crocodile River to form the Inkomati River.

According to the National Water Resource Strategy Third Edition (NWRS-3, 2023), the Inkomati-Usuthu WMA faces significant water resource challenges. The WMA has a total water availability of approximately 1,029 million m³/annum but experiences a deficit of approximately 163 million m³/annum. Water resources in the Crocodile River catchment remain over-allocated, and water requirements regularly exceed available supplies. Approximately 98% of the predicted total surface water resources are already being utilized. The Ecological Reserve continues to face challenges in meeting its requirements, which affects South Africa's international obligations for the release of water to Mozambique and Eswatini.

Water requirements within South Africa have grown to the extent that the total available yield from these rivers is being absorbed by local demands. Transfers of water into the Inkomati-Usuthu WMA from elsewhere in South Africa are not feasible given the distance from other water sources, meaning that water resource deficits must be addressed from within the WMA through alternative sources including groundwater utilization, water conservation and demand management measures, water reuse, and desalination. Opportunities for new surface water storage dams remain very limited, with some possible storage to meet growing domestic needs. Climate change considerations have added further complexity to water resource management in the WMA.

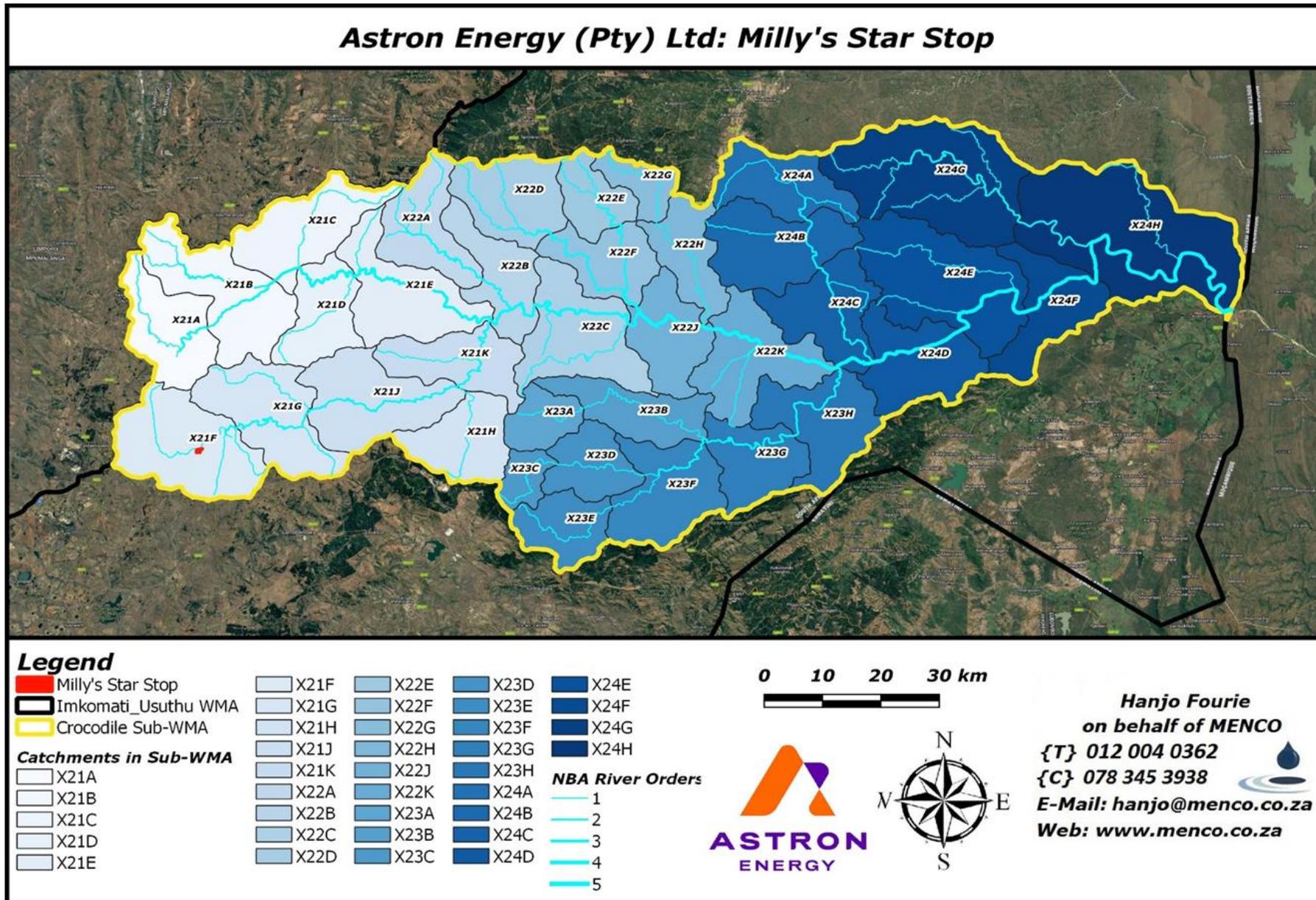


Figure 4-3: WMA Boundaries applicable to the study area



4.2.2 SURFACE WATER QUALITY

4.2.2.1 HISTORICAL SURFACE WATER QUALITY

Historical surface water quality data as obtained from the Directorate Resource Quality Services database for a monitoring point located downstream of the project site are presented in Table 4-2. The details for this monitoring point are indicated in Table 4-1 below.

Table 4-1: Locality and description of DWA surface water monitoring point.

Station	Place	Latitude	Longitude
X21_102956	At Geluk on Elands River	25°38'45.00"S	30°16'40.00"E

The DWS database information for this monitoring point extends back to 1977 with the latest quality information captured on the system in March 2009.

**Table 4-2: Locality and description of DWA surface water Reserve determination point**

Date	EC (m/Sm)	pH	Cl (mg/l)	K (mg/l)	Na (mg/l)	NH ₄ (mg/l)	SO ₄ (mg/l)	NO ₃ (mg/l)	F (mg/l)
13/03/2000	12.83	7.89	5.0	2.128	4.611	0.094	5.46	0.17	0.103
12/03/2001	29.1	8.192	29.347	0.956	16.114	0.06	23.694	0.042	0.128
12/03/2002	26.8	8.05	26.885	0.608	13.422	0.02	20.604	0.207	0.127
24/02/2003	29.0	8.054	25.139	0.556	13.507	0.02	22.554	0.177	0.176
24/02/2004	20.6	7.644	16.041	1.178	9.958	0.034	20.831	0.312	0.1
07/03/2005	33.2	7.866	31.198	1.091	17.944	0.02	31.948	0.325	0.142
13/03/2006	9.56	7.346	5.154	0.535	6.32	0.02	5.021	0.088	0.125
12/03/2007	54.0	7.953	58.355	0.672	37.612	0.114	58.654	0.1	0.05
10/03/2008	20.2	7.928	11.871	1.019	10.215	0.303	17.277	0.404	0.11
02/03/2009	17.1	7.522	12.514	1.919	7.33	0.025	16.487	0.162	---



4.2.2.2 CURRENT SURFACE WATER QUALITY

As a requirement of the notice of intent to direct issued to Milly's Star Stop by the Inkomati CMA, the analyses of surface water from the Elands River were initiated by Menco during February 2014. Sample points were established by Menco 100 m upstream of the WWTW and 100 m downstream of the WWTW as indicated in Figure 4-7.

Table 4-4 indicates the latest water quality results upstream and downstream from the Milly's WWTW as analysed by Waterlab (Pty) Ltd. Waterlab (Pty) Ltd (SANAS accredited laboratory according to ISO/IEC 17025:2005 standards). The components were analysed in accordance with parameters as set out in the notice of intent to direct and finally captured in the current WUL for the project.

Monthly monitoring has been conducted by Menco on behalf of Astron Energy in order to be compliant with the requirements as set out in the WUL issued to Astron Energy.

The average water quality data for 2017 –2024 are indicated in Table 4-3. The old WWTW did not have the capacity to treat the effluent to an acceptable standard. Although the 2019 results are above the set limits it is noticed that the new plant is improving the overall water quality. The Maturation Pond has also been decommissioned as a sampling point due to the current WUL conditions. In addition, the trout factory outlet has been added to the monitoring programme in February 2019 due to the discharge taken place into the small maturation pond.

The 2020 water quality results indicate that there has been a significant improvement in water quality parameters for the SW effluent with EC, NO₃, COD, E.coli and NH₃ showing significant improvements during the extent of 2020. E.coli levels have slightly increased for the upstream and downstream Elands River sites which are mostly related to external impact sources. Fluctuations in E.coli levels have been related to external impact sources and cannot be attributed to activities at Milly's Star Stop.

Table 4-3: Average Water Quality Comparisons for the Hydrological Years

2023 Average				
Variables	Milly's US	Milly's DS	SW Effluent	Trout Factory
pH	7.87	7.86	7.67	7.82
EC	15.61	14.36	84.41	856.4
SS	10.11	10.63	57.54	187.4
Cl	13.2	13.1	97	1415
F	0.2	0.2	0.2	0.2
P	0.1	0.1	3.27	1.64
NO₃	0.18	0.18	0.18	0.1
NO₂	0.05	0.05	0.22	0.05
COD	11.5	11.67	93	455.2
E. coli	111	109	9092	100000
NH₃	0.12	0.13	35.9	6.36
2024 Average				
Variables	Milly's US	Milly's DS	SW Effluent	Trout Factory



pH	7.94	7.93	7.64	Pre: 8.07 Mid: 8.19 Post: 8.12
EC	14.8	8.3	133	Pre: 528 Mid: 202 Post: 182
SS	5.22	5	78	Pre: 240 Mid: 462 Post: 107
Cl	4.5	5	162	Pre: 1446 Mid: 349 Post: 345
F	<0.2	<0.2	<0.2	Pre: <0.2 Mid: <0.2 Post: <0.2
P	0.13	0.13	7.53	Pre: 5.99 Mid: 4.54 Post: 4.19
NO3	0.29	0.44	3.7	Pre: 0.31 Mid: 0.26 Post: 0.2
NO2	<0.05	0.05	2.34	Pre: 0.06 Mid: <0.5 Post: <0.5
COD	14.18	17.50	180	Pre: 866 Mid: 813 Post: 330
<i>E. coli</i>	155	149	80001	Pre: 1694 Mid: 196 Post: 76
NH3	0.24	0.25	49	Pre: 10.61 Mid: 3.21 Post: 2.81

Taking the 2021 monitoring data (averages) into account it is clear that there are several alterations in chemical levels compared to 2020. A significant increase in E.coli levels have been observed within the 2021 hydrogeological year. It should be noted that considerable E.coli spikes have been observed during December which has significantly increased the average E.coli levels obtained during the yearly period. Apart from December all of the obtained E.coli levels were similar to the average levels obtained during the 2020 hydrological year. Apart from E.coli no significant changes in water quality data was observed for the Elands River during the 2021 year. The similarity in water quality data for the upstream and downstream site also indicates that there are currently no direct impacts from Milly's which has an impact on the chemical parameters of the Elands River. Several alterations in chemical parameters have been observed at the SW effluent. Compared to the 2020 monitoring results P, NO3 as well as E.coli levels have progressively improved throughout the monitoring year.

Taking the 2022 monitoring period into account similar water quality parameters were observed for the upstream and downstream Elands River sites with minimal fluctuations in chemical parameters. The E.coli levels have however decreased notably at both the Elands River upstream and downstream sites. Overall the water quality data indicates that the operations currently taking



place at Milly's has no impact on the overall water quality of the Elands River despite 2 spill events taking place during the 2022 monitoring period.

The average EC, P as well as E.coli levels of the SW Effluent have however increased during 2022 indicative that there are still several mitigation measures and management actions needed to be taken to ensure sustainable compliance of water quality variables. Despite increases in E.coli levels it should be noted that there were only 2 instances where the E.coli levels exceeded 1mg/l which is related to the spills taking place at the WWTW plant.

The 2023 monitoring period produced slight increases in COD and SS levels while improved EC, P and NO3 levels have been observed in terms of the SW effluent site. A significant average increase in E.coli levels have been observed for the SW effluent. It should be noted that up until December 2023 no traces of E.coli has been observed within the SW effluent with the increased average amount being completely related to the once off spike in parameter levels. The water quality within the Elands River has remained fairly similar apart from an increase in upstream and downstream E.coli levels. This increase is however related to upstream discharge sources and not activities related to Milly's.

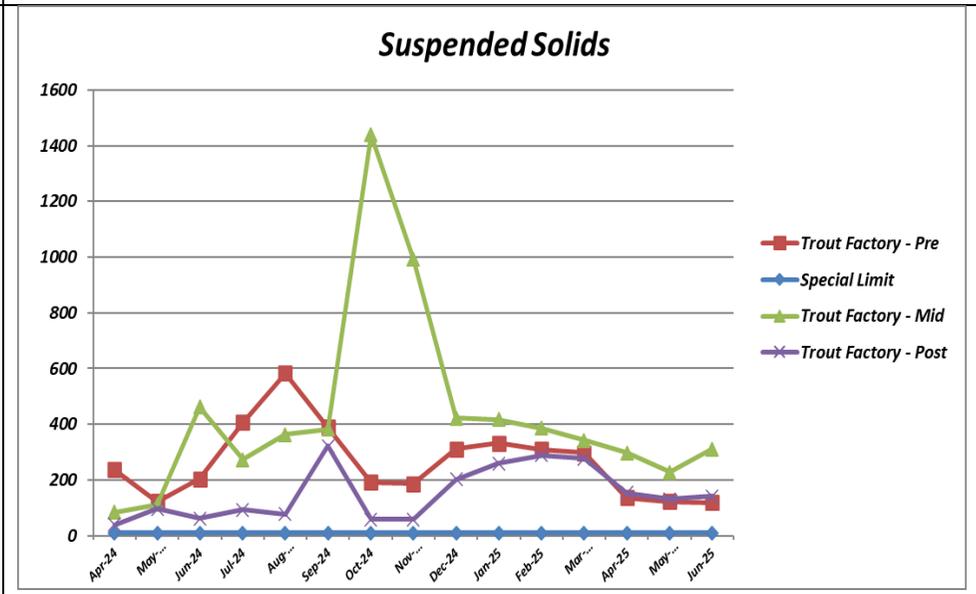
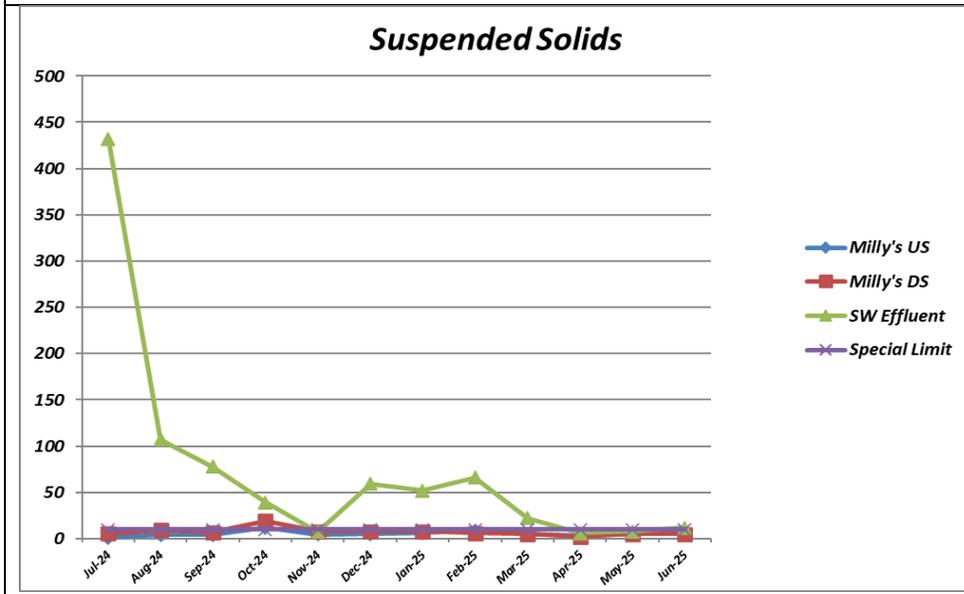
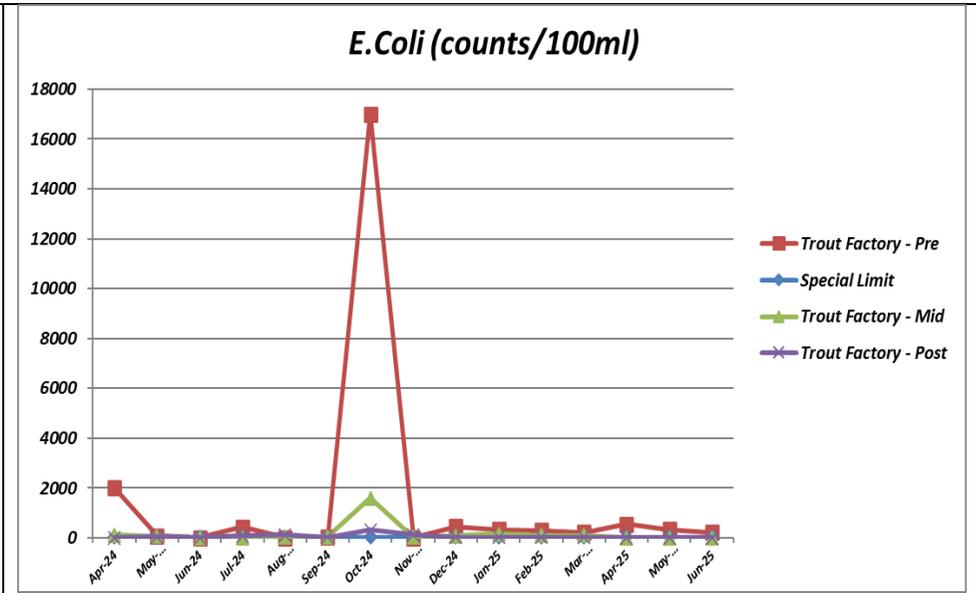
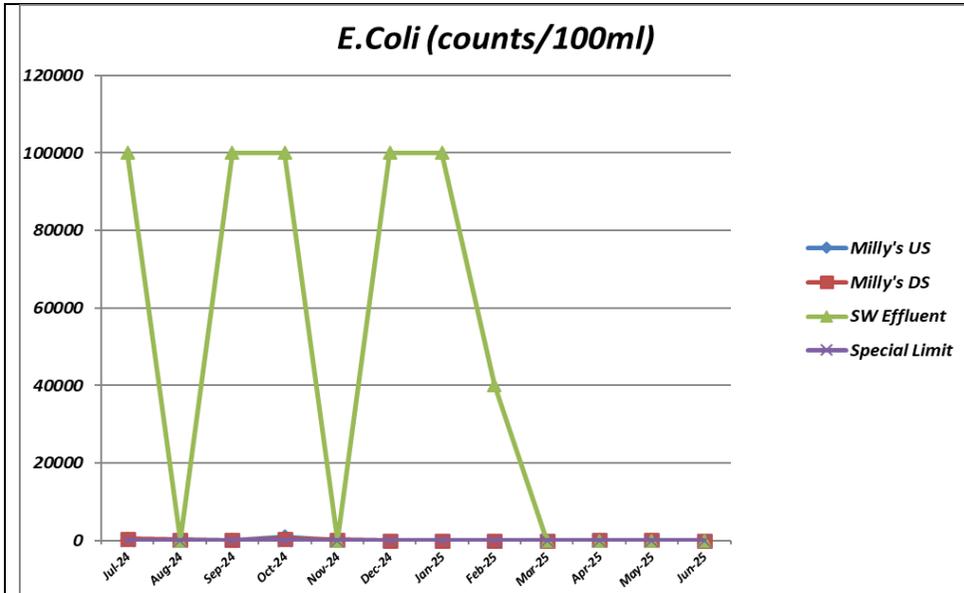
In addition to the 2024 monitoring data the Trout Pre, Trout post as well as the Trout mid sampling points have been added for comparative purposes. More comparative annual data will only be available at the end of 2025 to indicate the advanced effectiveness of the Trout factory treatment options. In terms of the 2024 data, it is clearly observed that the water quality parameters have gradually improved from the Trout pre to Trout post sampling points. Chloride levels, E.coli as well as COD levels in particular have markable improved compared to the Trout Pre site. Comparing the average SW effluent results to that of 2023 clear increases in EC, SS, Cl, P, COD, NH3 as well as E.coli have occurred. E.coli levels in particular has increased by more than 9 times the 2023 amount. As mentioned during the 2024 monitoring period the WWTW is currently being rebuilt and upgraded which has resulted in the improper functioning of the WWTW.

