

DRAFT BASIC ASSESSMENT REPORT

FOR THE PROPOSED CONSTRUCTION AND MAINTENANCE OF NEW SYSTEM 1 AT RAND WATER VEREENIGING TREATMENT WORKS, INSTALLATION OF APPROXIMATELY 7 KM PHASE 2 SLUDGE PIPELINE IN VEREENIGING, 1.5 KM SLUDGE LINE IN PANFONTEIN AND ASSOCIATED INFRASTRUCTURE WITHIN THE JURISDICTION OF SEDIBENG DISTRICT MUNICIPALITY, GAUTENG PROVINCE

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APPROVAL

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EXECUTIVE SUMMARY

I. Project Description and Location

Rand Water proposes the Construction and Maintenance of the New System 1 at the Vereeniging Water Treatment Works, along with the Installation of an approximately 7 km Sludge Pipeline (Phase 2) in Vereeniging and a 1.5 km Sludge Pipeline in Panfontein. These developments are located within the jurisdiction of the Sedibeng District Municipality in the Gauteng Province and span across three distinct sites: Vereeniging Water Treatment Works (New System 1) and the Phase 2 Sludge Pipeline which are located within Emfuleni Local Municipality, and the Panfontein Sludge Pipeline located within Midvaal Local Municipality.

The proposed Infrastructure Upgrades are necessitated by current operational inefficiencies, the deterioration of aging infrastructure, and the resultant risks posed to water quality and supply. The proposed project spans three locations but remains within the jurisdiction of the Servitude of Rand Water within the Sedibeng District Municipality, Gauteng Province, South Africa

▪ New System 1 at Vereeniging Treatment Works.

The Vereeniging New System 1 at Rand Water Vereeniging Treatment Works will consist of the following infrastructure but not limited to:

- Construction of a new 250 MLD flocculator and 225 MLD sedimentation tank.
- Installation of the de-sludge bridge.
- Construction of access roads.
- Installation of a raw water pipeline.
- Installation of a sludge pipeline.
- Demolition of System 1 tank (90 MLD) to allow for the installation of a new automated system capable of producing 1400 MLD.
- Construction of a Laboratory and
- The installation of a new Carbon Dioxide dosing Carbonisation Bay.

