KNOWLEDGE TO ENVIRONMENTAL SOLUTIONS

WATER MONITORING REPORT

Renergen: Storm Water Dam

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DISCLAIMER

TABLE OF CONTENTS

1. INTRODUCTION

iWater has recognized the need for directing the **specific analyses** selected, followed by accurate analysis to support clients to achieve compliance in their environmental management strategies. We offer a selection of quality tests for any type of environmental or waste sample. We do not select standard packages but use expert advice to support the client to decide on the most appropriate tests to create a comprehensive understanding of the site compliance**. iWater operates its in-house laboratory and development centre, but data is also independently verified with aligned SANAS accredited partners**.

iWater's qualified and expert staff is always available to assist any client to understand chemical and microbial results, while our knowledge, as well as international experts, are geared to remedy any situation. Monitoring is only a tool to support effective resource management, therefore iWater is a leader in supplying innovative sustainable solutions for water and soil remediation.

2. SAMPLING

iWater received water samples from Mr Kabelo Duiker from Renergen on the 10th of June 2024. The water sample was collected from the storm water dam (SWD) on site. The sample was analysed by an independent SANAS laboratory within 48 hours. Data is discussed below.

The aim is to determine if the water sample complies with the wastewater limits as stipulated in the GA standards as given by the National Water Act 1998 (ACT No. 36 of 1998).

3. RESULTS

3.1 Microbial

Table 1: Microbial results for the SWD water sample June 2024

Determinant	Units	SANS 241:(2015) Limits	2013 GN 665 GA	Risk[1]	SWD June
Faecal coliforms	cfu/100 ml	10	1000	Operational	<1
E. coli	cfu/100 ml	0		Acute Health Micro	<1

There were no faecal coliforms or *E. coli* bacteria detected in the SWD water sample and the water complies to SANS 241: (2015) standards for drinking water as well as GA standards for wastewater.

3.2 Chemical

Table 2: Chemical results of SWD water sample June 2024.

Determinants	Units	2013 GN 665 Limits[1]	SWD June
Alkalinity	mg $CaCO_3$/L		162
Electrical conductivity (EC)	mS/m	<200	56.6
pH	pH units	5.0 – 9.0	7.91
Total Hardness	mg/L		130
Total Suspended Solids (TSS)	mg/L	<25	**47.2**
Total Dissolved Solids (TDS)	mg/L		323
Turbidity	NTU		34.0
Chemical Oxygen Demand (COD)	mg/L	<75	**72.0**
Chlorine (Free)	mg/L	<0.25	<0.1
Ammonia	mg/L	<6	0.64
Calcium as Ca	mg/L		25.8
Chloride as Cl	mg/L		50.2

Fluoride as F	mg/L	<1	0.63
Soap, oil and grease	mg/L	<2.5	1.6
Magnesium as Mg	mg/L		16.0
Nitrate as N	mg/L	<15	<0.35
Nitrite	mg/L		<0.01
Ortho Phosphate	mg/L	<10	<0.03
Potassium as K	mg/L		16.5
Sodium as Na	mg/L		58.3
Silicon as Si	mg/L		0.13
Sulphate as SO_4	mg/L		57.4
Aluminium as Al	mg/L		0.12
Antimony as Sb	mg/L		<0.01
Arsenic as As	mg/L	<0.02	<0.009
Boron as Bo	mg/L	<1	0.02
Cadmium as Cd	mg/L	<0.005	<0.002
Chromium as Cr	mg/L	<0.05	<0.01
Cobalt as Co	mg/L		<0.01
Copper as Cu	mg/L	<0.01	<0.01
Cyanide (Free)	mg/L	<0.02	<0.01
Total iron (acid treated)	mg/L		0.50
Iron as Fe	mg/L	<0.3	0.10
Lead as Pb	mg/L	<0.01	<0.01
Manganese as Mn	mg/L	<0.1	<0.01
Mercury as Hg	mg/L	<0.005	<0.003
Nickel as Ni	mg/L		<0.01
Selenium as Se	mg/L	<0.02	<0.02
Zinc as Zn	mg/L	<0.1	<0.01
Total Organic Carbon (TOC)	mg/L		**25.6**

The chemical data indicated elevated levels of total suspended solids in the storm water dam sample and the value exceed the limits of GA standards as given by the National Water Act 1998 (ACT No. 36 of 1998).

The high suspended solids and TOC are likely to decrease dissolved oxygen levels in the water which can negatively affect aquatic health when water is released into the environment.

4. TREATMENT OPTIONS

A silica sand filter is a widely used filtration device that removes suspended particles from water by passing it through a bed of silica sand. This process is common in water treatment and industrial applications due to its simplicity and effectiveness. The filtration process begins with the introduction of feed water into the filter tank, where it is evenly distributed across the surface of the silica sand bed to ensure uniform filtration. As the water percolates through the layers of silica sand, suspended particles, debris, and impurities are trapped in the sand bed through physical straining and adsorption. The filtered water, free of suspended solids, is then collected at the bottom of the filter and directed to the clean water outlet.

However, there are also some drawbacks to silica sand filters. They require frequent maintenance, including regular backwashing, and are not effective in removing very fine particles, dissolved substances without additional treatment. Usually before selecting the matrix sizes a particle size distribution analysis is done to select the most appropriate matrix. The backwashing process generates wastewater that needs to be managed and treated, and over time, the sand may need to be replaced or replenished, adding to maintenance costs. Despite these limitations, silica sand filters remain a reliable and cost-effective solution for water filtration, providing effective removal of suspended solids and improving water quality for various applications.

Alternatively, a Granular Activated Carbon (GAC) filter can be installed, especially if a large portion of TSS is organic matter. GAC is a highly porous adsorption media commonly used in water treatment to remove organic contaminants, chlorine, odours, and other impurities. GAC is widely used in drinking water purification, wastewater treatment, and industrial processes due to its high efficiency in removing a wide range of pollutants and improving water quality.

Contact time and vessel size is a process engineering principle for efficient filtration.

Please feel free to engage with us if you have any questions.

This report only reflects the analysis and safety for the batch water source of the supplied water samples.