The WWTW also need additional time in order to readjust since additional waste load has been added to the overall monthly load. The E.coli levels discharged at the SW effluent is also expected to exceed 10000 mg/l on a continual basis during the 2024 period till the necessary improvements and reparations on the WWTW has been completed, which is scheduled for the end of 2024. Once the WWTW has been upgraded it is expected that the water quality results of the SW effluent will be in a similar or improved state compared to the 2023 monitoring results.

E. coli levels have also increased within the Elands River, although the downstream water quality remained in a similar state when being compared to the upstream water quality. It is however evident that there have been additional external upstream impacts on the main Elands River. The 2025 monitoring data will be included within Table 4-3 at the end of the 2025 monitoring period.

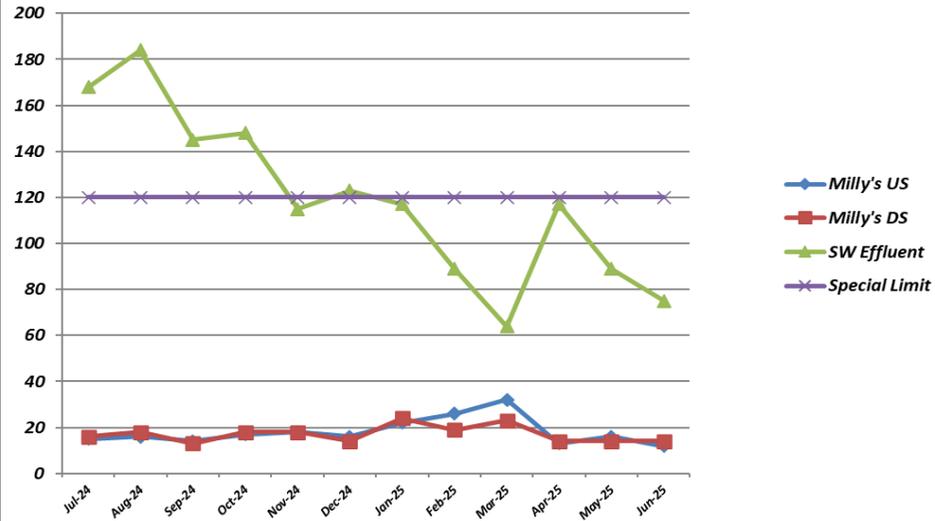


Table 4-4: Water Quality Comparisons of 2024/2025

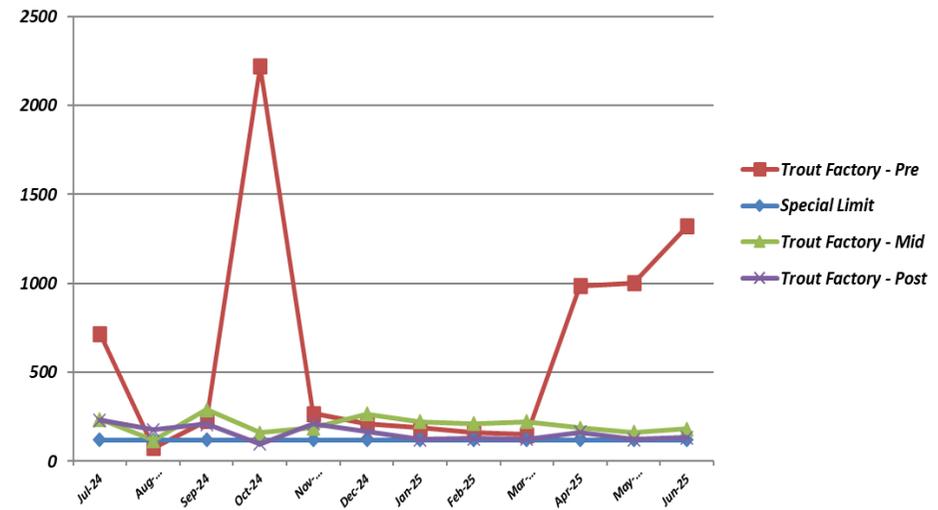




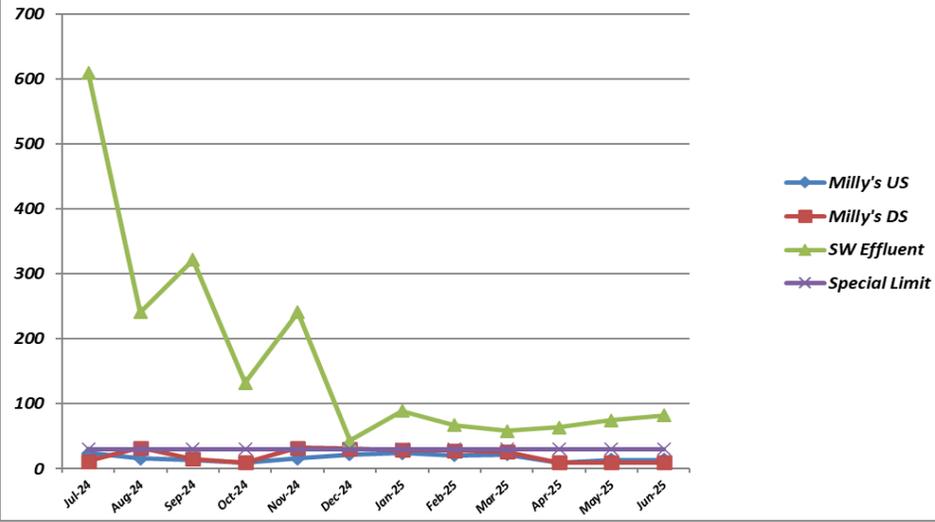
Electric Conductivity



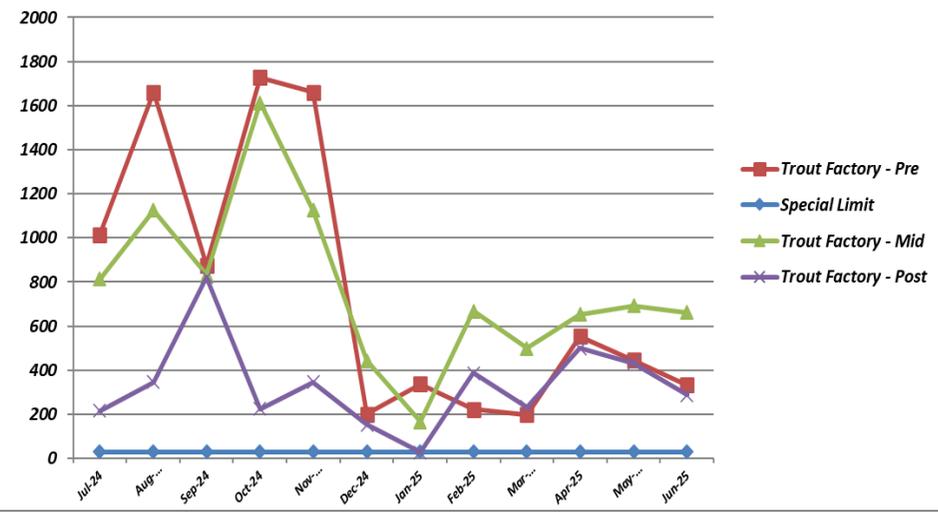
Electric Conductivity



Chemical oxygen demand

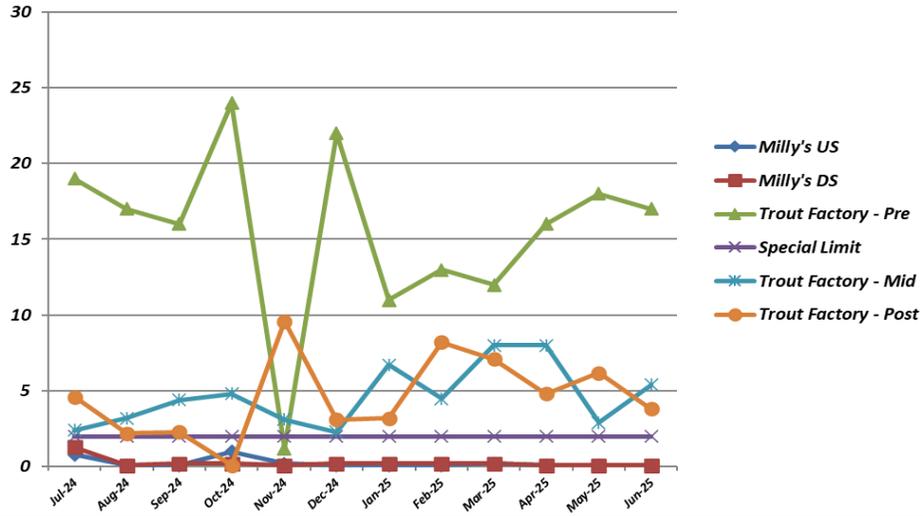


Chemical oxygen demand

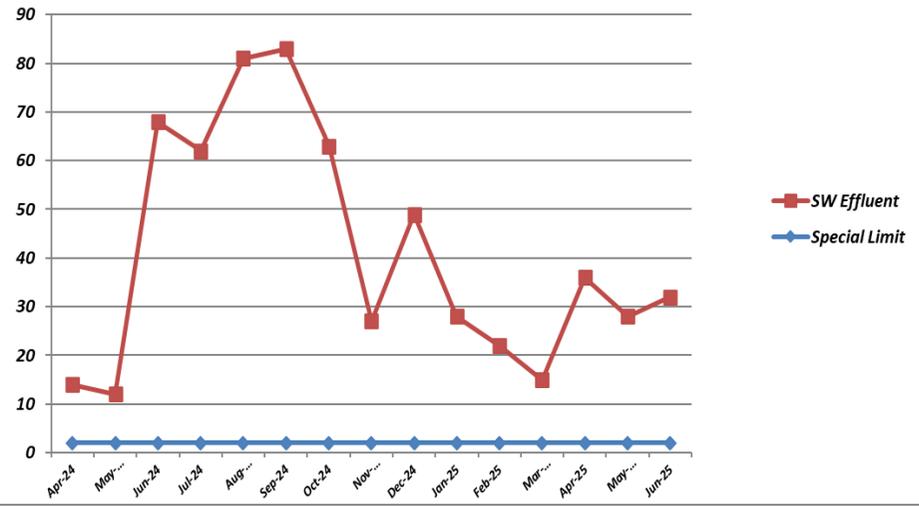




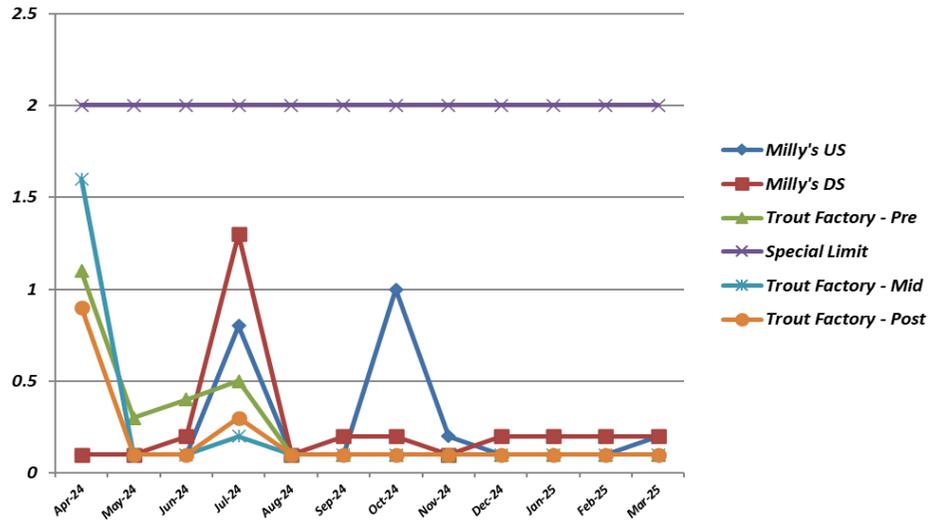
Ammonia



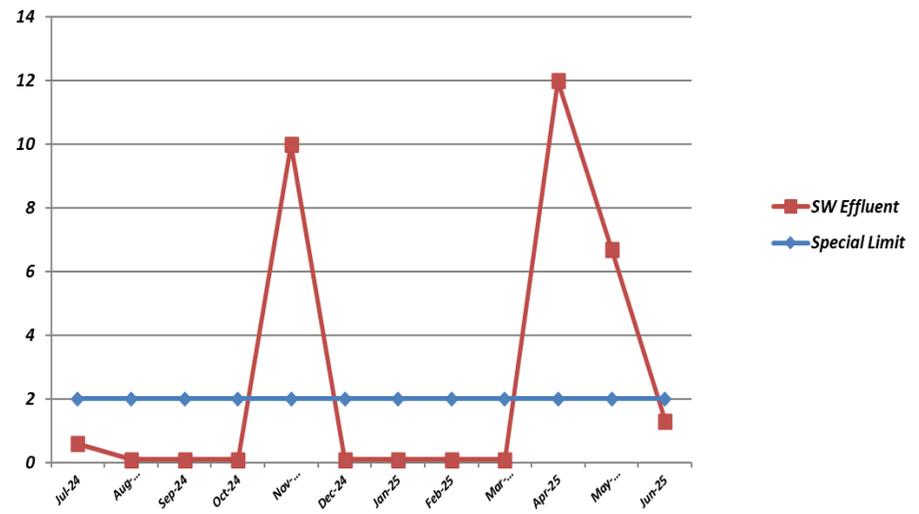
Ammonia

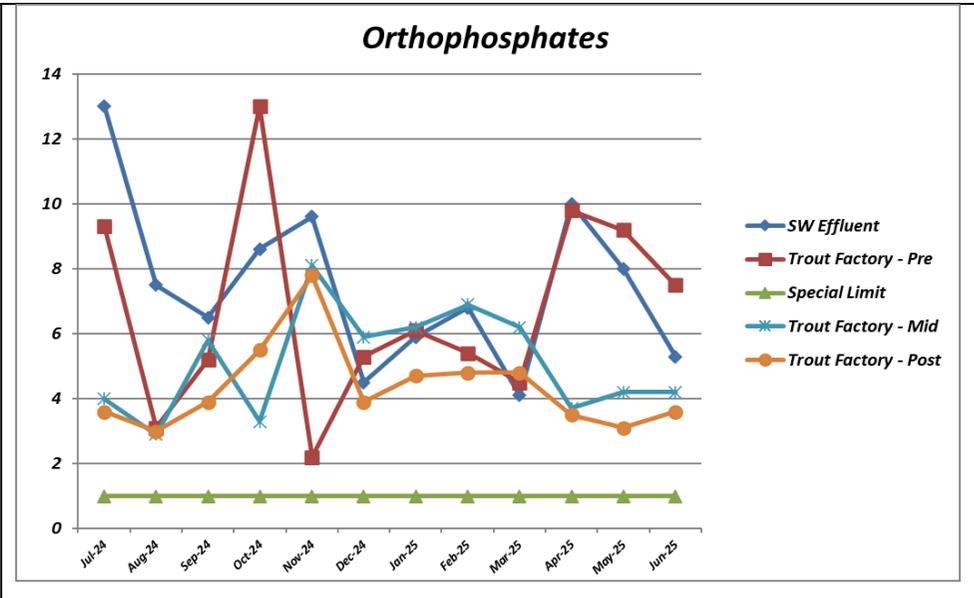
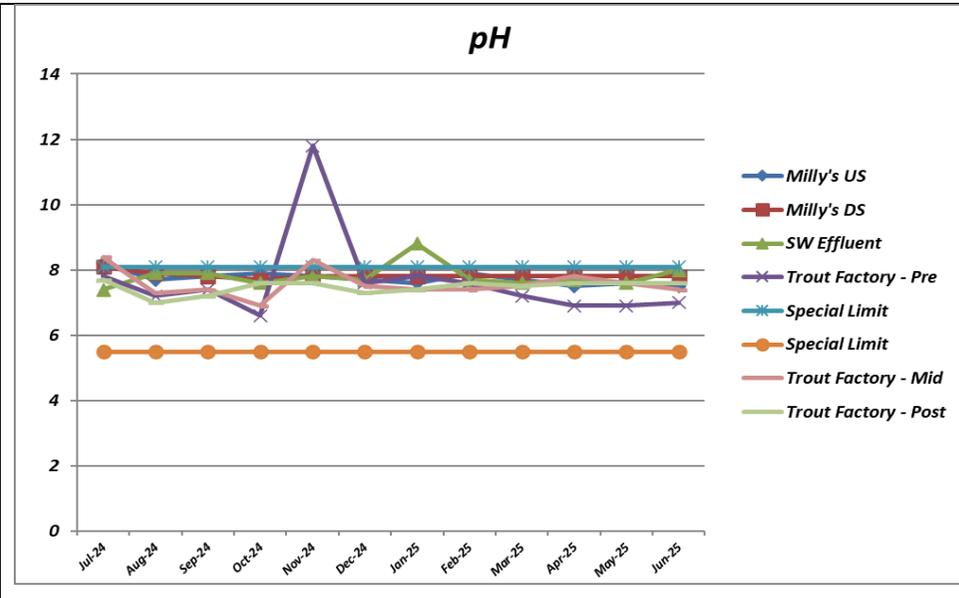


Nitrate



Nitrate







The graphs above are comparisons from July 2024 until June 2025. The current data trend indicates that overall, the water quality parameters at the SW effluent have gradually improved over the last three months with E.coli levels also returning to compliant levels during the last 2 quarters. The E.coli results have also significantly improved at the SW effluent with no traces being observed during the current quarter.

The current water quality results indicate that the Elands River sites remain largely compliant to the special limits apart from non-compliant E coli levels which have been observed on a monthly basis. The Trout-pre, Trout-mid and Trout-post sampling sites revealed that despite some high parameter levels obtained at the Trout pre sampling site these levels have significantly improved at the Trout-mid and Trout-post sampling sites.

4.2.3 MEAN ANNUAL RUNOFF (MAR)

The proposed results (GN 1248 of November 2017) for the Reserve determination and ecological categorisation for the Inkomati Catchment, where the Reserve is expressed as a percentage of the NMAR for the respective catchments (cumulative) in terms of section (16) (1) are tabulated below.