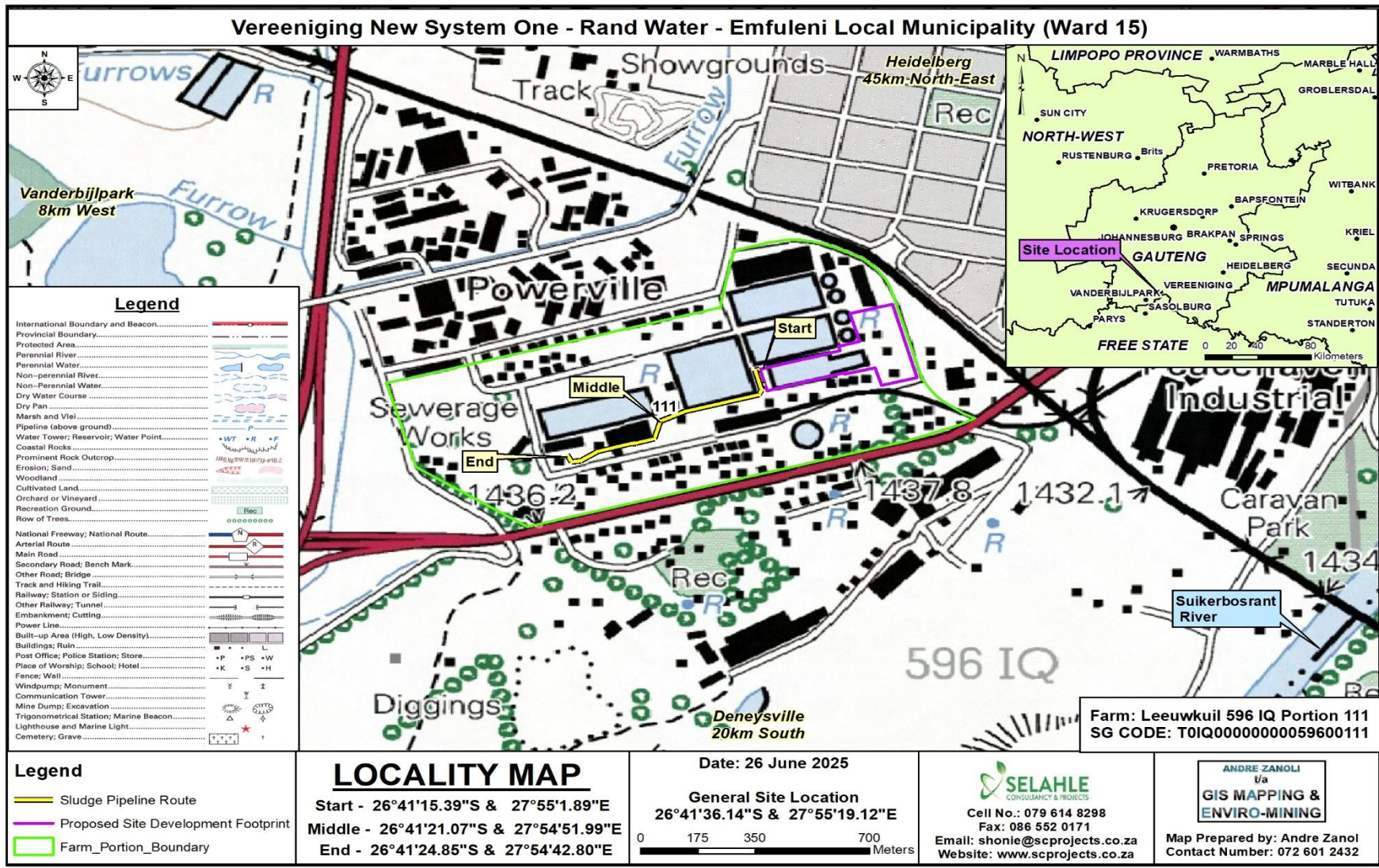


Figure 1: New System 1 Locality Map

▪ **Phase 2 Sludge Pipeline in Vereeniging**

The sludge pipeline will comprise, but not be limited to, steel pipe sections, cathodic protection (CP) units, valves, and other associated infrastructure.

- Phase 2 of the sludge pipeline transverse from the sludge pumping station inside Vereeniging Treatment Works and runs through mostly an established industrial area in the south of Vereeniging.
- The proposed sludge pipeline runs alongside as well as across some of these services, which also include Rand Water Bulk Water Pipelines to the Vaal River Crossing.
- The installation and Maintenance of approximately 7 km in length of 1000mm nominal internal diameter steel sludge pipe with an 8mm wall thickness to be laid from the Vereeniging Pumping Station to the Vaal River Crossing.