Table 4-5: Quantity component for the Rivers which includes the results of the EWR Sites and the biophysical nodes

Quaternary catchment	Water Resource	Ecological Reserve (%NMAR)	BHN Reserve (%NMAR)	Total Reserve (%NMAR)	NMAR (MCM)
X21F	Elands	35.50	0.17	35.67	50.80

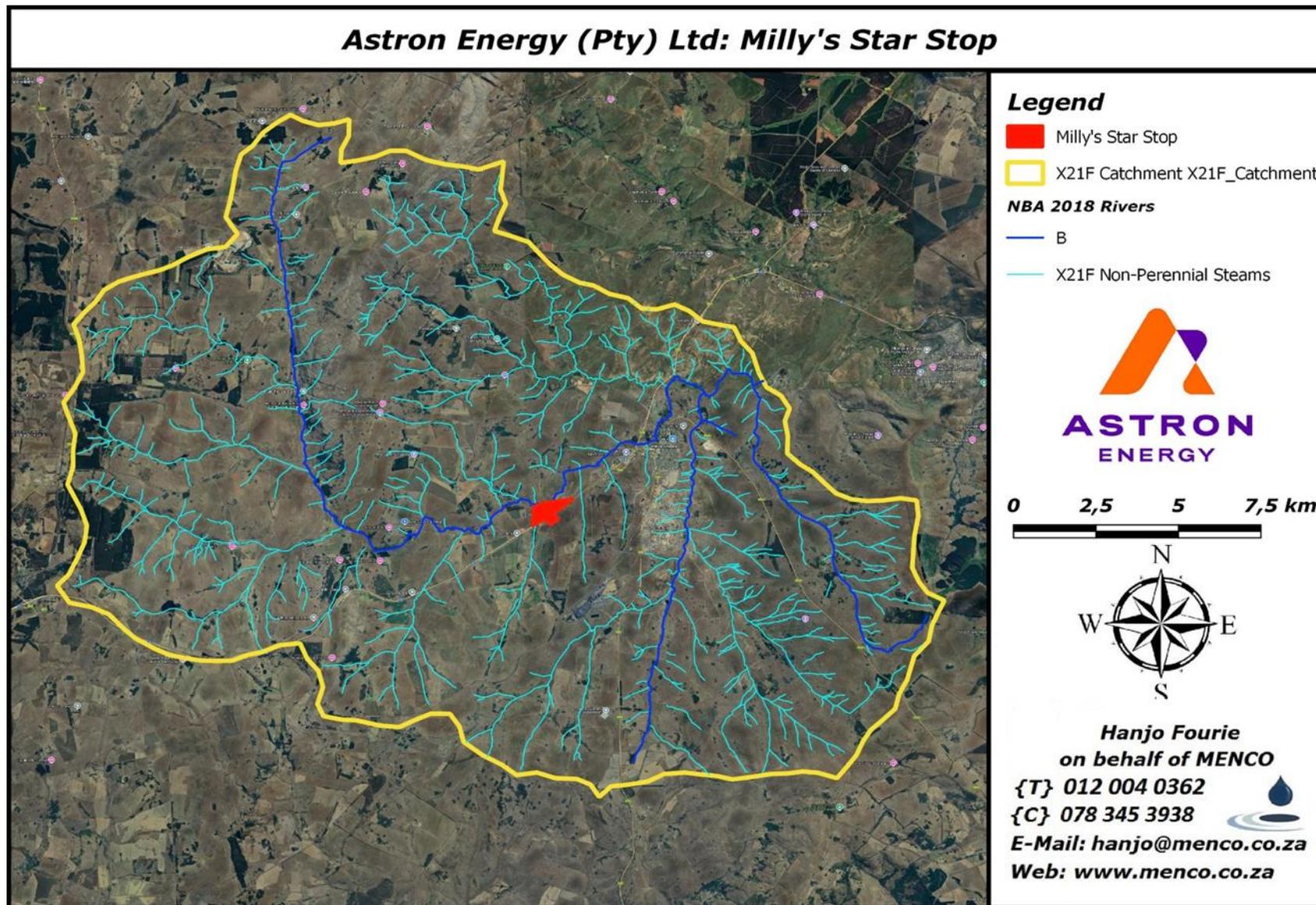


Figure 4-4: Surface Water Drainage Lines within the Relevant Quaternary Catchment



4.2.4 RESOURCE CLASS AND RIVER HEALTH, RQOs & RESERVE

The ecological status of a river refers to its overall condition of health, i.e. the totality of the features and characteristics of the river and its riparian areas, which manifests in its ability to support a natural array of species. This ability relates directly to the capacity of the system to provide a variety of goods and services. The information reported here refers to the area applicable to the license application and has been derived from the 2016 Ecstatus Report for the Elands River Catchment in the Inkomati-Usuthu Water Management Area.

The in-stream and riparian health for the Elands River near Machadodorp is moderately to largely modified (Category C to C/D). The greatest threat to river health in this region is sewage pollution from poorly maintained wastewater treatment works at Machadodorp and Waterval Boven. These facilities have critical compliance failures, resulting in high nutrient loads and excessive algal growth. Additional threats include invasive alien vegetation (particularly black wattle, eucalyptus, and weeping willow) in the riparian zone, commercial forestry activities, and over-abstraction during drought periods.

The Elands River in Quaternary Catchment X21F has been classified by the Department of Water and Sanitation as having a Present Ecological State (PES) of Class C, indicating a moderately modified river system. To ensure sustainability of this critically important river system and protect endemic fish species, urgent intervention is required to upgrade wastewater treatment infrastructure and manage invasive vegetation.

Table 4-6: RWQO for the relevant Quaternary Catchment

Catchment	River	PESC	EISC	REC
X21F	Elands River	Class C	High	Class C

4.2.5 SURFACE WATER USER SURVEY

Water requirements for the Inkomati-Usuthu WMA, as reported in 2016, show a total water availability of 1,029 million m³/annum against a deficit of 163 million m³/annum. The largest water user in the WMA is the irrigation sector, which represents 31% of total requirements (approximately 319 million m³/a). The ecological reserve accounts for 23% (237 million m³/a), while afforestation consumes 21% (216 million m³/a). Strategic water use represents 8% (82 million m³/a), cross-border obligations 6% (62 million m³/a), and domestic use 5% (51 million m³/a). The remainder is allocated to alien vegetation impacts at 3% (31 million m³/a), water transfers at 2% (21 million m³/a), and industrial use at 1% (10 million m³/a). This distribution reflects the WMA's critical role in supporting South Africa's agriculture, forestry, and energy sectors, particularly the coal-fired power stations in Mpumalanga Province.

4.2.6 SENSITIVE AREAS SURVEY & WETLAND DESCRIPTION

According to current assessments, the Greater Lakenvlei Protected Environment near eMakhazeni (Belfast) was expanded in September 2023, now covering 21,753 hectares across 98 properties. De Berg Nature Reserve, approximately 20 kilometres north of Dullstroom, was designated as South Africa's 30th Ramsar site in February 2024, representing the highest altitude wetlands in Mpumalanga.



No RAMSAR sites are located immediately at the project site; however, numerous local wetland areas surround the site and are ecologically significant.

The area is zoned for tourism industry development according to the Environmental Management Framework for the Emakhazeni Local Municipality. The Greater Lakenvlei Protected Environment protects endangered grassland habitats and two main water catchments – the Crocodile and the Olifants.

The Elands River remains an important and biologically diverse aquatic habitat. However, the conservation status of key fish species has changed significantly. The Incomati rock catlet (*Chiloglanis bifurcus*) is now classified as Critically Endangered by the IUCN and was recently rediscovered after being thought extinct for the past 20 years. A 2013 survey by Mpumalanga Tourism and Parks Authority showed drastic population decline, with the species sampled from only three of 56 biomonitoring sites. The Bushveld smallscale yellowfish (*Labeobarbus polylepis*) population continues to recover but has not reached historical levels. Continued conservation efforts are critical to protect these threatened species and maintain the ecological integrity of the Elands River system.

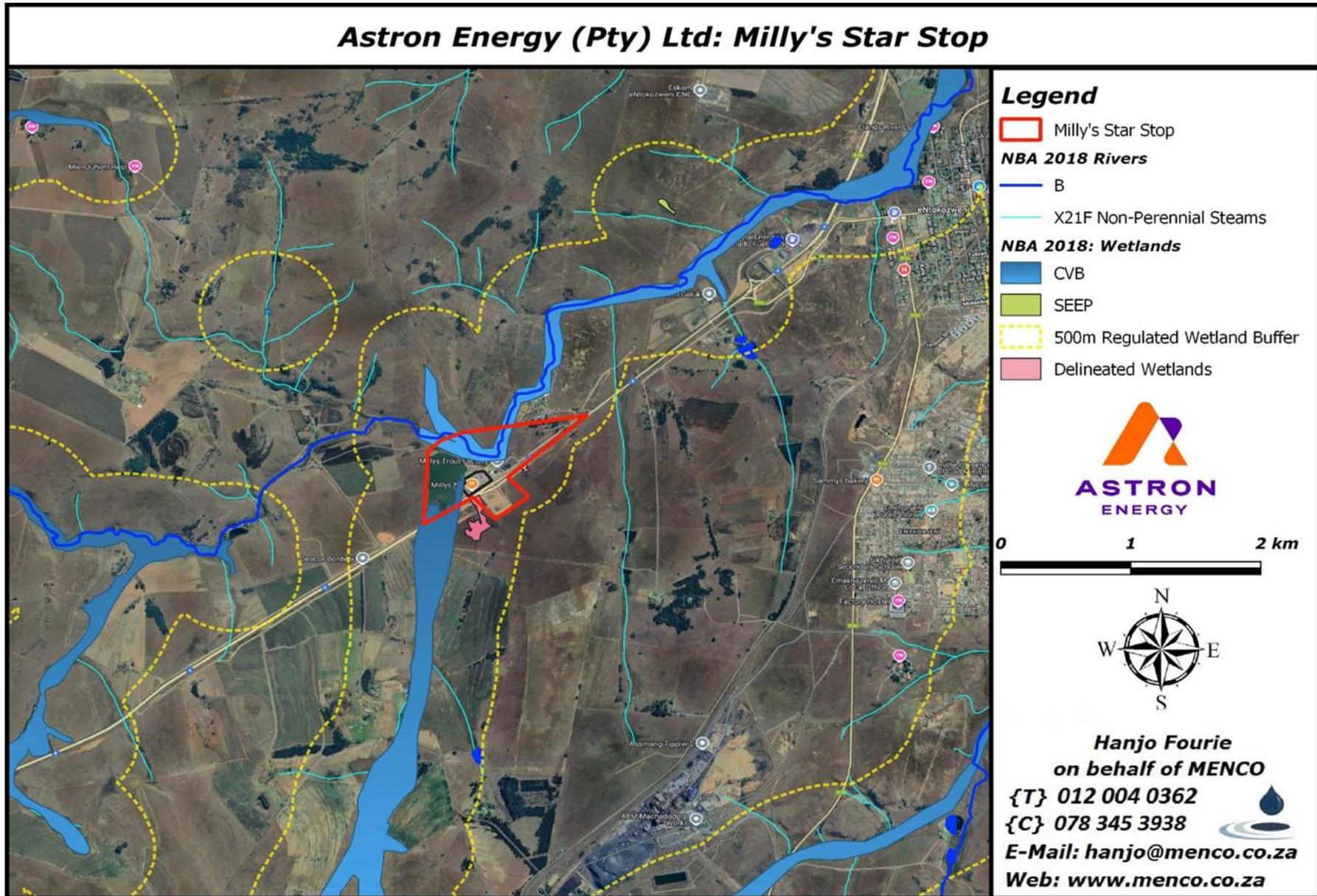


Figure 4-5: Surface Water Features in close proximity to the project site

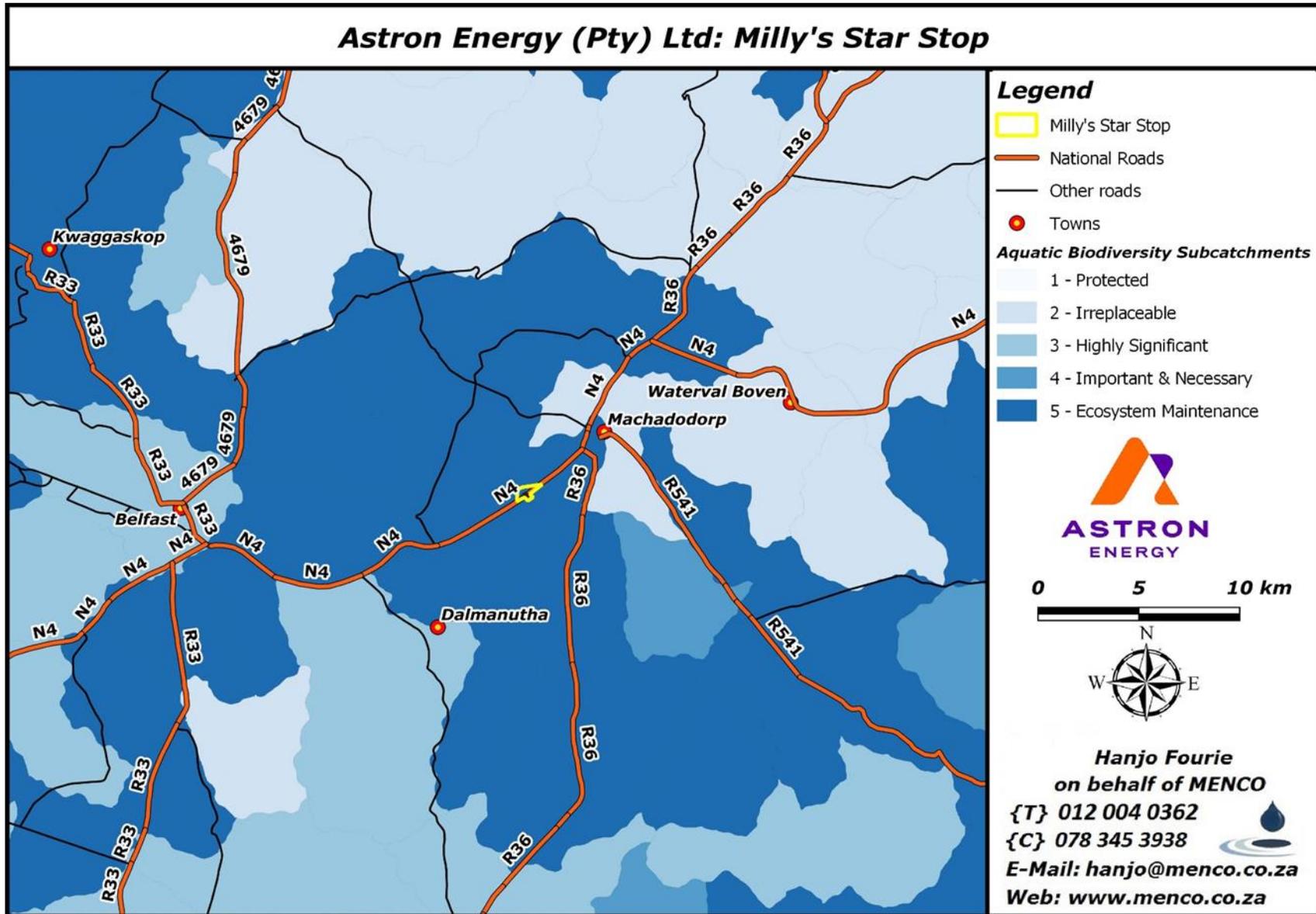


Figure 4-6: Aquatic Ecosystem Classification

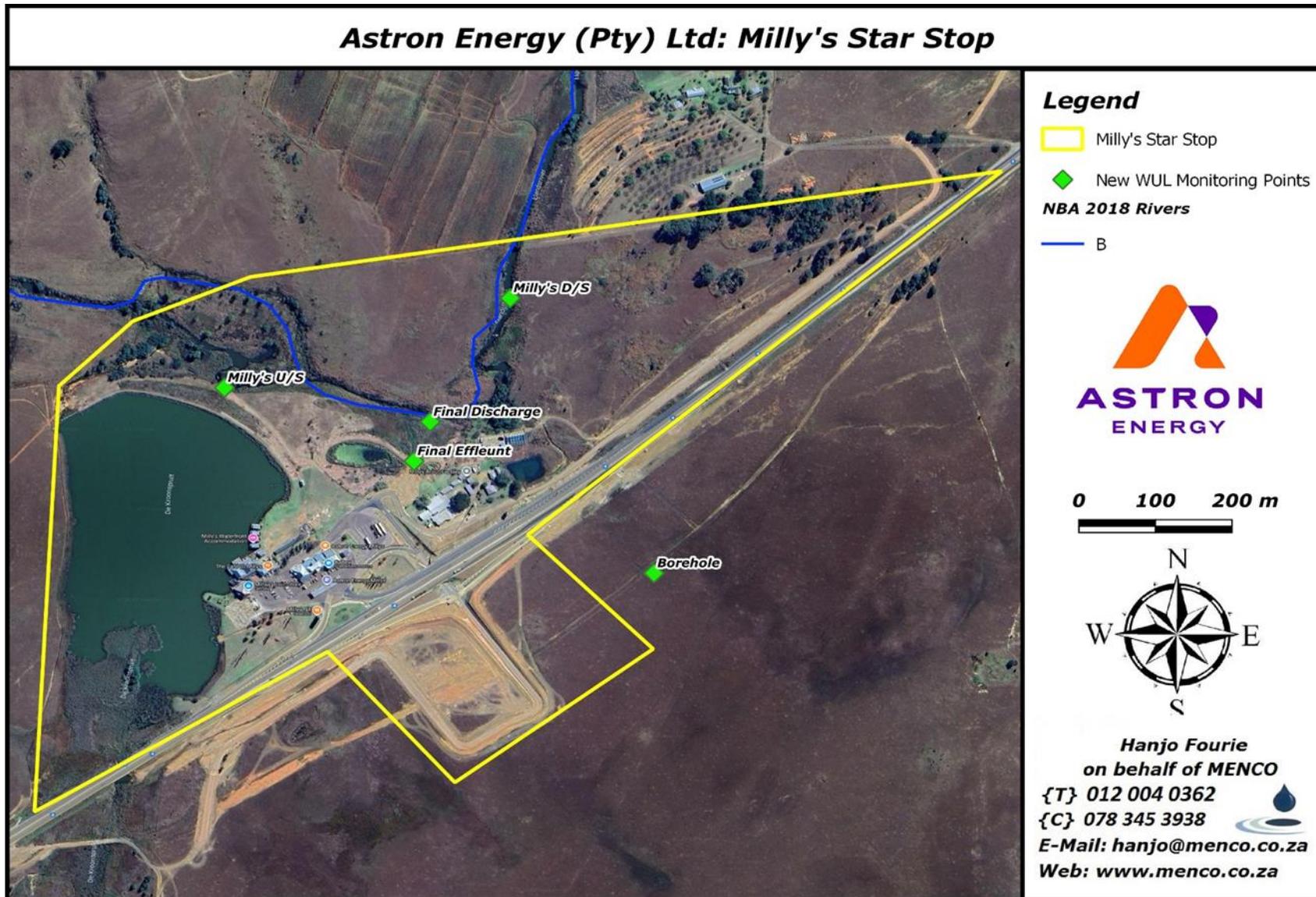


Figure 4-7: Surface Water Monitoring sites applicable to the study area



4.3 GROUNDWATER

4.3.1 AQUIFER CHARACTERISATION

The aquifer system underlying the proposed development is hosted within sedimentary rocks of the Silverton Formation of the Pretoria Group, Transvaal Supergroup. The geology is dominated by shale with subordinate mudstone, which generally exhibits low primary porosity. As a result, groundwater occurrence within the study area is controlled predominantly by secondary features such as weathering, fracturing, and lithological contacts.

Based on drilling records and borehole logs, two main hydrogeological units were identified. The upper unit comprises a shallow weathered zone extending to depths of approximately 15 to 20 m below ground level. This zone consists of fine-grained, weathered shale material and is laterally discontinuous. Minor groundwater strikes were encountered within this unit; however, the yields were low and not considered sufficient to support sustainable abstraction. The weathered zone therefore does not constitute a reliable aquifer and is expected to contribute limited groundwater storage.

The primary aquifer unit is associated with fractured bedrock and contact zones between shale and intrusive diabase. Significant groundwater strikes were encountered at depths of approximately 30 m and 49 m below ground level, particularly at the shale–diabase contact. Groundwater is stored and transmitted through fracture networks within the otherwise low-permeability bedrock. The aquifer is therefore classified as an intergranular and fractured aquifer with low to moderate yields.

Aquifer test results indicate moderate transmissivity and low storativity, which is characteristic of fractured rock aquifers. Groundwater abstraction sustainability is dependent on maintaining sufficient saturated thickness within the fractured zones. Excessive abstraction may result in fracture dewatering and a corresponding reduction in borehole yield. For this reason, abstraction from the aquifer requires careful management and ongoing monitoring to prevent long-term impacts.

Table 4-7: Ratings – Aquifer System Management and Second Variable Classifications

Aquifer System Management Classification		
Class	Points	Study Area
Sole Source Aquifer System:	6	
Major Aquifer System:	4	
Minor Aquifer System:	2	2
Non-Aquifer System:	0	
Special Aquifer System:	0 - 6	
Second Variable Classification (Weathering/Fracturing)		
Class	Points	Study Area
High:	3	
Medium:	2	2
Low:	1	



Table 4-8: Ratings - Groundwater Quality Management (GQM) Classification System

Aquifer System Management Classification		
Class	Points	Study Area
Sole Source Aquifer System:	6	
Major Aquifer System:	4	
Minor Aquifer System:	2	2
Non-Aquifer System:	0	
Special Aquifer System:	0 - 6	
Second Variable Classification (Weathering/Fracturing)		
Class	Points	Study Area
High:	3	
Medium:	2	2
Low:	1	

As part of the aquifer classification, a Groundwater Quality Management (GQM) Index is used to define the level of groundwater protection required. The GQM Index is obtained by multiplying the rating of the aquifer system management and the aquifer vulnerability. The GQM index for the study area is presented in Table 4-9.