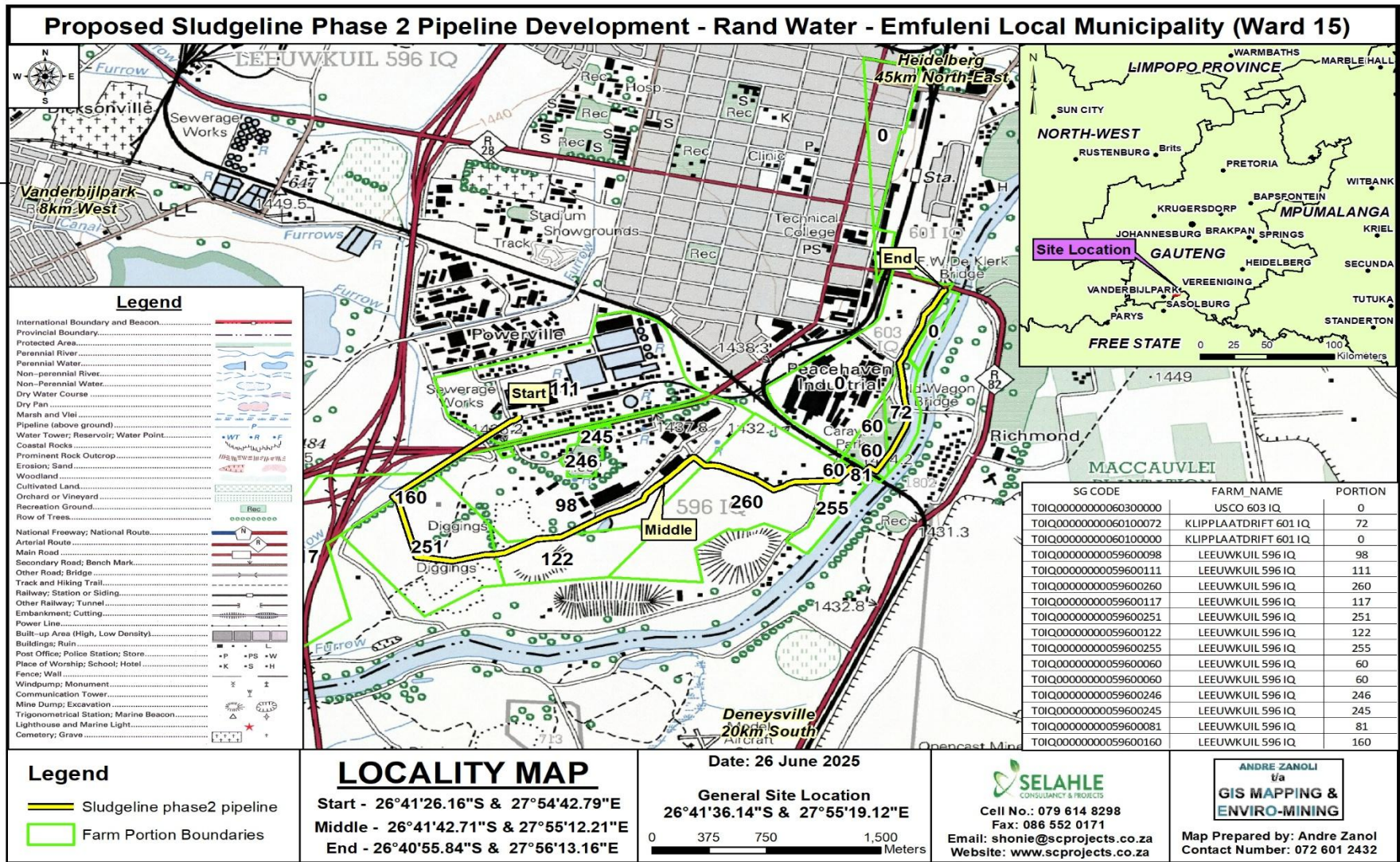


Figure 2: Phase 2 Sludge Pipeline Locality Map

- **Panfontein Sludge Pipeline**

The proposed Panfontein Sludge Pipeline will consist of the installation of a new interconnecting sludge pipeline, approximately 1.5 km in length and 800 mm in diameter. The pipeline will comprise, but not be limited to, steel pipe sections, cathodic protection (CP) units, valves, and other associated infrastructure.