The level of groundwater protection based on the Groundwater Quality Management Classification:

$$\begin{aligned} \text{GQM Index} &= \text{Aquifer System Management} \times \text{Aquifer Vulnerability} \\ &= 2 \times 2 = 4 \end{aligned}$$

Table 4-9: GQM Index for the Study Area

GQM Index	Level of Protection	Study Area
<1	Limited	
1 - 3	Low Level	
3 - 6	Medium Level	4
6 - 10	High Level	
>10	Strictly non-degradation	

Minor aquifers may not yield large volumes of sustainable flow but is potentially important for local supply and baseflow contribution to rivers. For this reason, this aquifer should be protected against over-abstraction and contamination.

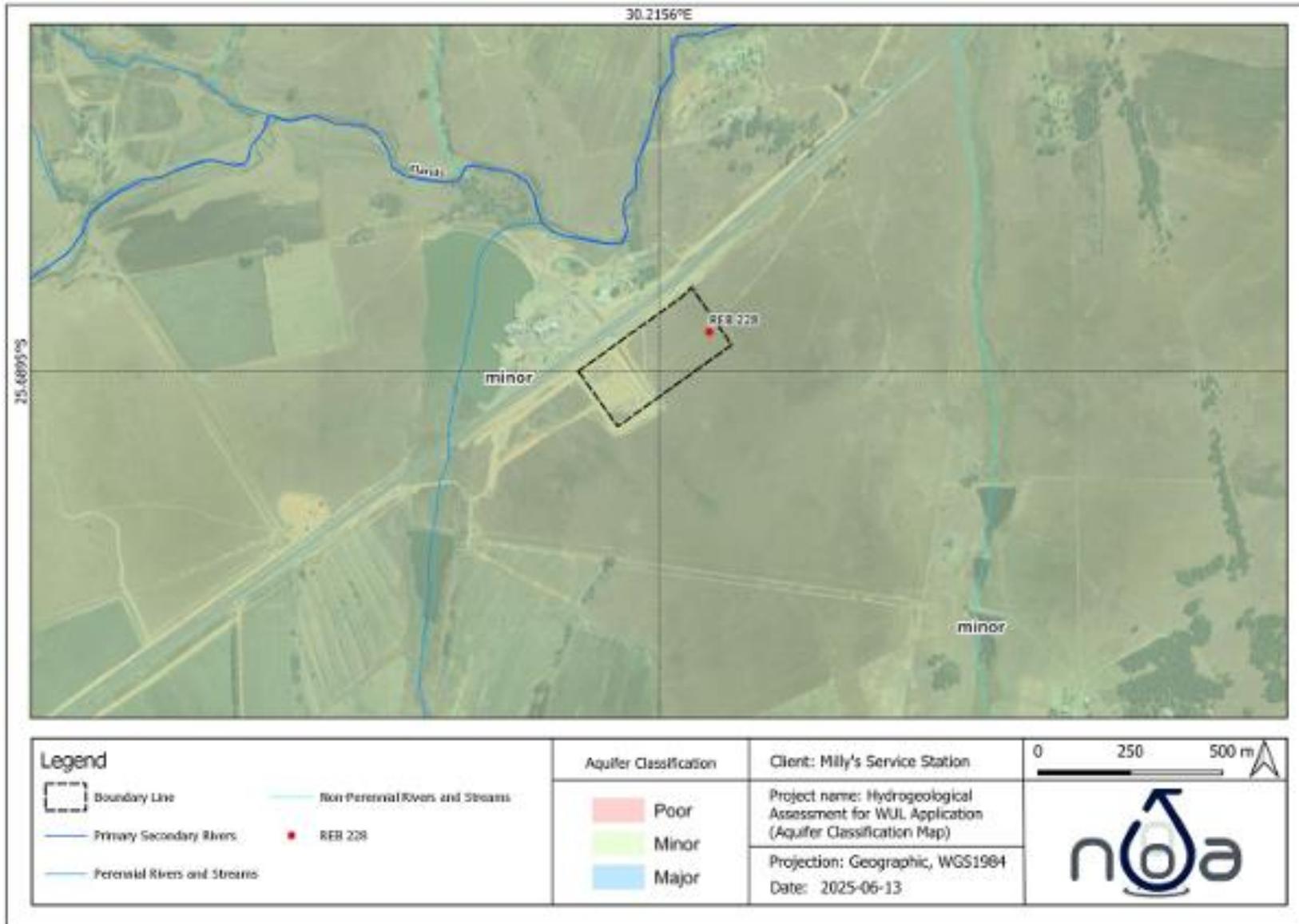


Figure 4-8: Aquifer Classification Map of South Africa



4.3.2 AQUIFER SENSITIVITY

Aquifer sensitivity within the study area was assessed using the national Aquifer Vulnerability Map of South Africa, based on the Borehole Prospects mapping by Vegter. According to this classification, the aquifer underlying the proposed development falls within a moderately vulnerable category.

This classification indicates that the aquifer is susceptible to contamination under conditions of continuous or prolonged pollutant loading, rather than from isolated or short-term incidents. The moderate vulnerability reflects the fractured nature of the aquifer, combined with relatively shallow groundwater levels in parts of the area. While the presence of weathered material in the upper profile provides some degree of natural protection, it is not sufficient to fully prevent the downward migration of contaminants over time.

The aquifer vulnerability rating was used together with the aquifer system classification to determine the Groundwater Quality Management (GQM) Index. The aquifer was classified as a minor aquifer system with a medium vulnerability rating, resulting in a GQM Index of 4. This corresponds to a medium level of groundwater protection, indicating that groundwater resources should be protected against contamination and that appropriate management and monitoring measures are required.

Given the moderate vulnerability of the aquifer, activities with pollution potential should be carefully controlled, and preventative measures should be implemented to minimise the risk of groundwater contamination (refer to Figure 4-10).

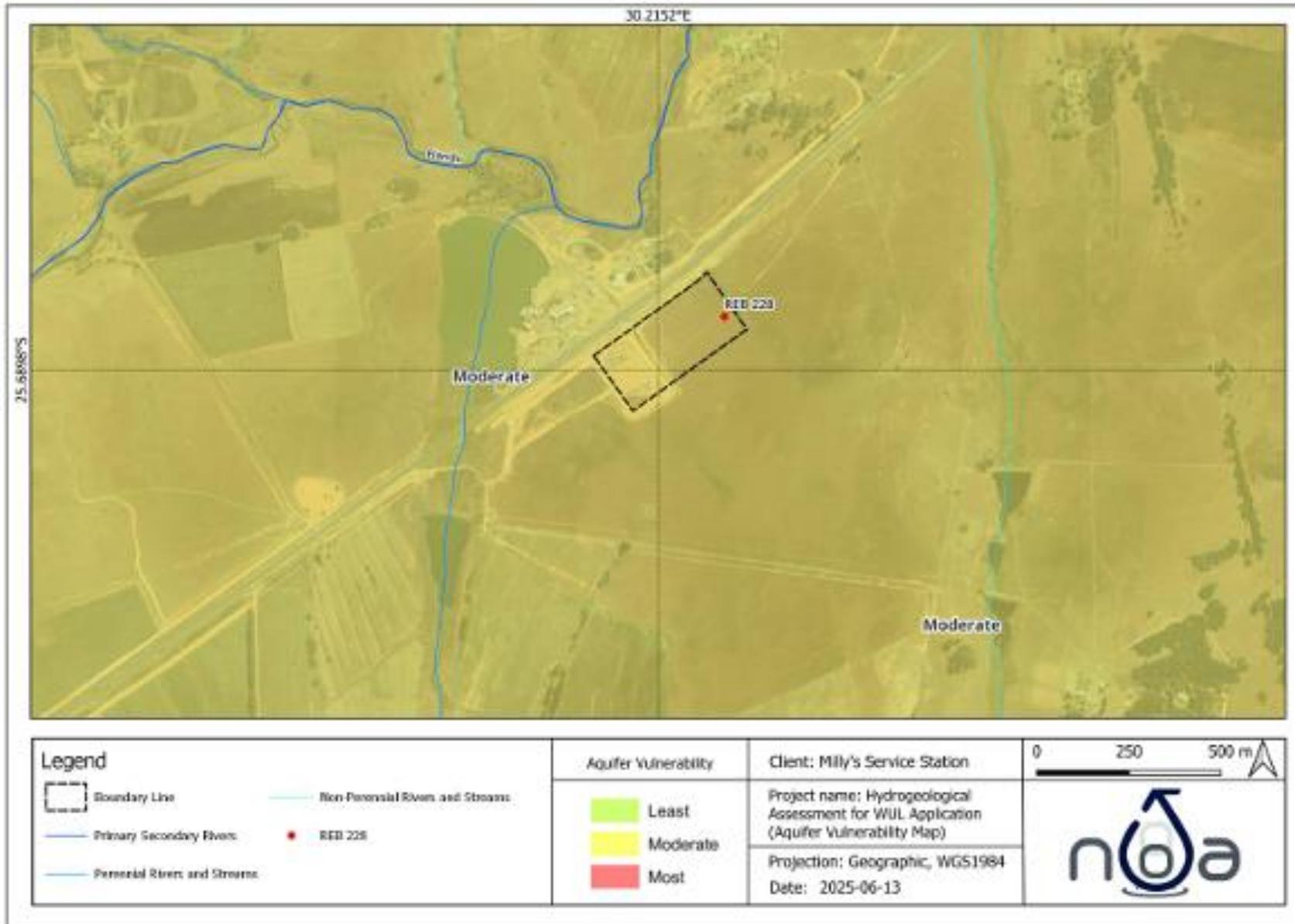


Figure 4-9: Aquifer Vulnerability Map of South Africa



Figure 4-10: Aquifer Vulnerability Map of South Africa

4.3.3 GROUNDWATER QUALITY

Groundwater quality within the study area is generally good and suitable for domestic and agricultural use, subject to appropriate treatment. Analytical results indicate circum-neutral pH values and low electrical conductivity, reflecting low salinity conditions. Major ions occur at low concentrations and comply with applicable drinking water, irrigation, and livestock watering guidelines.

All determinands complied with SANS 241 drinking water standards, with the exception of microbiological indicators, which exceeded guideline limits in at least one sample. This suggests potential surface influence or borehole sanitation issues and indicates that treatment is required prior to human consumption.

No petroleum-related contaminants were detected at the time of sampling. These results provide a baseline against which future groundwater quality monitoring can be assessed. Given the proposed land use, ongoing monitoring for hydrocarbons and volatile organic compounds is recommended to ensure early detection of any potential contamination.



Table 4-10: Groundwater Quality data for M20A quaternary catchment (DWA 2009)

Sample ID / Parameter	Unit	SANS 241	DWS Irrigation 1996	DWS Livestock	MBH01 (04/06/2025)	REG 228 (11/06/2025)
pH	pH	<5 & >9.7	<6.5 & >8.4	NG	7.8	7.24
EC	mS/m	170	40	NG	22.6	9.70
TDS	mg/l	1200	NG	<1000	141	72
Total Alkalinity	CaCO ₃	NG	NG	NG	90	40
Chloride	mg/l Cl	300	100	<1500	4.6	2.28
Sulphate	mg/l SO ₄	500	NG	<1000	<2	<2
Fluoride	mg/l F	<1.5	NG	NG	0.28	0.09
Nitrate as N	mg/l N	11	5	100	<0.5	<0.5
Free Ammonia as N	mg/l N	1.5	NG	NG	<0.02	0.28
Phosphate	mg/l PO ₄	NG	NG	NG	<0.20	<0.2
Calcium	mg/l Ca	NG	NG	<1000	17.31	5.10
Magnesium	mg/l Mg	NG	NG	<500	10.45	6.14
Sodium	mg/l Na	<200	70	<2000	9.87	5.37
Potassium	mg/l K	NG	NG	NG	0.56	0.51
Iron	mg/l Fe	2	5	<10	<0.05	0.06
Manganese	mg/l Mn	0.4	0.02	<10	<0.05	<0.05
Zinc	mg/l Zn	5	NG	NG	<0.05	0.09
E. coli	colonies/100ml	0	1	NG	30	0
Total Coliform	colonies/100ml	<10	NG	NG	190	9
Total Plate Count	colonies/ml	NG	NG	NG	17	17



4.3.4 HYDRO-CENSUS

A hydro-census was undertaken within a one-kilometre radius of the proposed abstraction borehole to identify existing groundwater users, groundwater-dependent receptors, and surface water features that could be influenced by abstraction. The survey confirmed that groundwater use in the surrounding area is limited, with only one operational borehole identified within the assessment radius. This borehole is used for domestic and irrigation purposes and represents a potential receptor to abstraction-related drawdown.

The surrounding land use is predominantly agricultural, consisting of grazing land and cultivated fields. Groundwater abstraction in the area is therefore primarily associated with household supply and small-scale irrigation. No evidence of intensive groundwater exploitation was observed, and database searches confirmed the absence of registered high-volume groundwater users in the immediate vicinity.

Several surface water features, including farm dams and tributaries linked to the Elands River system, were identified. These features may receive baseflow contributions from groundwater, particularly during dry periods. In addition, a hillslope seep wetland located within approximately 100 m of the abstraction borehole was identified as a sensitive groundwater-dependent ecosystem. This feature represents a key ecological receptor that could be affected by excessive drawdown.

The hydro-census findings indicate that while regional groundwater use is limited, localised impacts on nearby users and groundwater-dependent features could occur if abstraction is not carefully managed.



Table 4-11: Hydrocensus Details

BH ID	Coordinates		Z mamsl	Water Level (mbgl)	Water Level Elevation	Depth (m)	Pump Type	Casing Type	Water Use	Comments	Sampled
	Latitude	Longitude		Static	(mamsl)			Steel/uPVC			
MBH01	-25.68170	30.217909	1560.00	NM	NM	40	Submersible	Steel	Domestic Irrigation	Borehole sealed	Yes
REB 228	-25.68855	30.216990	1588.00	4.14	1583.86	56	Not equipped	Steel	Not in use	Borehole sealed with cap. Not equipped	Yes

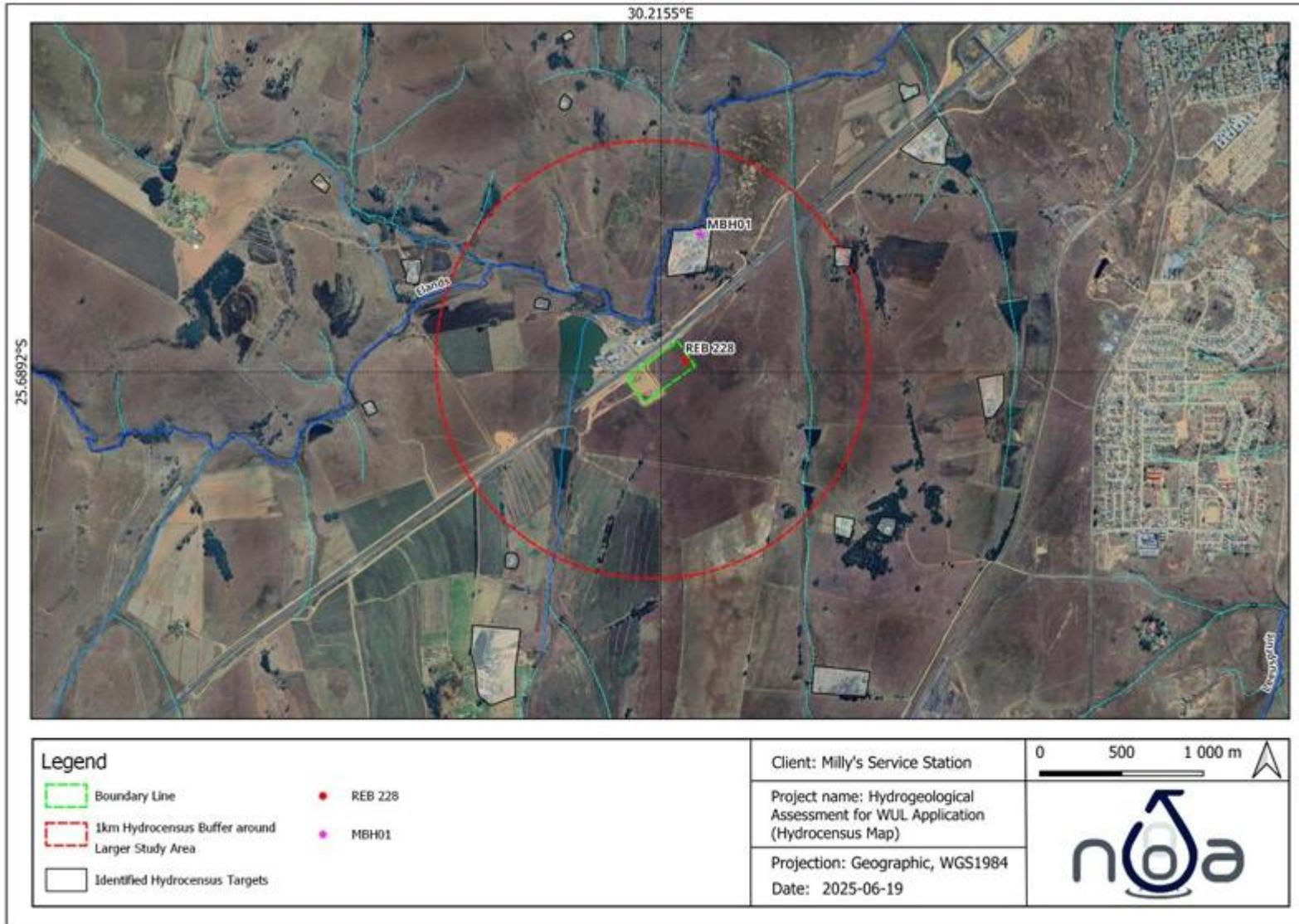


Figure 4-11: Hydrocensus Borehole Map



4.3.5 POTENTIAL POLLUTION SOURCE IDENTIFICATION

Potential sources of groundwater contamination within the study area were identified based on existing land use and the nature of the proposed development. The primary potential pollution risk is associated with fuel storage, handling, and dispensing activities linked to the proposed service station. Accidental fuel spills or leaks represent a potential source of hydrocarbon contamination if not adequately managed.

Secondary potential sources include general operational activities associated with the service station, as well as surrounding agricultural land uses. Agricultural activities may contribute diffuse inputs such as nutrients or microbiological contaminants, although no evidence of groundwater degradation was identified at the time of assessment.

The fractured nature of the underlying aquifer increases the importance of preventative management, as once contaminants enter the subsurface they may be difficult to remediate. For this reason, the identification and control of potential pollution sources is considered an important component of groundwater protection, supported by routine groundwater quality monitoring.

4.4 SOCIO-ECONOMIC ENVIRONMENT

This section describes the socio-economic environment within which Milly's Star Stop operates, with reference to the Emakhazeni Local Municipality Integrated Development Plan (IDP) 2022–2027 (2025/26 Review). The discussion focuses on population dynamics, economic structure, employment, education, tourism, and development priorities relevant to environmental planning and sustainable resource management.

4.4.1 MUNICIPAL CONTEXT AND POPULATION PROFILE

Milly's Star Stop is located within the jurisdiction of the Emakhazeni Local Municipality (MP314), which forms part of the Nkangala District Municipality in Mpumalanga Province. The municipality encompasses the towns of eNtokozweni (Machadodorp), Belfast (eMakhazeni), Dullstroom, and Emgwenya (Waterval Boven), together with extensive rural areas.

According to the IDP:

- The municipality has an estimated population of approximately 50 000 people, with slow to moderate population growth.
- The population is characterised by a large working-age cohort, creating ongoing demand for employment opportunities and service-sector growth.
- Settlement patterns are mixed, comprising urban nodes, peri-urban settlements, and dispersed rural households.

The IDP identifies service accessibility, economic participation, and sustainable infrastructure development as key priorities in addressing socio-economic challenges within the municipal area.



4.4.2 LOCAL ECONOMY AND ECONOMIC STRUCTURE

The Emakhazeni Local Municipality economy is diversified but remains heavily influenced by primary and service-based sectors. The IDP identifies the following as dominant contributors to the local economy:

- Mining and quarrying, historically significant within the municipality;
- Transport and logistics, supported by the N4 Maputo Corridor;
- Trade, catering and accommodation, particularly along major transport routes;
- Agriculture, including livestock farming and crop production;
- Tourism, centred on Dullstroom, fly-fishing, nature-based tourism and scenic landscapes.

The municipality's strategic location along the N4 national route positions service stations, hospitality facilities, and logistics-related activities as important economic drivers. The IDP explicitly recognises the role of roadside commercial developments in supporting tourism, freight movement, and local economic resilience.

Milly's Star Stop functions within this context as a key commercial and service node, providing fuel retail, food services, accommodation, and tourism-related retail offerings.

4.4.3 EMPLOYMENT AND LIVELIHOODS

Unemployment remains a significant socio-economic challenge within Emakhazeni, consistent with trends across the Nkangala District and Mpumalanga Province. The IDP highlights:

- High unemployment levels, particularly among youth and unskilled workers;
- A reliance on seasonal employment in agriculture, tourism, and service industries;
- Limited local access to high-skill employment opportunities.

Service-sector operations such as Milly's Star Stop contribute to local livelihoods by:

- Providing direct employment across retail, hospitality, maintenance and operations;
- Supporting indirect employment through suppliers, service providers, and tourism-related activities;
- Enhancing economic activity along the N4 corridor.

From a water and waste management perspective, sustained operation of such facilities supports municipal objectives for economic participation without introducing high-impact industrial pressures.



4.4.4 EDUCATION, SKILLS AND HUMAN CAPITAL

The IDP identifies education and skills development as critical enablers of long-term socio-economic upliftment. Key characteristics include:

- High levels of basic education participation, with most residents having access to primary and secondary schooling;
- Lower levels of tertiary education and specialised technical skills, which limits local access to skilled employment opportunities;
- Ongoing municipal focus on skills development programmes aligned to tourism, agriculture, and service-sector needs.

The operational nature of Milly's Star Stop aligns with the prevailing skills profile of the local labour market, offering employment opportunities that do not require highly specialised qualifications while still supporting skills transfer and on-the-job training.

4.4.5 TOURISM AND SPATIAL DEVELOPMENT

Tourism is identified in the IDP as a priority economic growth sector, particularly in the northern and western parts of the municipality. Dullstroom and surrounding areas attract visitors for:

- Fly-fishing and trout-related tourism;
- Nature-based recreation;
- Hospitality and scenic stopover services.

Milly's Star Stop plays an important supporting role in this tourism economy by:

- Acting as a gateway and stopover point for tourists travelling along the N4;
- Providing food, fuel, accommodation, and retail services;
- Supporting the broader tourism value chain identified in the IDP.

The IDP emphasises that sustainable management of environmental resources particularly water resources is essential to maintaining the tourism appeal and ecological integrity of the area.

4.4.6 MUNICIPAL DEVELOPMENT PRIORITIES AND ENVIRONMENTAL LINKAGES

The Emakhazeni IDP highlights several development priorities that are directly relevant to the IWWMP, including:

- Protection of water resources and wetlands;
- Improved wastewater treatment and effluent management;
- Sustainable infrastructure development aligned with environmental constraints;
- Promotion of economic growth without compromising ecological systems.

The preparation and implementation of this IWWMP for Milly's Star Stop directly support these objectives by ensuring that water use, wastewater discharge, and waste management are undertaken in a manner that safeguards the Elands River system and surrounding ecological resources.



5 ANALYSES AND CHARACTERISATION OF ACTIVITY

This section presents a detailed analysis and characterisation of activities undertaken at Milly's Star Stop that may influence water resources and waste generation. The assessment considers the spatial extent of activities, water and waste streams, operational management practices, monitoring systems, and associated risks. The purpose of this section is to provide a clear understanding of how the activity interacts with the receiving environment and to inform the management measures described in later sections of this IWWMP.

5.1 SITE DELINEATION FOR CHARACTERISATION

For the purposes of this IWWMP, the site delineation includes all areas within Milly's Star Stop where activities have the potential to interact with surface water, groundwater, wetlands, or stormwater systems. This includes the Astron service station, restaurant and retail facilities, accommodation units, trout-processing plant, wastewater treatment works (WWTW), De Kroon Dam, internal access roads, parking areas, and stormwater infrastructure.

The delineation further extends to the immediate receiving environment, including the De Kroon Spruit, associated wetlands, and the Elands River downstream of the effluent discharge point. These areas were included to ensure that both direct and indirect impacts of the activity are adequately characterised and managed.

5.2 WATER AND WASTE MANAGEMENT

5.2.1 PROCESS WATER

Process water is required to support the trout-processing facility, food preparation areas, cleaning operations, and general operational requirements across the site. Water is supplied through authorised abstraction and storage infrastructure, including the De Kroon Dam.

Process water use is characterised by variable demand, with higher usage during peak tourism periods and increased processing throughput. All process water that becomes wastewater is directed to the on-site WWTW for treatment. Measures to improve water use efficiency are progressively implemented to minimise abstraction volumes and reduce wastewater generation.

5.2.2 STORMWATER

Stormwater is generated from roofs, paved areas, parking surfaces, access roads, and the fuel forecourt. Stormwater management infrastructure is designed to convey clean runoff separately from contaminated areas and to prevent the ingress of stormwater into the wastewater system.

At the Astron service station, hydrocarbon interceptors and controlled drainage systems are used to reduce the risk of petroleum contamination. Stormwater infrastructure is maintained to ensure effective flow control, erosion prevention, and protection of downstream watercourses.



5.2.3 GROUNDWATER

Groundwater is utilised as part of the site's authorised water supply and occurs within a fractured secondary aquifer of moderate yield. Although groundwater interaction is limited by extensive hardstand surfaces and engineered infrastructure, protection of the aquifer remains a key consideration.

Potential risks to groundwater include accidental spills, infiltration from stormwater systems, or infrastructure failure. These risks are mitigated through sealed surfaces, bunding, controlled drainage, and routine inspection and maintenance.

5.2.4 SOLID WASTE

Solid waste generated at Milly's Star Stop includes general refuse from hospitality and retail operations, food waste, packaging materials, and sludge produced by the WWTW. Waste is stored temporarily in designated areas and removed by licensed service providers for disposal at authorised facilities.

Sludge from the WWTW is managed as a controlled waste stream and removed at appropriate intervals to prevent accumulation or secondary pollution. Waste management practices are aligned with applicable waste legislation and Astron Energy procedures.

5.3 OPERATIONAL MANAGEMENT

5.3.1 ORGANISATIONAL STRUCTURE

Environmental and water management responsibilities at Milly's Star Stop are defined within Astron Energy's operational structure. Overall accountability lies with Astron Energy, supported by site management, specialist wastewater contractors, and environmental consultants. Clear reporting lines ensure that operational issues, non-compliances, and incidents are addressed promptly.

5.3.2 RESOURCES AND COMPETENCIES

Astron Energy (Pty) Ltd, drives its South African operations with extensive resources and specialized competencies, positioning it as a leading downstream petroleum player. Its key assets include the Milnerton Refinery (100,000 barrels/day), the Durban Lubricants Plant, 15 distribution terminals, and over 850 service stations under rebranding from Caltex to Astron Energy. Backed by R6 billion in investments for Clean Fuels II compliance by 2027, the company ensures fuel security and economic impact, supporting industries like mining, aviation, and agriculture with premium products like Quartech™ fuels and Jet A1. Core competencies include operational efficiency, technical expertise in low-sulphur fuel production, a diverse workforce (86% black, Level 1 B-BBEE), sector-specific solutions, and sustainability initiatives focused on cleaner fuels and STEAM education. These strengths enable Astron Energy to navigate market challenges, pursue growth, and aim to become South Africa's top fuel brand while fostering transformation and environmental stewardship. Therefore, appropriate human, technical, and financial resources are allocated to support effective water and waste management. This includes trained site personnel, specialist wastewater treatment service providers, and access to environmental expertise. The



allocation of resources ensures that infrastructure is maintained, monitored, and operated in accordance with licence conditions.

5.3.3 EDUCATION AND TRAINING

Astron Energy is dedicated to enhancing the skill level of all staff and in particular, the personal development of previously disadvantaged individuals. On-the-job training and successive training is in order for employees to be able to grow and be able to be eligible for promotions in the company.

Astron Energy is committed to the upliftment of previously disadvantaged members within the local community. Education and training programmes are implemented to ensure that personnel are competent in environmental management practices relevant to their roles. Training includes wastewater system operation, spill response, waste handling, and awareness of Water Use Licence obligations. Refresher training is provided as required and when operational changes occur.

5.3.4 INTERNAL AND EXTERNAL COMMUNICATION

Astron Energy will strive to ensure that all employees are made aware of water issues. With regards to external communication, Astron Energy will ensure that they timeously respond to any complaints or issues brought to their attention.

5.3.5 AWARENESS RAISING

Astron Energy (Pty) Ltd, as the successor to Chevron South Africa following its 2018 acquisition by Glencore, continues and builds upon a legacy of health awareness-raising initiatives aimed at promoting community well-being, disease prevention, and sustainable resource use in South Africa. These efforts align with the company's broader corporate social investment strategy, focusing on vulnerable populations, employee health, and environmental stewardship. By addressing critical issues such as HIV/AIDS, gender-based violence, poverty, and water conservation, Astron Energy fosters healthier communities and empowers individuals through education, partnerships, and internal programs.

Key Health Awareness Raising Initiatives

Community Support for Vulnerable Children:

Amy Biehl Foundation (now Amy Foundation): Astron Energy, through its Chevron legacy, supports this foundation, which assists over 2,000 children from impoverished communities in the Western Cape with after-school programs. These activities help participants navigate negative influences such as HIV/AIDS, poverty, gangs, violence, and crime, promoting resilience and healthier lifestyles through education and cultural engagement. The foundation's work continues to align with Astron Energy's focus on youth development and community empowerment.

Women's Empowerment and HIV/Gender Equity Programs:

Intervention with Microfinance for AIDS & Gender Equity (IMAGE): Building on Chevron's support, Astron Energy contributes to this community-centered program, which integrates microfinancing with the "Sisters for Life" gender and HIV training curriculum. The initiative aims to enhance



women's economic independence, decrease susceptibility to HIV and gender-based violence, and encourage community mobilization on shared health concerns. In South Africa, IMAGE has empowered women through financial tools and awareness training, fostering robust discussions on HIV prevention and gender equity.

Employee Health and HIV/AIDS Awareness:

HIV/AIDS Awareness Program: Astron Energy's employee program, inherited and adapted from Chevron South Africa, educates workers on maintaining personal and family health. It emphasizes voluntary HIV testing, counselling, and strategies to prevent transmission. As part of Glencore's global standards, this includes voluntary counselling, testing, and awareness campaigns, with a focus on reducing mother-to-child transmission. These efforts ensure a safe, informed workforce.

Environmental Health and Water Conservation Awareness:

Water Recycling Plant at Cape Town Refinery: Astron Energy operates a water recycling facility at its Milnerton Refinery, which produces 80% of the water needed for refining processes using treated effluent from the City of Cape Town. This initiative raises awareness about water use efficiency, reducing the refinery's reliance on potable water and promoting environmental health. By conserving water resources, it indirectly supports community health in water-scarce regions, educating stakeholders on sustainable practices amid South Africa's water challenges.

Broader Health Campaigns and Partnerships:

- Cancer and Mental Health Awareness: Astron Energy participates in campaigns like Breast Cancer Awareness Fun Walks (e.g., in Botshabelo) and Men's Health Month initiatives, raising awareness for prostate cancer and mental health across South Africa.
- Youth HIV Prevention via Partnerships: Through the Astron Energy Development Fund (AEDF) and collaborations with gold Youth Development Agency, programs include HIV/AIDS prevention training, human rights education, and peer mentoring for youth, reaching sites nationwide and empowering young people to address HIV issues.
- COVID-19 and General Health Awareness: Internal campaigns have supported employee awareness on pandemics and health protocols, ensuring operational safety and community resilience.

Astron Energy's health awareness-raising initiatives have a tangible impact, reaching thousands through partnerships and programs that address South Africa's high HIV prevalence, gender inequities, and environmental health risks.

5.4 MONITORING AND CONTROL

Inadequately treated wastewater discharged into the environment can adversely affect water quality and poses a potential significant risk to the area's water resources. Monitoring at Astron Energy's PE depot is therefore critical in order to make the correct management decisions. The



following monitoring systems are proposed to provide sound information on the effectiveness of protection measures.

5.4.1 SURFACE WATER MONITORING

Surface water quality monitoring at Milly's Star Stop commenced in October 2016 and continued until October 2017, forming the baseline and first year of compliance monitoring prior to the granting of water use authorisations. This monitoring was undertaken in support of the Water Use Licence Application and now forms a condition of the approved Water Use Licence (WUL).

Monthly monitoring was implemented to establish a representative water quality database for the Elands River based on the water quality parameters (refer to Table 5-1), allowing for assessment of seasonal variability, baseline conditions, and long-term trends associated with the wastewater treatment works (WWTW) discharge.

Table 5-1: Surface Water Quality Monitoring Parameters

Variable	Unit
Chemical Oxygen Demand	mg/L
pH	
Ammonia (ionised and un-ionised) as Nitrogen	mg/L
Nitrate/Nitrite as Nitrogen	mg/L
Electrical Conductivity	mS/m
Ortho-Phosphate as phosphorous	mg/L
E-Coli (per 100ml)	mg/L
Suspended Solids	mg/L
Chlorine as Free Chlorine	mg/L
Soap, oil or grease	mg/L

A second year of compliance monitoring was conducted from January to December 2018, during which Astron Energy implemented a formalised monthly monitoring programme covering all authorised monitoring points. Quarterly compliance reports were submitted in accordance with WUL and IUCMA requirements. In addition, bi-annual bio-monitoring (wet and dry seasons) is undertaken to assess the ecological condition of the receiving environment.

Monitoring includes upstream and downstream sites located approximately 100 m from the WWTW discharge point, as stipulated in Appendix IV, Condition 4 of the WUL. These monitoring points may not be altered without IUCMA approval.

Since February 2019, surface water monitoring points associated with the trout-processing facility—namely Trout Factory Pre, Mid and Post have been incorporated into the programme, replacing the original trout factory site and improving comparative assessment of process water and treatment performance.



During 2024, rehabilitation of the former maturation ponds improved downstream wetland functionality, and the old maturation pond was converted into a solar panel facility, removing its hydraulic interaction with the wetland system.

The current monitoring programme is considered adequate to support regulatory compliance, trend analysis, and adaptive management.

5.4.2 Groundwater Monitoring

As part of the current WULA, a single abstraction borehole is being applied for on Erf 3 Milly's South Township. This borehole will be utilised as a potable water source providing water for the new development. The following monitoring requirements have been recommended in the Geohydrological Assessment (NOA8, 2025):

- Monitor flow in the hillslope valley seep in response to abstraction of borehole REG 228.
- Groundwater level should not reach critical groundwater level of 30 metres below ground level.
- Implementation of a level logger to record when the groundwater level reaches the critical groundwater level and automatically switches off the pump.
- Should the groundwater level reach the critical groundwater level, the borehole shall be allowed to recover to static groundwater level.
- Daily monitoring of abstraction volumes.
- Monthly manual measuring of groundwater levels.

5.4.3 BIO-MONITORING

Bi-annual aquatic Ecological Assessments have been conducted since 2014 in order obtain a PES of the Elands River. These studies are conducted to ensure that the current Health Class associated with the river system is maintained at a Health Class B/C which is considered as the PES for the quaternary catchment. Aquatic ecological assessments are also conducted specifically to detect any impacts from the WWTW on the receiving Elands River system.

Based on the sensitivity of the Elands River, it is suggested that bio-monitoring be conducted on a quarterly basis upstream and downstream of the WWTW. It is recommended that the same monitoring points be used as was used during the initial field survey and as included in the current WUL.

5.4.4 WASTE MONITORING

5.4.4.1 SOLID WASTE

(see **Section 5.2.4**)

5.4.4.2 WASTEWATER

Wastewater monitoring at Milly's Star Stop focuses on assessing the performance of the on-site Wastewater Treatment Works (WWTW) and ensuring compliance with the effluent quality limits stipulated in the Water Use Licence (WUL). Wastewater generated from domestic sources and the



trout-processing facility is conveyed to the WWTW for treatment prior to discharge into the Elands River.

Effluent quality monitoring is undertaken at the final discharge point in accordance with the monitoring requirements set out in Appendix IV of the WUL. Monitoring parameters include chemical, physical and microbiological indicators relevant to the sensitivity of the receiving environment. Sampling is conducted at the prescribed frequency to support compliance assessment and trend analysis.

Historical monitoring identified periods of non-compliance, which informed the redesign and upgrade of the WWTW. The current treatment system, comprising six mini-treatment trains, has resulted in improved treatment efficiency and a marked improvement in effluent quality. Recent monitoring results indicate significant reductions in COD, nutrients, electrical conductivity, and E. coli concentrations.

Wastewater monitoring results are reviewed routinely by Astron Energy and specialist service providers to identify trends, confirm system performance, and inform operational adjustments. Monitoring data are reported to the Department and the IUCMA in accordance with licence conditions.

The wastewater monitoring programme is considered adequate to verify compliance, support adaptive management of the WWTW, and minimise risks to the Elands River and associated wetland systems.

5.4.5 STORMWATER

Refer to **Section 5.2.2**.

5.5 RISK ASSESSMENT

This section of the report describes and evaluates the potential impact of the activity on the receiving water environment.

5.5.1 IMPACT ASSESSMENT CRITERIA

The criteria for the description and assessment of environmental impacts on water resources were provided by the DWS during the recent consultation process followed for proposed amendments to the regulations. This risk assessment key was referenced from the DWS risk based water use authorisation approach and delegated guidelines. The criteria were drawn from the EIA Regulations, published by the Department of Environmental Affairs and Tourism (DEAT, 1998) in terms of the NEMA.

The level of detail as depicted in the DWS Risk-Based Water Use Authorisation Approach and Delegation Guidelines was fine-tuned by assigning specific values to each impact. In order to establish a coherent framework within which all impacts could be objectively assessed, it was necessary to establish a rating system, which was applied consistently to all the criteria. For such purposes each aspect was assigned a value, ranging from one (1) to five (5), depending on its



definition. This assessment is a relative evaluation within the context of all the activities and the other impacts within the framework of the project. An explanation of the impact assessment criteria is defined in the table below.