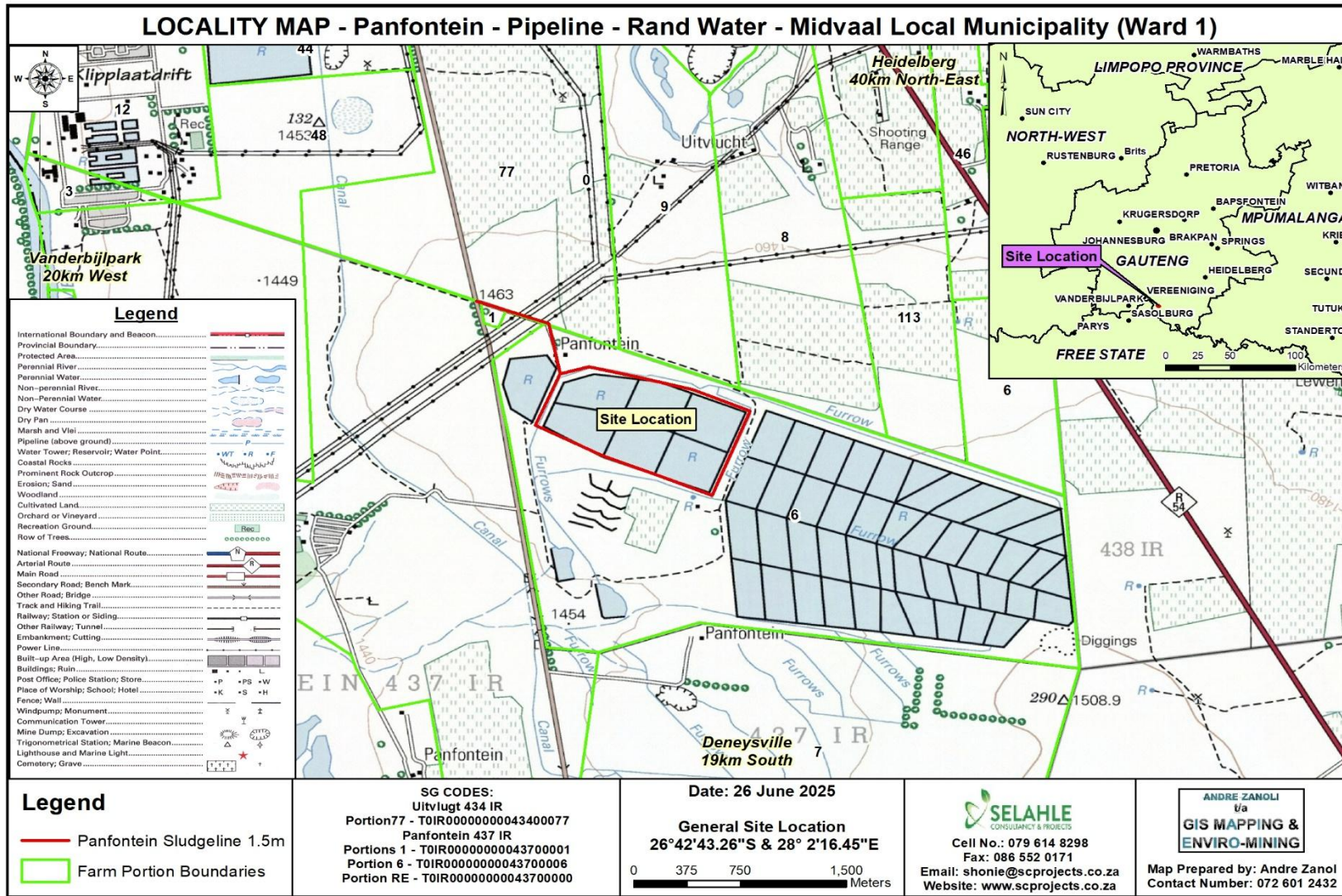


Figure 3: Panfontein Locality Map

II. Triggered Activities

The proposed development triggers the activities listed below in terms of the EIA Regulations, 2014, as amended, promulgated under the National Environmental Management Act (Act No. 107 of 1998). All potential impacts related to these Listed Activities are being evaluated and thoroughly assessed in this Basic Assessment process.

- Listing Notice 1 – Activity 9, 10(i), 12 (ii) (c), 13, 19 and 27
- Listing Notice 3 – Activity 12(c)(ii) and 14(ii)(c)

III. Other Authorisations Required

The Water Use License

The proposed Sludge Pipeline Installation falls within the 500m regulated area of a watercourse and based on the Aquatic assessment study conducted by the Biodiversity Company, Seepage wetlands were identified at the Panfontein site where the 1.5 km Sludge Pipeline is proposed, therefore proposed sludge lines require an authorisation under the National Water Act, 1998 (Act No. 36 of 1998). The proposed triggers Section 21(c) and 21(i), relating to the impeding or diverting of water flow and altering watercourse characteristics. The Water Use License Application (WULA) process is currently underway.

Heritage Impact Permits

The proposed activities at the Rand Water Vereeniging Treatment Works require a Heritage Permit, as the facility is believed to be over 100 years old and of historical significance. In accordance with Section 34(1) of the National Heritage Resources Act, a Permit Application will be submitted to the Gauteng Provincial Heritage Resources Authority (PHRA-G). A Heritage Specialist has been appointed to conduct the necessary impact assessment. Additionally, the South African Heritage Resources Authority (SAHRA) will be notified under Sections 38(1)(a) and 38(c)(i), as the project involves linear development exceeding 300 metres.

IV. Needs & Desirability

The Need for the Proposed Development

The need for the proposed developments is evident. The New System 1 at the Vereeniging Water Treatment Works has been out of operation for over two decades due to extensive structural damage and outdated design. Therefore, rehabilitating the outdated system is neither cost-effective nor sustainable. Instead, replacing it with a modern, automated sedimentation tank and Flocculator is crucial for restoring lost capacity, improving reliability, and ensuring that water production remains stable even when other tanks are taken offline for maintenance. The new system's automated features also reduce the need for manual intervention, lower operational costs, and increase efficiency in sludge removal.