Table 5-2: Table Explanation of the EIA Criteria

Spatial Scale/Extent			
Classification of the physical and spatial scale of the impact How big is the area that the aspect is impacting on?			
DWS	NEMA	Description	Class
Area specific	Footprint (F)	The impacted area extends only as far as the activity, such as footprint occurring within the total site area.	1
Whole site	Site (S)	The impact could affect the whole, or a significant portion of the site.	2
Regional / neighbourhood areas	Regional (R)	The impact could affect the area including the neighbouring farms, the transport routes and the adjoining towns.	3
National	National (N)	The impact could have an effect that expands throughout the country (South Africa).	4
Global	International (I)	Where the impact has international ramifications that extend beyond the boundaries of South Africa.	5
Duration			
The lifetime of the impact that is measured in relation to the lifetime of the proposed development. How long does the aspect impact on the environment and resource quality?			
DWS	NEMA	Description	Class
1 day – 1 month, PES, EIS and/REC not impacted	Short (ST)	The impact will either disappear with mitigation or will be mitigated through a natural process in a period shorter than that of the construction phase.	1
1 month – 1 year, PES, EIS and/REC impacted but no change in status	Short to Medium(S-M)	The impact will be relevant through to the end of a construction phase (1.5 years)	2
1 year – 10 years, PES, EIS and/REC impacted to a lower status but it can be improved over this period through mitigation	Medium (M)	The impact will last up to the end of the development phases, where after it will be entirely negated.	3
Life of the activity, PES, EIS and/REC permanently lowered	Long (LT)	The impact will continue or last for the entire operational lifetime i.e. exceed 30 years of the development, but will be mitigated by direct human action or by	4



		natural processes thereafter.	
More than the life of the organisation/facility, PES and EIS scores a E or F	Permanent (P)	This is the only class of impact, which will be non-transitory. Mitigation either by man or natural process will not occur in such a way or in such a time span that the impact can be considered transient.	5
Probability / Frequency			
This describes the likelihood of the impacts actually occurring. The impact may occur for any length of time during the life cycle of the activity, and not at any given time. Activity frequency: How often do you do the specific activity? Frequency of impact: How often does the activity impact on the environment?			
DWS		NEMA	
Activity frequency	Impact frequency		Class
Annually or less	Almost never / almost impossible / >20%	Probable (Pr)	The possibility of the impact occurring is none, due either to the circumstances, design or experience. The chance of this impact occurring is zero (0 %).
6 monthly	Very seldom / highly unlikely / >40%	Possible (Po)	The possibility of the impact occurring is very low, due either to the circumstances, design or experience. The chances of this impact occurring is defined as 25 %.
Monthly	Infrequent / unlikely / seldom / >60%	Likely (L)	There is a possibility that the impact will occur to the extent that provisions must therefore be made. The chances of this impact occurring is defined as 50 %.
Weekly	Often / regularly / likely / possible / >80%	Highly Likely (HL)	It is most likely that the impacts will occur at some stage of the development. Plans must be drawn up before carrying out the activity. The chances of this impact occurring is defined as 75 %.
Daily	Daily / highly likely / definitely /	Definite (D)	The impact will take place regardless of any prevention plans, and only mitigation actions



	>100%		or contingency plans to contain the effect can be relied on. The chance of this impact occurring is defined as 100 %.	
Magnitude/Intensity/Severity				
The intensity of the impact is considered by examining whether the impact is destructive or benign, whether it destroys the impacted environment, alters its functioning, or slightly alters the environment itself.				
How severe does the aspect impact on the environment and resource quality characteristics (flow regime, Water quality, geomorphology, biota, habitat)?				
DWS		NEMA		Class
Insignificant / non-harmful	1	Insignificant (I)		2
Small / potentially harmful	2	Low (L)	The impact alters the affected environment in such a way that the natural processes or functions are not affected.	4
Significant / slightly harmful	3	Moderate (M)	The affected environment is altered, but functions and processes continue, albeit in a modified way.	6
Great / harmful	4	High (H)	Function or process of the affected environment is disturbed to the extent where it temporarily or permanently ceases.	8
Disastrous / extremely harmful and/or wetland(s) involved ¹	5	Very high / Don't know		10
Legal Issues				
How is the activity governed by legislation?				
DWS				
No Legislation				1
Fully covered by legislation (wetlands are legally covered) ²				5
Detection				
How quickly can the impacts/risks of the activity be observed on the environment (water resource quality, characteristics) people and property?				
Immediately				1

¹ Where "or wetland(s) are involved" it means the activity is located within the boundary (the temporary, seasonal / permanent zone of the wetland)

² Within the outer edge of the 1 in 100 year flood line or delineated riparian area as measured from the middle of the watercourse measured on both banks, or within a 500 m radius from the boundary of any wetland (The boundary of a wetland is the outer edge of the seasonal or temporary zone as delineated for the wetland)



Without much effort	2
Need some effort	3
Remote and difficult to observe	4
Covered	5

In order to assess each of these factors for each impact, the following ranking scales will be used.

Table 5-3: Assessment Criteria: Ranking Scales

PROBABILITY		SEVERITY / MAGNITUDE	
Description / Meaning	Score	Description / Meaning	Score
Definite/don't know	5	Very high/don't know	10
Highly likely	4	High	8
Likely	3	Moderate	6
Possible	2	Low	4
Improbable	1	Insignificant	2
DURATION		SPATIAL SCALE / EXTENT	
Description / Meaning	Score	Description / Meaning	Score
Permanent	5	International	5
Long Term	4	National	4
Medium Term	3	Regional	3
Short term	2	Local	2
Temporary	1	Footprint	1/0

5.5.2 DETERMINATION OF SIGNIFICANCE

Determination of significance refers to the foreseeable significance of the impact after the successful implementation of the necessary mitigation measures. The Significance Rating (SR) is determined as follows:

Equation 1:

Consequence = Severity + Spatial Scale + Duration

Likelihood = Frequency of activity + Frequency of Incident + Legal Issues + Detection

Significance / Risk Rating (SRR) = Consequence x Likelihood

5.5.3 IDENTIFYING THE POTENTIAL IMPACTS

Following the assignment of the necessary weights to the respective aspects, criteria are summed and multiplied by their assigned probabilities, resulting in a value for each impact (prior to the implementation of mitigation measures).

In order to gain a comprehensive understanding of the overall significance of the impact, after implementation of the mitigation measures, it will be necessary to re-evaluate the impact.

Table 5-4: Significance Rating Scales without mitigation



Rating	Class	Management Description
1 – 55	(L) Low Risk	Acceptable as is or consider requirement for mitigation. Impact to watercourses and resource quality small and easily mitigated. Wetlands may be excluded.
56 – 169	(M) Moderate Risk	Risk and impact on watercourses are notable and require mitigation measures on a higher level, which costs more and require specialist input. Wetlands are excluded.
170 – 300	(H) High Risk	Always involves wetlands. Watercourse(s) impacts by the activity are such that they impose a long-term threat on a large scale and lowering of the Reserve.

Table 5-5: Significance Rating scale With Mitigation

SR < 30	Low (L)	The impact is mitigated to the point where it is of limited importance.
30 < SR < 60	Medium (M)	Notwithstanding the successful implementation of the mitigation measures, to reduce the negative impacts to acceptable levels, the negative impact will remain of significance. However, taken within the overall context of the project, the persistent impact does not constitute a fatal flaw.
SR > 60	High (H)	The impact is of major importance. Mitigation of the impact is not possible on a cost-effective basis. The impact is regarded as high importance and taken within the overall context of the project, is regarded as a fatal flaw. An impact regarded as high significance, after mitigation could render the entire development option or entire project proposal unacceptable.

5.5.4 AREAS OF INFLUENCE

In order to assess the impact of the proposed activities and associated infrastructure on the water resources, various areas of potential impacts have been assessed. The first area is referred to as the “area of direct influence” (ADI), which is the area directly impacted upon by the WWTW activities. The second area is referred to as the “area of indirect influence” (AII) which includes the broader catchments perspective.

5.5.5 AREA OF DIRECT INFLUENCE

The ADI for water resources is determined by:

- Interception of regulated areas due to the development of the WWTW
- Reduction of base flow feeding the watercourses caused by a surface water abstraction
- Potential for spillage from WWTW and Garage



In terms of the EIA methodology, the spatial extent of the ADI is referred to as "Local" and "Site Specific".

5.5.6 AREA OF INDIRECT INFLUENCE (AII)

The Area of Indirect Influence (AII) is determined by the boundaries of the quaternary drainage area, X21F, with the main emphasis on catchment. In terms of the EIA methodology, the spatial extent of the AII is referred to as "Regional".

5.5.7 RESULTS OF IMPACT ASSESSMENT

The identified impacts on surface water and groundwater are described and outlined in **Table 5-6** and **Table 5-7**, below.



Table 5-6: Calculation of severity rating based on the identified impacts

Nr.	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorphology & Vegetation)	Biota	Severity
1	0	The effect of Milly's Star Stop operations on the surface water quality of the Elands River, De Kroon Spruit and its surrounding wetland areas	Surface Water quality	Pollution of surface water features as result of contaminated storm water runoff from Milly's infrastructure and the WWTW Pollution of surface water features as result of inadequately treated waste water discharged	2	3	3	3	2.75
2	0	The effect of Milly's Star Stop operations on the surface water quantity of water resources in close proximity	Surface Water quantity	Impact on catchment yield as result of Milly's operations	1	2	1	2	1.75
3	0	The effect of Milly's	Groundwater	Pollution of	1	1	2	1	1.25



Nr.	Phases	Activity	Aspect	Impact	Flow Regime	Physico & Chemical (Water Quality)	Habitat (Geomorphology & Vegetation)	Biota	Severity
		Star Stop operations on the groundwater quality	quality	groundwater resources as result of contamination, either by hydrocarbon spills or untreated effluent					
4	O	Over abstraction	Groundwater quantity	Fracture dewatering	2	1	1	1	1.25
5	O	Over abstraction	Groundwater quantity	Drawdown of receptor boreholes	2	1	1	1	1.25
6	O	Impact on identified receptor	Interflow	Intercept interflow that sustains hillslope seep wetland	2	1	2	2	7
7	O; C	Erf 3 Milly's South vegetation clearance	Wetland habitat loss	Loss of wetland vegetation and associated functions in hillslope seep wetlands (S2, S3) and valley bottom wetland (S1)	3	3	4	3	3.25

Table 5-7: Calculated Risk Rating based on Consequences and likelihood



Nr.	Severity	Spatial scale	Duration	Consequence	Frequency of activity	Frequency of impact	Legal Issues	Detection	Likelihood	Significance	Risk Rating
1	2.75	3	2	7.75	2	2	5	2	11	85.25	M
2	1.75	3	2	6.75	2	2	5	3	12	81	M
3	1.25	3	2	6.25	2	2	5	3	12	75	M
4	1.25	2	2	5.25	1	2	5	3	11	57.75	M
5	1.25	2	1	4.25	1	2	5	2	10	42.5	L
6	7	1	2	10	1	1	5	1	8	80	M
7	3.25	2	4	9.25	2	3	5	2	12	111	M

Table 5-8: Mitigation and Management Plan

Nr.	Objective	Mitigation	Significance after Mitigation
1	Pollution of surface water features as result of contaminated storm water runoff from Milly's infrastructure and the WWTW Pollution of surface water features as result of inadequately treated waste water discharged into the environment	<ul style="list-style-type: none"> Design water containing structures according to applicable standards Storm water management to divert clean water around Milly's infrastructure must be maintained in order to prevent runoff from becoming contaminated and to maximise the return of clean runoff to the Elands River When possible, monitor the quality of storm water before it is discharged into the environment Enforce appropriate maintenance and management practices to ensure correct functioning of the WWTW and treatment of effluent to acceptable standard Spills from equipment and other infrastructure must be cleaned immediately 	Low



Nr.	Objective	Mitigation	Significance after Mitigation
		<ul style="list-style-type: none"> • Ensure operation of the WWTW by skilled operators • Emergency standby pumps and contingency measures to retain untreated sewerage will minimise impacts on the environment • Final effluent must be monitored to determine if effluent standards are met • Clearly demarcate construction areas during construction processes and also no-go areas • Enforce appropriate maintenance and management practices to ensure correct functioning of the WWTW and treatment of effluent to acceptable standards 	
2	Impact on catchment yield as result of Milly's operations	<ul style="list-style-type: none"> • Implement effective storm water management to divert clean water around the site to ensure that the dirty footprint is kept to a minimum • Contain all contaminated water in a dedicated design facility to adhere to legislation and to contain a 1:50 year storm event and have a 0.8 m freeboard. • Ensure that all hazardous substances (Oils etc.) are stored in suitable facilities (bund walls / roofs). 	Low
3	Pollution of groundwater resources as result of contamination, either by hydrocarbon spills or untreated effluent	<ul style="list-style-type: none"> • Ensure that pipes are sufficiently protected or of a hard enough material to withstand damage. • Groundwater must be monitored regularly for early detection of possible pollution occurrence. • Ensure that waste water facilities are suitably lined (concrete/cement) and that the lining is maintained during the operational phase • Inspect waste water facilities regularly for early detection of spills/leaks • When effluent is spilled, it must be contained immediately to ensure that it 	Low



Nr.	Objective	Mitigation	Significance after Mitigation
		<p>does not spread into the surrounding environment</p> <ul style="list-style-type: none"> • Hydrocarbon spills emanating from the fuel station area (vehicles/storage/products) should immediately be cleaned up and responsibly disposed of. • Fuel/chemical storage areas should be bounded effectively and applicable safety standards must be adhered to. • All liquid material (Fuel and mechanical oil etc.) must be stored on solid concrete surfaces and must be surrounded by bunds. • Storage containers must be inspected regularly • Sewage effluent emanating from the ablution blocks must be conveyed to the WWTW and treated to acceptable levels before discharge into the environment. 	
4 & 5	Fracture dewatering	<ul style="list-style-type: none"> • The recommended yield is 70 m³ in a 16-hr pumping cycle, which equates to 25 638 m³/a. The borehole should be allowed to recover for at least 8 hours after a 16-hour pumping schedule. • To protect borehole failure and dewatering, water level should not reach a maximum allowable drawdown of 30 metres • If the maximum allowable drawdown is reached, the pumps should be switched off and allowed to recover to 90 % of the static ground water level. • Daily monitoring of abstraction volumes (preferably with automated flow meters) • Monthly capturing of groundwater levels in an electronic database, for long-term trend analysis) 	Low



Nr.	Objective	Mitigation	Significance after Mitigation
		<ul style="list-style-type: none"> It is recommended to do a comprehensive bi-annual analysis at an accredited laboratory for parameters pH, Electrical Conductivity, total dissolved solids, major anions and cations (Ca, Mg, Na, NO₃, Cl, SO₄,) as well as Total Petroleum Hydrocarbons, Benzene, Toluene, Ethylbenzene and Xylene 	
6	Ensure wetland sustainability	<ul style="list-style-type: none"> Borehole is situated outside of a 30-metre width buffer zone and aligns with Mpumalanga Tourism and Parks Agency (2006) 	Low
7	Loss of wetland vegetation and associated functions in hillslope seep wetlands (S2, S3) and valley bottom wetland (S1) through vegetation clearance at Erf 3 Milly's South	<ul style="list-style-type: none"> Clearly demarcate all wetland boundaries (S1, S2, S3) as identified in the wetland delineation as strict no-go areas during construction Maintain a minimum 30m buffer zone from all delineated wetland boundaries as recommended by MTPA (2006) Minimize development footprint and avoid encroachment into wetland areas and buffer zones Implement erosion and sediment control measures (silt fences, sediment traps) during vegetation clearance to prevent sedimentation of wetlands Maintain existing vegetation within buffer zones and wetland areas Rehabilitate any areas within buffer zones that are inadvertently disturbed with indigenous wetland species Implement alien invasive plant species management and control program (<i>Acacia dealbata</i>, <i>Pennisetum clandestinum</i>, etc.) Ensure no dumping of construction materials or waste within wetland areas or buffer zones Install environmental signage to demarcate wetland no-go areas Appoint an Environmental Control Officer (ECO) to monitor compliance 	Low



Nr.	Objective	Mitigation	Significance after Mitigation
		during construction <ul style="list-style-type: none">• Implement storm water management to prevent altered runoff patterns affecting wetland hydrology	



5.5.8 WETLAND ASSESSMENT

A wetland assessment was conducted by Menco which covered Portions 11, 13 and 14 of the farm De Kroon 363 JT. The Department has specifically requested that a PES and REC assessment be undertaken for the wetland.

Therefore, this wetland study was conducted in order to:

- Determine the nature and importance of water resources potentially impacted by the service station and related WWTW activities;
- Delineation of areas classified as wetlands;
- Identification of wetland vegetation;
- Functionality and current status of the delineated wetland; and
- Identify practicable mitigation measures to reduce negative impacts on the wetland and indicate how these can be implemented.

As part of the proposed new development located on Erf 3 of Milly's South Township, Wet-Earth compiled a stand-alone Wetland Assessment (2022) during which the following activities were conducted:

- Area description;
- Identification of wetlands;
- Delineation of wetland zones;
- Classification of wetlands;
- An assessment of the Present Ecological State (PES) or integrity of the wetlands;
- An assessment of Ecological Importance and Sensitivity (EIS) of wetlands; and
- Buffer determination.

5.5.9 WETLAND DELINEATION RESULTS - PORTIONS 11, 13 AND 14 OF THE FARM DE KROON 363 JT

The wetland obtained a Class B category in the Present Ecological State (PES) assessment, which indicates that the habitat is largely natural. The Ecological Importance and Sensitivity of the wetland is considered to be high; the wetland was considered ecologically important on a provincial and local scale. The biodiversity of this valley bottom and hillslope wetland system is not sensitive to flow and habitat modifications. The Hydrological Functional and Importance of this wetland is considered to be moderate; the wetland plays a small role in moderating the quantity and quality of water in major rivers. Direct Human Benefits obtained from this wetland is considered to be a Class D and consisted of uses such as grazing and livestock watering. This wetland contributes little towards the larger community.

Table 5-9: Summarised result for the wetland at Milly's Service station

Quaternary	Coordinates	Wetland	PES	EIS	Confidence	REC
X21F	25°41'27.10"S 30°12'34.85"E	Channelled Valley Bottom	C	Very High	High	B



	25°41'12.04"S 30°12'48.66"E	Hillslope	C	High		
--	--------------------------------	-----------	---	------	--	--

Based on the hydro-geomorphic setting, a channelled valley bottom type wetland was identified in the project area. The hydrological benefits from this wetland are indicated in **Table 5-9**. The channelled valley bottom system is surrounded by farm land and is maintained by rain water precipitation draining the catchment that feeds into the wetland system. Flow within this wetland is therefore predominantly surface flow, generated as a result of rainfall events. The wetland has several functions still intact of which nutrient removal, flow regulation and sediment trapping appears to be most important.

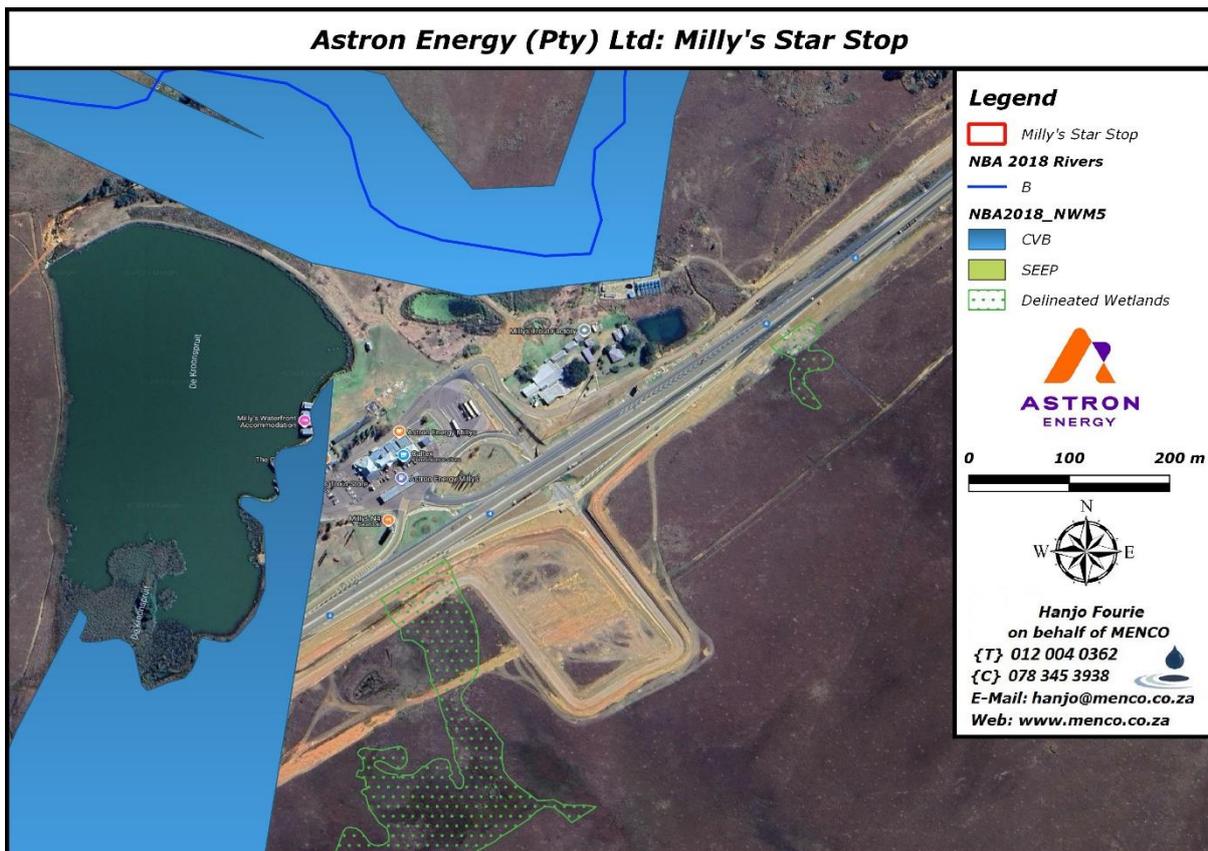


Figure 5-1: Locality of delineated bottom valley wetland with buffer zone

5.5.10 WETLAND DELINEATION RESULTS - ERF 3 OF MILLY'S SOUTH TOWNSHIP

The wetland's catchment is still reasonably intact, with signs of historic agriculture, grazing and trampling, a suspect burning regime and some exotic vegetation. The wetland itself has impacts such as road-crossings, grazing, exotic vegetation, etc. which has resulted in changes to the three components of wetland health assessed. The wetland can, therefore be currently described as having a "C" Category (**Table 5-10**).

It is anticipated that management conditions will stay the same in the near future for all the components assessed, therefore it is expected that conditions will remain stable.



Table 5-10: Summary of present wetland health based on the Wet-Health assessment

Wetland	Ha	Hydrology		Geomorphology		Vegetation	
		Impact Score	Change Score	Impact Score	Change Score	Impact Score	Change Score
Hillslope Seep connected to a stream	0.2	5.0	0	2.2	0	2.9	0
PES Categories		D	→	C	→	C	→
Wetland Impact Score		3.60					
Wetland PES		C					

Ecological Importance and Sensitivity (EIS)

The Ecological Importance and Sensitivity of this wetland is considered to be Moderate (1.2) i.e. important on a local scale. Its biodiversity is not sensitive to flow or habitat modifications. In addition, the presence of good vegetation cover and a variety of species contributes towards its moderate biodiversity.

The Hydro-functional Importance of this wetland is considered to be Moderate (1.4) as it plays a small role in moderating the quantity and quality of water in rivers and wetlands downstream. Unfortunately, the Milly's development downstream limits this potential. Good vegetation cover contributes towards a moderate score in this regard.

The Direct Human Benefits derived are considered to be non-existent Low (0.2). Local people do not depend on many direct benefits from this wetland, although some grazing does take place.

A combined EIS score of 0.9 indicate Marginal (D) conditions.

Buffer Zone recommendations

Buffer zones are strips of undeveloped, typically vegetated land (composed in many cases of riparian habitat or terrestrial plant communities) which separate development or adjacent land uses from aquatic ecosystems (rivers and wetlands). The primary purpose for establishing buffers in this case would be to reduce the potential impact of adjacent land-uses on wetland habitat and for providing this habitat the opportunity to recover and to improve its integrity.

To assess and apply the width of any buffer, it is important to understand the role that buffer zones play in protecting aquatic resources, with associated biota and in mitigating impacts from anthropogenic impacts. Thus, the proposed buffer serves to provide a wide range of buffer functions and values including (MacFarlane, Dickens, & Von Hase, 2009):

- Sediment removal;
- Nutrient removal;
- Toxic removal;
- Control of microclimate and water temperature;
- Provision of habitat for wildlife;
- Screening of adjacent disturbances;
- Habitat connectivity;
- Channel stability and flood attenuation;



- Groundwater recharge; and
- Aesthetic appeal.

Indications are that this wetland is mainly dependent on groundwater which can thus be described as the key driver for the wetland's existence. However, it is also important to take into account the surface water contribution in determining wetland buffer zones. Anthropogenic impacts (agriculture, roads (include management roads and N4 highway), dams, filling station, powerline crossings, etc.) in and around this wetland, emphasises the already increased impacts from the wetland's catchment. To support the wetland's integrity, in an already disturbed environment and with the proposed development still to come, a wetland buffer will be a necessity. However, it should be noted that a wetland surface buffer of 20-30 m is highly unlikely to provide catchment-related hydrology support such as groundwater recharge. Therefore, the identification of mitigation and management measures of the proposed development in the catchment should compensate for the possible loss of catchment support.

It is important to place emphasis on the fact that wetland and or aquatic buffer zones are typically defined from the edge of the identified wetland and/or aquatic resource, extending outwards, ending at the interface with another land use. Buffers would, therefore, typically be applied from the delineated edge of the wetland.

Several approaches exist in determining buffer widths and the one proposed in this case is the Fixed Width methodology. The fixed-width approach applies a standard buffer width (e.g. 30m) to a resource and typically prohibits any land use within this zone. In this case a generic width is applied regardless of any characteristic of the water resource and/or any biotic requirements. However, no single-size buffer can protect all functions, unless it is extremely large.

A buffer width of 30 m is recommended by the Mpumalanga Tourism and Parks Agency (2006) and is also supported in this case, it will cater for various buffer functions as mentioned above (Macfarlane, et al., 2009).

5.6 MATTERS REQUIRING ATTENTION / PROBLEM STATEMENT

Not applicable at this time.

5.7 ASSESSMENT OF LEVEL AND CONFIDENCE OF INFORMATION

The author deems the information in this report to be obtained from sources with a high level of confidence and is of the opinion that the information in this document is sufficient for the DWS to make a decision with regard to the WULA for Astron Energy.



6 WATER AND WASTE MANAGEMENT

This section contains the water and waste management philosophies for stormwater, process water, groundwater and waste applicable to the activity and is informed by the company's policies and legislation. These philosophies are translated to strategies for stormwater, process water, groundwater and waste management for the activity. Goals and objectives are formulated for the water use or waste management of the activity in accordance with the philosophies and strategies to ensure improvement of the status of the water resources.

A range of management measures are identified to reach the set objectives. These measures may be presented to and discussed with the DWS to ensure that all possible measures have been considered.

An options analysis may be required in instances where more than one potential management measure has been identified, in order to determine the most appropriate (feasible and sustainable) measure to be implemented.

The outcome of such options analyses will demonstrate the financial feasibility of the preferred selected management option, and it will form part of a motivation for the selection of the preferred management measures.

The action plan must include the time frame and schedule for the implementation of the selected management measures. The management measures may include priority measures which must be implemented to address major legal non-compliance or a high business risks, and then other short, medium and long term actions.

6.1 WATER AND WASTE MANAGEMENT PHILOSOPHY

The following aspects related to water and waste management is important to the Astron Energy:

1. Clean water must be diverted around the site;
2. Monitor, measure and control effluent discharges to minimise the impact on the environment;
3. Wherever practicable all waste must be re-used and recycled to reduce the impact on the environment; and
4. Ensure compliance with all applicable legislative requirements.



6.2 STRATEGIES (SURFACE WATER, GROUNDWATER, STORMWATER AND WASTE)

6.2.1 WATER MANAGEMENT STRATEGIES

Astron Energy has adopted the following for the management at the Milly's Star Stop fuel depot and aims to:

- Minimise the extent to which water becomes contaminated;
- Treat/Scrub wastewater to a standard suitable for discharge;
- Continuously monitor surface water quality for early detection of pollution

6.2.2 WASTE MANAGEMENT STRATEGIES

Astron Energy has adopted the following waste management strategies:

- Minimise the impact of Astron Energy operations on the environment by eliminating, reducing or appropriately managing the Astron Energy-operated terminals;
- Ensure compliance with applicable external and internal compliance requirements (laws and regulations); and
- Apply the following waste management hierarchy:
 - Eliminate
 - Reduce
 - Re-use
 - Recycle
 - Dispose

The above-mentioned strategies will be achieved by:

- Defining acceptable waste management practices;

Astron Energy will strive to ensure that any wastewater is disposed of in a way that does not damage or threaten the environment. This applies to the disposal of wastewater on-site.

6.3 PERFORMANCE OBJECTIVES / GOALS

6.3.1 STORMWATER MANAGEMENT

- Identify all sources of water contributing to the stormwater generated on site
- Inspect stormwater channels at least once a month
- Clean stormwater channels at least twice a year (once before the rainy season starts)
- Maintain stormwater infrastructure and ensure that the integrity of the system is intact
- Monitor stormwater quality monthly

6.3.2 GROUNDWATER MANAGEMENT

- Protect groundwater quality by ensuring wastewater is suitable for discharge and thus cannot contaminate groundwater from seepage through the wetland.



6.3.3 SURFACEWATER MANAGEMENT

- Protect surface water quality of nearby streams and wetlands from contaminated surface water runoff by monitoring wastewater/stormwater discharged monthly.
- Conduct bio-monitoring bi-annually (once in the wet season and once in the dry season)
- Record all complaints from adjacent surface water users.

6.3.4 WASTE MANAGEMENT

The waste management objective is to ensure that solid waste, hazardous waste, and wastewater treatment sludge are managed, stored, and disposed of in a manner that prevents secondary pollution and complies with applicable waste legislation.

Waste minimisation, segregation, and the use of licensed waste service providers form the basis of waste management practices at Milly's Star Stop. Refer to **Section 7.3.3**.

6.4 MEASURES TO ACHIEVE AND SUSTAIN PERFORMANCE OBJECTIVES

The tables to follow summarise the measures to achieve and sustain performance objectives for each aspect listed in **Section 6.3** of this report.

Table 6-1: Measures to achieve and sustain performance objectives for Wastewater/Stormwater Management

Performance Objective	Implementation Measures
Identify all sources of water contributing to the stormwater generated on site	<ul style="list-style-type: none"> ▪ Appoint a suitable person to plan the stormwater management infrastructure for the entire site ▪ Compile a suitable stormwater management procedure
Monitor the water discharged on a monthly basis	<ul style="list-style-type: none"> ▪ Appoint suitable person to conduct monitoring ▪ Keep records (hard copies and electronic format) of all monitoring data ▪ Install flow meter divers at selected locations (where possible) ▪ Maintain flow meter devices ▪ If possible ensure that a back-up flow meter device is available on site ▪ Service/calibrate flow meter divers at least every 2 years ▪ Keep copies of flow meter calibration certificates on site
Inspect stormwater channels at least once a month	<ul style="list-style-type: none"> ▪ Appoint a responsible person ▪ Set a schedule for when inspection is to take place
Clean stormwater channels at least twice a year (once before the rainy season starts)	<ul style="list-style-type: none"> ▪ Appoint a responsible person ▪ Set a schedule for cleaning ▪ Conduct cleaning as outlined in schedule
Maintain stormwater infrastructure and ensure that the integrity of the system is intact	<ul style="list-style-type: none"> ▪ Appoint a responsible person ▪ Set a system with contact details out for the responsible person to contact in case of spills / leaks ▪ If possible have replacement parts on site for immediate repair
Recycle and re-use water where possible	<ul style="list-style-type: none"> ▪ Record on a monthly basis the sources and volumes of all water used on site



Table 6-2 Measures to achieve and sustain performance objectives for Surface Water Management

Performance Objective	Implementation Measures
Protect surface water quality of nearby streams and wetlands from spills / leaks and associated contaminated surface water runoff	<ul style="list-style-type: none"> ▪ Design water containing structures according to applicable standards ▪ Immediate action must be taken to contain spillage and prevent it from entering nearby streams or surrounding environment ▪ Monitor the quality of stormwater effluent before it is discharged into the environment ▪ Enforce appropriate operational, maintenance and management practices on site to minimise contamination potential of stormwater on site.
Protect surface water quality of nearby streams and wetlands from contamination by inadequate effluent discharged into the environment	<ul style="list-style-type: none"> ▪ Oil separators to be monitored biannually and cleaned as necessary. ▪ Hydrocarbon spills on site to be cleaned immediately. Spill kits to be made readily available and accessible on site.
Reduce impact on the catchment yield by implementing suitable separation of clean and dirty stormwater	<ul style="list-style-type: none"> ▪ Refer to Table 6-1: measures to achieve and sustain performance objectives for stormwater management
Conduct bio-monitoring bi-annually (once in the wet season and once in the dry season)	<ul style="list-style-type: none"> ▪ Appoint a responsible person ▪ Set-up a monitoring plan that specify location and frequency of monitoring as well as parameters to be analysed for ▪ Ensure that all monitoring sites are accessible ▪ Conduct monitoring as set out in the monitoring plan ▪ Keep records (hard copy and electronic) of all monitoring data
Record all complaints from adjacent surface water users	<ul style="list-style-type: none"> ▪ Keep a complaints register on site and record all complaints received from neighbouring properties etc. in order to formally respond and rectify issues of concern

6.5 OPTIONS ANALYSES AND MOTIVATION FOR IMPLEMENTATION OF PREFERRED OPTION

6.5.1 PREFERRED ALTERNATIVE

The preferred alternative is the continued operation and optimisation of the upgraded on-site Wastewater Treatment Works, supported by comprehensive surface water, groundwater, and wastewater monitoring. This option provides effective pollution control while remaining operationally and economically feasible. Therefore no alternatives being considered.

6.5.2 INFRASTRUCTURE OR DESIGN ALTERNATIVES

Alternative treatment technologies and stormwater control designs were considered; however, the current treatment trains and drainage systems were selected based on proven performance, site constraints, and regulatory acceptance.



6.5.3 LOCATION ALTERNATIVES

Alternative discharge and infrastructure locations were not considered feasible due to site layout constraints, proximity to watercourses, and existing authorised infrastructure.

6.5.4 STATUS QUO/NO-GO ALTERNATIVE

Management of wastewater/stormwater runoff remains as is.

6.6 IWWMP ACTION PLAN

GOAL: MANAGE STORMWATER/WASTEWATER ASPECTS IN A RESPONSIBLE AND ENVIRONMENTALLY SUSTAINABLE MANNER	
Objectives	
<ul style="list-style-type: none"> ▪ Identify all sources of water contributing to the stormwater generated on site ▪ Inspect stormwater channels at least once a month ▪ Clean stormwater channels at least twice a year (once before the rainy season starts) ▪ Maintain stormwater infrastructure and ensure that the integrity of the system is intact ▪ Monitor stormwater quality monthly 	
Actions	When
Appoint responsible persons to oversee specific requirements (stormwater management infrastructure, monitoring, recording, inspection and cleaning of stormwater channels, maintenance of stormwater infrastructure)	As needed
Compile a suitable stormwater management procedure	As required by WULA
Keep records (hard copy and electronic format) of all monitoring data	Continuous
Install flow meter devices at selected locations	If required by WULA
Maintain flow meter devices	If required by WULA
If possible ensure that a back-up flow meter device is available on site	If required by WULA
Service/calibrate flow meter devices at least every 2 years	If required by WULA
Keep copies of flow meter calibration certificates on site	If required by WULA
Set a schedule for when inspection of stormwater channels is to take place	Immediate
Set a schedule for cleaning of stormwater channels	Immediate
Conduct cleaning as set out in the schedule	Continuous
Set a system with contact details out for a responsible person to contact in case of stormwater contamination	Immediate
If possible have replacement parts on site for immediate repair of stormwater channels	Continuous/ As needed
Record on a monthly basis the sources and volumes of all water used on site	Monthly



GOAL:	
LIMIT THE IMPACT ON SURFACE WATER RESOURCES AND MONITOR SURFACE WATER RESOURCES	
Objectives	
<ul style="list-style-type: none"> ▪ Protect surface water quality of nearby streams and wetlands from contaminated surface water runoff by monitoring water discharged into wetland ▪ Conduct bio-monitoring bi-annually (once in the wet season and once in the dry season) ▪ Record all complaints from adjacent surface water users 	
Actions	When
Appoint responsible persons to oversee specific requirements	As needed
Final effluent must be monitored to determine if effluent standards are met	Monthly
Enforce appropriate operational, maintenance and management practices to minimise contamination potential of water runoff	Continuous
Hydrocarbon spills from equipment and other infrastructure must be cleaned immediately	As needed
Set-up a monitoring plan that specify location and frequency of monitoring as well as the parameters to be analysed for	Immediate
Ensure that all monitoring sites are accessible	Continuous
Keep records (hard copy and electronic format) of all monitoring data	Continuous
Keep a complaints register on site and record all complaints received from neighbouring properties etc. to formally respond and rectify issues of concern	Continuous
<i>Also refer to the Stormwater Section of this action plan for the responsible management of Stormwater aspects related to Surface Water</i>	

6.7 CONTROL AND MONITORING

6.7.1 MONITORING OF CHANGE IN BASELINE (ENVIRONMENT) INFORMATION

Routine monitoring of surface water, groundwater, wastewater, and biological indicators is undertaken to detect changes relative to baseline conditions and to assess operational impacts. as outlined in **Section 5.4**.

6.7.2 AUDIT AND REPORT ON PERFORMANCE OF MEASURES

Internal reviews and external audits are conducted to evaluate the effectiveness of implemented measures. Monitoring results and audit findings are reported to the Department and other entities as required by the WUL.

6.7.3 AUDIT AND REPORT ON RELEVANCE OF IWWMP ACTION PLAN

Internal and external audits will be conducted on compliance to the objectives, measures and goals as outlined in this document. Please also refer to **Section 6.7.2** above.



7 CONCLUSION

This section provides a summary of the regulatory status of activities at Milly's Star Stop, outlines the water uses requiring authorisation, and motivates the continued implementation of the Integrated Water and Waste Management Plan (IWWMP) in accordance with the National Water Act (Act No. 36 of 1998).

7.1 REGULATORY STATUS OF ACTIVITY

Milly's Star Stop operates under an approved Water Use Licence (WUL) issued in terms of the National Water Act, which authorises specified water uses associated with abstraction, wastewater treatment, and discharge activities. The facility is required to comply with licence conditions relating to water use volumes, effluent quality, monitoring, reporting, and infrastructure management.

The Integrated Water and Waste Management Plan supports compliance with the WUL by providing a structured framework for pollution prevention, monitoring, operational control, and continual improvement. Ongoing monitoring and reporting demonstrate that water and waste management activities are actively managed in accordance with regulatory requirements.

The water uses applied for in terms of Section 21 of the National Water Act, 1998 (Act 36 of 1998) are summarised in **Section 3.1** of this report.

7.2 STATEMENT ON WATER USES REQUIRING AUTHORISATION, DISPENSING WITH THE REQUIREMENT FOR A LICENSE AND POSSIBLE EXEMPTION FROM REGULATIONS

Water uses undertaken at Milly's Star Stop that require authorisation in terms of Section 21 of the National Water Act include water abstraction, wastewater treatment, and the discharge of treated effluent to a water resource. These water uses are authorised under the existing Water Use Licence and are managed in accordance with the conditions set out therein.

Certain water-related activities that do not pose a risk to water resources and fall within permissible limits may be considered lawful uses or may not require additional authorisation, provided they are conducted in accordance with applicable legislation and do not result in pollution. No activities are currently undertaken that would qualify for exemption from regulation outside the scope of the approved WUL.

Water uses requiring authorisation in terms of the NWA is summarised in **Section 3.1** of this report.

7.3 MOTIVATION IN TERMS OF SECTION 27(1) OF THE NWA

A Section 27 motivation needs to form part of the water use license application submitted to the DWS. All criteria as specified in the NWA have been considered as



contemplated in **Table 7-1**. The Section 27 motivation is included in the Water Use License Application Report (WULAR) and is hereby submitted as stand-alone upon request.

Table 7-1: Section 27 Motivation Criteria

Section	Aspect
5 – 7	The National Water Resource Strategy
27 (1)(e)	The Catchment Management Strategy applicable to the relevant water resource
27 (1)(j)(i)	The quality and quantity of water in the water resource which may be required for the reserve
27 (1)(j)(ii)	The quantity and quality of water in the water resource which may be required for meeting international obligations
27 (1)(g)	The class and the resource quality objectives of the water resource
27 (1)(i)	The strategic importance of the water use to be authorised
27 (1)(a)	Existing Lawful Water Uses (ELU)
27 (1)(f)	The likely effect of the water use to be authorised on the water resource and on other water users
41(3)	Compliance with the requirements contained in regulations made under section 26 of the Environment Conservation Act, 1989 (Act no. 73 of 1989)
41(4)	Comments/objections from stakeholders and interested and affected parties
27 (1)(b)	The need to redress the results of past racial and gender discrimination
27 (1)(c)	Efficient and beneficial use of water in the public interest
27 (1)(d)(i)	The socio-economic impact of the water use or uses if authorised
27 (1)(d)(ii)	The socio-economic impacts of the failure to authorise the water use or uses
27 (1)(h)	The investments already made and to be made by the water user in respect of the water use in question
27 (1)(k)	The probable duration of the undertaking for which a water use is to be authorised

SECTION 27(A) EXISTING LAWFUL USE

An Existing Lawful Water Use as defined by Section 32 of the National Water Act, 1998 (Act 36 of 1998) as a water use that has taken place at any time during a period of two years immediately before the date of commencement of the Act and was authorised by a law before the date of commencement.

Existing lawful water uses at Milly's Star Stop include the following:

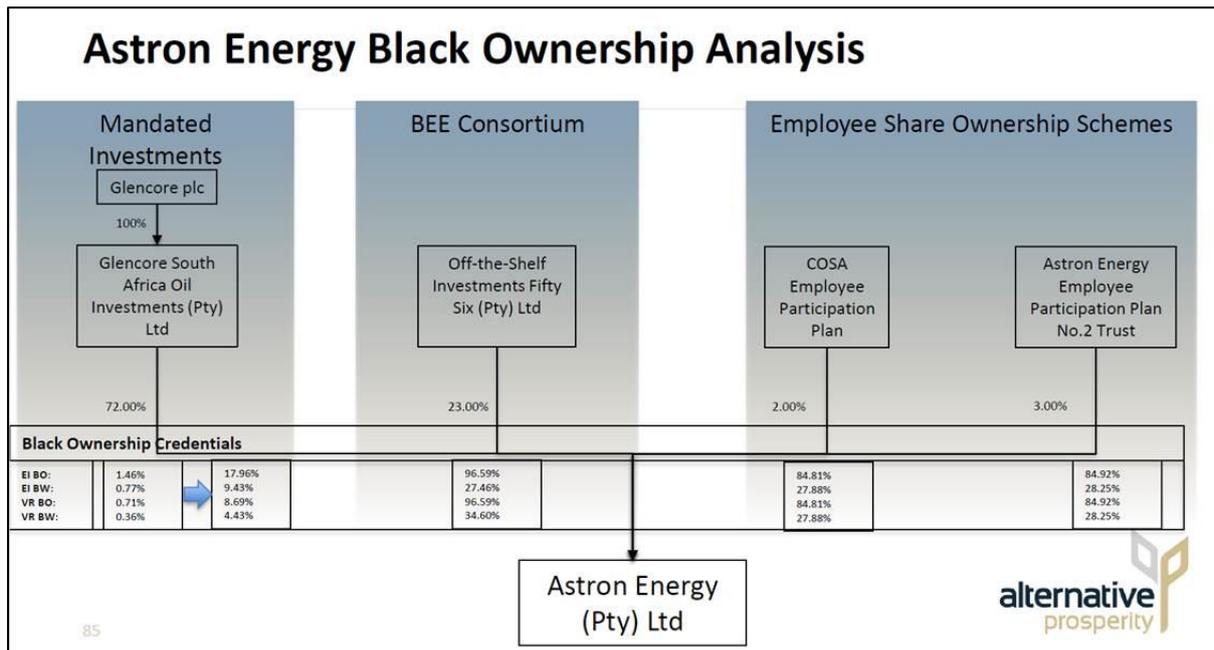
- The storing of water in the De Kroon Dam (Section 21(b) water use).

SECTION 27(B) THE NEED TO REDRESS THE RESULTS OF DISCRIMINATION



Astron Energy (Pty) Ltd retains an approved Social Investment Programme which aims to promote sustained economic growth by investing in people, partnerships and performance by focusing on education, health and economic development. The current B-BEE status is as follows:

- Direct Black Shareholding is 28% with 12,55% of that held by Black women.
- Level 1 B-BBEE contributor
- The company employs a large group of individuals of which more than 80% are previously disadvantaged individuals.



SECTION 27(C) EFFICIENT AND BENEFICIAL USE OF WATER IN THE PUBLIC INTEREST

All of the water uses that are being applied for as discussed in the WULAR will be beneficial in the public interest.

- Section 21 (a): abstracting water from resource: Water abstraction from the De Kroon Dam and the borehole will take place and be used as potable water in the facilities. Monitoring of the volumes abstracted will be recorded to ensure that the volumes stipulated in the WUL are not exceeded. This abstraction is already authorised under the current license however and additional volume increase is being applied for.
- Section 21(c) & (i): Impeding or diverting the flow of water in a watercourse and Altering the bed, banks, course or characteristics of a watercourse
 - Existing and already licensed WWTW situated within the 100 m buffer zone of the Elands River;
 - Trout Farm situated within the 500 m buffer zone of a wetland;
 - De Kroon Dam is also situated within 500 m of the wetland area,



Regular monitoring (surface water and biomonitoring) will take place, as stipulated in the WUL, to ensure that the activities do not negatively impact the affected water resources. All water uses will be of beneficial use to the public due to monitoring schemes that will be incorporated and set in place to help determine if the associated activities has an impact on the water system. During various site visits it was noted through monitoring that the water quality of the Elands River has been improving.

- Section 21(f) Disposal of treated waste water from the WWTW into the Elands River through a reedbed system.
- Section 21(g) water use: Disposing of waste in a manner which may detrimentally impact on a water resource. The following section 21(g) water uses are relevant:
 - Maturation Pond
 - Existing Waste Water Treatment Works

The current upgrades of the WWTW will be beneficial due to it being able to handle higher volumes of waste water with an improved effluent quality.

SECTION 27(D)(I) SOCIO-ECONOMIC IMPACT OF THE WATER USES IF APPROVED

The main positive impacts associated with the operations at Milly's Star Stop are summarised below:

- Provision of employment to a number of people during the expansion and operational phase of the WWTW.
- Provision of long-term employment during the operational phase.
- Money paid out locally in the form of the company payroll.
- Money paid to the government in the form of local, regional and national taxes.
- Trout production and thus food contribution (together with an onsite bakery, restaurant, trout stall and Star Stop Shop).
- The outsourcing of service provision to local and regional service providers.
- Milly's is an important stop for tourists, attracting many travellers.

SECTION 27(D)(II) THE SOCIO-ECONOMIC IMPACT OF THE FAILURE TO AUTHORISE THE WATER USE

All water uses, apart from the increased abstraction volume, are already licensed under the current WUL. The increased abstraction volume being applied for stems from an omission in the previous application whereby water used by the trout factory was not accounted for and thus not applied for.



As the trout factory is operational and currently using water, the currently licensed abstraction volume is being exceeded. If the new application is declined and the increased abstraction volume not authorised, Astron Energy Milly's will be in contravention of the existing WUL and will be unlawful.

SECTION 27(E) CATCHMENT MANAGEMENT STRATEGY APPLICABLE

According to DWAF (2004b) (also as specified in the National Water Act, Act 36 of 1998) the delegation of water resource management from central government to catchment level will be achieved by establishing Catchment Management Agencies (CMAs) at WMA level. Each CMA has the responsibility to develop a Catchment Management Strategy (CMS) for the protection, use, development, conservation, management and control of water resources within its WMA.

The CMA relevant to this Water Use License Application is the Inkomati-Usuthu Catchment Management Agency (IUCMA), the first of a total of nineteen CMAs to be formed by the South African Government. As per their website, the Agency was formed to protect, conserve, develop and manage water resources at the Water Management Area level. The central objective of the IUCMA is to ensure that water is used to support equitable and sustainable social and economic transformation and development. The currently implemented CMS is for the period 2023-2028.

SECTION 27(F) THE LIKELY EFFECT OF THE WATER USE TO BE AUTHORIZED ON THE CATCHMENT

The taking of raw surface water from the De Kroon Dam at Milly's has previously been registered under Water Use License 05/X21F/CFICCIIGAI/7130. However, as result of the site's increasing popularity amongst travellers and subsequent increase in water abstraction the applicant is applying to abstract an increased volume of water equating to 69 350 m³/a (currently authorised volume is 36 500 m³/a).

SECTION 27(G) CLASS AND RESOURCE QUALITY OBJECTIVES OF THE WATER RESOURCE

The ecological status of a river refers to its overall condition of health, i.e. the totality of the features and characteristics of the river and its riparian areas, which manifests in its ability to support a natural array of species. This ability relates directly to the capacity of the system to provide a variety of goods and services. The information reported here



refers to the area applicable to the license application and has been derived from the 2016 Ecostatus Report for the Elands River Catchment in the Inkomati-Usuthu Water Management Area.

The in-stream and riparian health for the Elands River near Machadodorp is moderately to largely modified (Category C to C/D). The greatest threat to river health in this region is sewage pollution from poorly maintained wastewater treatment works at Machadodorp and Waterval Boven. These facilities have critical compliance failures, resulting in high nutrient loads and excessive algal growth. Additional threats include invasive alien vegetation (particularly black wattle, eucalyptus, and weeping willow) in the riparian zone, commercial forestry activities, and over-abstraction during drought periods.

The Elands River in Quaternary Catchment X21F has been classified by the Department of Water and Sanitation as having a Present Ecological State (PES) of Class C, indicating a moderately modified river system. To ensure sustainability of this critically important river system and protect endemic fish species, urgent intervention is required to upgrade wastewater treatment infrastructure and manage invasive vegetation.

Table 7-2: RWQO for the relevant Quaternary Catchment

Catchment	River	PESC	EISC	REC
X21F	Elands River	Class C	High	Class C

Table 7-3: Treated Effluent Discharge Limits

<i>Variable (s)</i>	<i>Limit (s)</i>
<i>pH</i>	<i>5.5 – 7.5</i>
<i>Electrical Conductivity</i>	<i>50 mS/m above background receiving water</i>
<i>Nitrates as (N)</i>	<i>1.5 mg/l</i>
<i>Ammonia as (N)</i>	<i>2 mg/l</i>
<i>Chemical Oxygen Demand as (COD)</i>	<i>30 mg/l</i>
<i>E-Coli (Counts/100ml)</i>	<i>0</i>
<i>Orthophosphate as (P)</i>	<i>1.0 mg/l</i>
<i>Suspended Solids (SS)</i>	<i>10 mg/l</i>

The water quality parameters relevant for sampling are presented in **Table 7-4** and provide the required set limits as specified by the IUCMA. These limits must be adhered to in order to be compliant to the X21F catchment reserve. In terms of Milly's Resource Quality Objectives as contemplated in Government Notice 1248 of 10 November 2017 the X21F quaternary drainage area falls under the Ecological Water Requirement (ERW1) as determined at monitoring site X2H074Q01 in the Crocodile East catchment. The Eco-Specs relevant to the catchment is presented in **Table 7-4** together with the IUCMA set Limits.



The X21F catchment is further classified as Water Quality Class III with a PES of Class C and an EIS of high. With reference to the IUCMA set limit for pH, it is clear that the pH should not be rated as a variable of concern as the effluent range is given as 6.5 to 8.0. The table below is used to compare the monthly water quality data to detect any potential increases that might exceed the required limits. It also assists to identify potential impact sources stemming from certain monitoring points.

Table 7-4: Required limits set for the X21F Catchment

<i>Variable (s)</i>	<i>IUCMA Limits</i>	<i>GN 1248 (ERW1) RQO's</i>
<i>pH</i>	<i>5.5 – 7.5</i>	<i>6.5 – 8.0</i>
<i>Electrical Conductivity</i>	<i>50 mS/m</i>	<i><30 mS/m</i>
<i>Ammonia as (N)</i>	<i>1</i>	<i>1.5</i>
<i>Nitrate as (N)</i>	<i>1.5</i>	<i><6</i>
<i>Nitrite as (N)</i>	<i>1.5</i>	<i><6</i>
<i>Chemical Oxygen Demand as (COD)</i>	<i>30</i>	<i>-</i>
<i>Orthophosphate as (P)</i>	<i>2</i>	<i><0.125</i>
<i>Fluoride</i>	<i>-</i>	<i>1.5</i>
<i>Suspended Solids (SS)</i>	<i>10</i>	<i>-</i>
<i>E-Coli (Counts/100ml)</i>	<i>0</i>	<i>0</i>

In order to identify exceeding variables on the water quality database, a Management Target Range has been implemented to which the set limits by the IUCMA are compared to. This will assist in comparing the monthly data to each other and make for easy identification of impacts sources. **Table 7-5** provides the Management Target Range implemented for Milly's Star Stop.

Table 7-5: Management Target Range

<i>Parameter</i>	<i>Special Limit</i>	<i>Tolerable Target</i>	<i>Unacceptable</i>
<i>pH</i>	<i>5.5 – 7.5</i>	<i>7.6 – 8.0</i>	<i>< 5.4 ; >8.1</i>
<i>Electrical Conductivity</i>	<i>50</i>	<i>50 - 80</i>	<i>80 – 120</i>
<i>Suspended Solids</i>	<i>10</i>	<i>10 - 30</i>	<i>30 – 50</i>
<i>Chloride</i>	<i>120</i>	<i>120 - 150</i>	<i>150 – 180</i>
<i>Nitrate</i>	<i>1.5</i>	<i>1.6 – 5.9</i>	<i><6</i>
<i>Nitrite</i>	<i>1.5</i>	<i>1.6 – 5.9</i>	<i><6</i>
<i>Fluoride</i>	<i>0.5</i>	<i>0.6 – 1.5</i>	<i>1.6 – 3.0</i>
<i>Orthophosphate</i>	<i>1.0</i>	<i>1.1 – 2.0</i>	<i>2.1 - 10</i>
<i>Chemical Oxygen Demand</i>	<i>30</i>	<i>30 - 40</i>	<i>40 -55</i>
<i>E. coli</i>	<i>0</i>	<i>0 - 20</i>	<i>20 – 40</i>
<i>Ammonia</i>	<i>2</i>	<i>2 - 4</i>	<i>4 - 8</i>



SECTION 27(H) INVESTMENTS ALREADY MADE AND TO BE MADE BY THE APPLICANT

Various investments have been made by the applicant in term of appointment of specialists to conduct environmental investigations in support of the Water Use License Application. WULAR, IWWMP together with Bio-monitoring and surface water assessment has been conducted. Water samples have been taken to determine a reference condition which must be maintained during operation of the WWTW. Monthly Surface Water monitoring is taking place as well.

The applicant has also invested in the construction of a new WWTW to ensure better waste water management. This includes complete WWTW Supplies (all tanks, mechanical equipment, construction material), and complete installation of upgraded WWTW by a professional Civil Engineering Company.

SECTION 27(I) STRATEGIC IMPORTANCE OF THE ACTIVITY

The project entails the management of the WWTW at Milly's to ensure the discharge of adequately treated waste water into the Elands River system. The Elands River is a listed water resource in terms of the General Authorisations (GA's) which means that waste water needs to meet special standards in terms of GN 399 of 26 March 2004 and GN 665 of 6 September 2013 before it is discharged into the environment. These special standards have been set by the Department of Water and Sanitation (DWS) to protect sensitive water resources.

Astron Energy Milly's is currently not complying with the existing WUL by abstracting more water from the De Kroon dam. This increased volume, which is applied for in the new application, is used at the Trout Factory for cleaning and processing.

SECTION 27(J) QUANTITY OF WATER THAT IS REQUIRED FOR THE RESERVE

The operations taking place at Milly's Star Stop will not have any impact on the reserve as they do not abstract from the Elands River and only use water from the De Kroon Dam which is mainly rain water.

A summary of the quality component for the Rivers at the EWR sites for the Inkomati Catchment is set out in Tables 5.1.1 - 5.3.6 of GN998 of 2019.

A summary of the groundwater contribution to the Reserve for Water Quantity for the Inkomati Catchment is set out in Table 6.1 of GN998 of 2019.



A summary of the groundwater contribution to the Reserve for Water Quality for the Inkomati Catchment is set out in Tables 7.1, 7.2 and 7.3 of GN998 of 2019.

A summary of the Water Quantity & Quality Reserve for selected Wetlands for the Inkomati Catchment is set out in Tables 8.1 and 8.2 GN998 of 2019.

Gazetted into law under GN998 of 2019, the reserve quantity for the area of interest is summarised below:

Node	Water Resource	PES	EIS	TEC	Ecological Reserve (%NMAR)	NMAR (MCM)	BHN Reserve (%NMAR)
X21F-01046	Elands	C	Moderate	C	35.2	35.1	0.17
X21F-01081	Elands	C	High	C	35.5	50.8	

SECTION 27(K) THE PROBABLE DURATION OF ANY UNDERTAKING FOR WHICH WATER USE IS TO BE AUTHORISED

The life of activities at Milly's Star Stop is mainly determined by product market and socio-economic aspects. If the market and socio-economic aspects allow it, the life of Milly's can be unlimited depending on whether the owner decides to discontinue activities in future.

Taking this into consideration a license is requested for the maximum period with a review period of every three (3) years.

7.4 PROPOSED LICENSE CONDITIONS

While it is acknowledged that it is not the responsibility of the report compiler to prescribe licence conditions to the Department of Water and Sanitation (DWS), the following considerations are proposed to support effective regulation and ongoing compliance at Milly's Star Stop.

Monitoring as outlined in this Integrated Water and Waste Management Plan should be implemented at the prescribed frequencies, locations, and for the parameters identified in this document. Continued compliance monitoring is essential to verify the effectiveness of water and waste management measures and to detect potential impacts on water resources.



It is proposed that the Water Use Licence be issued for a validity period of twenty (20) years, subject to five-yearly review, in recognition of the stable, long-term nature of the operations and the established monitoring and management systems in place.

It is further recommended that a formalised Stormwater Management Plan be compiled and maintained to consolidate stormwater controls, inspection regimes, and maintenance procedures, particularly in relation to high-risk operational areas.

In addition, the following measures are recommended to support ongoing compliance and environmental protection:

- Existing stormwater infrastructure and hydrocarbon interceptors should continue to be maintained and inspected on a biannual basis.
- Monthly water quality monitoring should continue in accordance with applicable authorisation and licence requirements.
- Flow meters should be calibrated at least every two years to ensure accurate recording of water use volumes.
- The IWWMP should be reviewed every five years, or sooner should significant operational or infrastructure changes occur.

The proposed licence validity period, together with periodic review and continued monitoring, is considered appropriate given the nature of the activities and the demonstrated commitment to responsible water and waste management at Milly's Star Stop.

A WUL validity period of 20 years is applied for, subject to periodic review, as the operations are stable and long-term in nature.



8 REFERENCES

Department of Water Affairs (DWA), South Africa. 2013a. Government Notice No. 665 of 6 September 2013, Revision of Water Use License in terms of Section 40 of the National Water Act, 1998 (Act No. 36 of 1998). Pretoria.

Department of Water Affairs (DWA), South Africa. 2013b. Registration Guide: Raw Water Related Water Uses, A guide for the registration of Raw Water Use information under the National Water Act, (Act 36 of 1998). Pretoria.

Department of Water Affairs (DWA), South Africa. 2013c. Registration Guide: Waste Discharge Related Water Uses, A guide for the registration of Waste Discharge Water Use information under the National Water Act, (Act 36 of 1998). Pretoria.

Department of Water Affairs (DWA), South Africa. 2013d. National Water Resources Strategy, 2nd Ed. Pretoria.

Department of Water Affairs (DWA), South Africa. 2009. Government Notice No. 1199 of 18 December 2009, Replacement of General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998). Pretoria.

Department of Water Affairs and Forestry (DWAf), South Africa. 2004a. National Water Resources Strategy, 1st Ed. Pretoria.

Department of Water Affairs and Forestry (DWAf), South Africa. 2004b. Government Notice No. 399 of 26 March 2004, Revision of General Authorisations in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998). Pretoria.

Department of Water Affairs and Forestry (DWAf), South Africa. 1996a. South African Water Quality Guidelines, Volume 1: Domestic Use, 2nd Ed. Pretoria.

Department of Water Affairs and Forestry (DWAf), South Africa. 1996b. South African Water Quality Guidelines (2nd Ed.) Volume 7: Aquatic Ecosystems. Pretoria.

Websites:

- Astron Energy: www.astronenergy.co.za (Date of access: 07/01/2026)
- Department of Water & Sanitation (DWS). Water Resource Classification – Active Projects. Project reports. <https://www.dws.gov.za/rdm/WRCS/kft.aspx> (Date of access: 13/01/2026)
- Millys Star Stop weather and climate. Meteoblue <http://www.meteoblue.com> (Date of access: 12/01/2026)