Sludge management is another tenacious issue. The existing sludge pipeline between Vereeniging and Zuikerbosch is in a deteriorating condition and presents a serious operational risk. Pipeline failure would result in the rapid accumulation of sludge in the treatment tanks, potentially halting operations

and compromising water quality. The installation of the Phase 2 Sludge Pipeline and the Panfontein Sludge pipeline are therefore essential to ensure continuous and reliable sludge transport, avoid unplanned shutdowns, and protect water quality. In addition, these upgrades introduce redundancy and flexibility to the existing system, reducing reliance on a single line and allowing for maintenance and upgrades without operational disruptions.

- **The Desirability of the Proposed Development**

Section 24 of the Constitution of the Republic of South Africa, 1996 (Act No.198 of 1996), states that “Everyone has the right—(a) to an environment that is not harmful to their health or well-being; “. The project contributes significantly to public health, environmental protection, and sustainable service delivery. Reliable access to clean water supports the community’s wellbeing and industrial development, while improved sludge management safeguards surrounding ecosystems from pollution risks. The proposed development will ensure compliance with relevant Environmental Legislation, including the National Water Act, 1998, and the National Environmental Management Act, 1998 (NEMA), and ensure that sludge disposal is managed in line with regulated waste management practices. Furthermore, the use of modern pipeline materials and protective technologies, such as the CP unit Valves and Steel Pipeline, etc., extends infrastructure lifespan and reduces maintenance costs, enhancing long-term sustainability.

The infrastructure maintenance will also improve climate resilience by replacing vulnerable structures with systems better suited to withstand environmental stressors such as groundwater fluctuations and extreme weather events.

In conclusion, the proposed development is both necessary and desirable. It addresses critical infrastructure and operational challenges, enhances water treatment reliability and resilience, supports environmental protection, and aligns with key policy frameworks. By investing in modern, sustainable, and compliant systems. Rand Water is ensuring the long-term viability and efficiency of the Vereeniging Water Treatment Works and its broader sludge management network.

V. Project Alternatives

After evaluating various options, no practical or suitable alternatives were identified for the proposed project. Only the preferred alternative, a design alternative, and the no-go option were assessed, due to the project being located within the Rand Water servitude.

- **Preferred alternative (Proposal)**

The preferred alternative entails the construction and maintenance of New System 1 at the Rand Water Vereeniging Treatment Works, the Installation of approximately 7 km of Phase 2 Sludge Pipeline, and a 1.5 km Sludge line in Panfontein, along with Associated Infrastructure. This option was chosen due to its technical feasibility and operational efficiency. The layout strategically follows existing servitudes to minimise land acquisition and reduce environmental and community impacts, with any necessary deviations limited to areas within Rand Water’s jurisdiction or already disturbed zones.

This alternative incorporates modern engineering designs, including valve chambers, air release mechanisms, and cathodic protection units, to ensure durability and system reliability. A key feature is the cross-connection pipeline at the No.2 Central Sludge Pumphouse, which provides redundancy and operational flexibility during maintenance. Overall, the preferred alternative supports Rand Water's long-term infrastructure goals by addressing inefficiencies associated with ageing systems and reducing environmental disturbance. It also enhances monitoring capabilities, aligns with sustainable development principles, and meets both provincial and national infrastructure planning objectives.

- **Design Alternative (Demolition of old System 1)**

The decision to demolish and replace the existing System 1 at the Vereeniging Water Treatment Works is based on its outdated design, severe structural damage, and operational inefficiencies. Originally built with a capacity of 90 ML/day using vertical sedimentation tanks, the old system required manual sludge removal and suffered from issues such as leaking tanks, cracked outlet flumes, and uplifted tank bases caused by groundwater and expansive soils. These problems led to the complete decommissioning of the system in the early 2000s.

The proposed New System 1 introduces a modern, enclosed horizontal sedimentation design with enhanced flocculators and automated de-sludging, increasing capacity to 225 ML/day. This upgrade improves treatment efficiency, reduces environmental risks, and strengthens operational resilience. Designed to meet current and future water demands, the new system offers a sustainable and technically advanced alternative aligned with Rand Water's long-term infrastructure goals, making replacement a more viable solution than refurbishment. See the figure below.

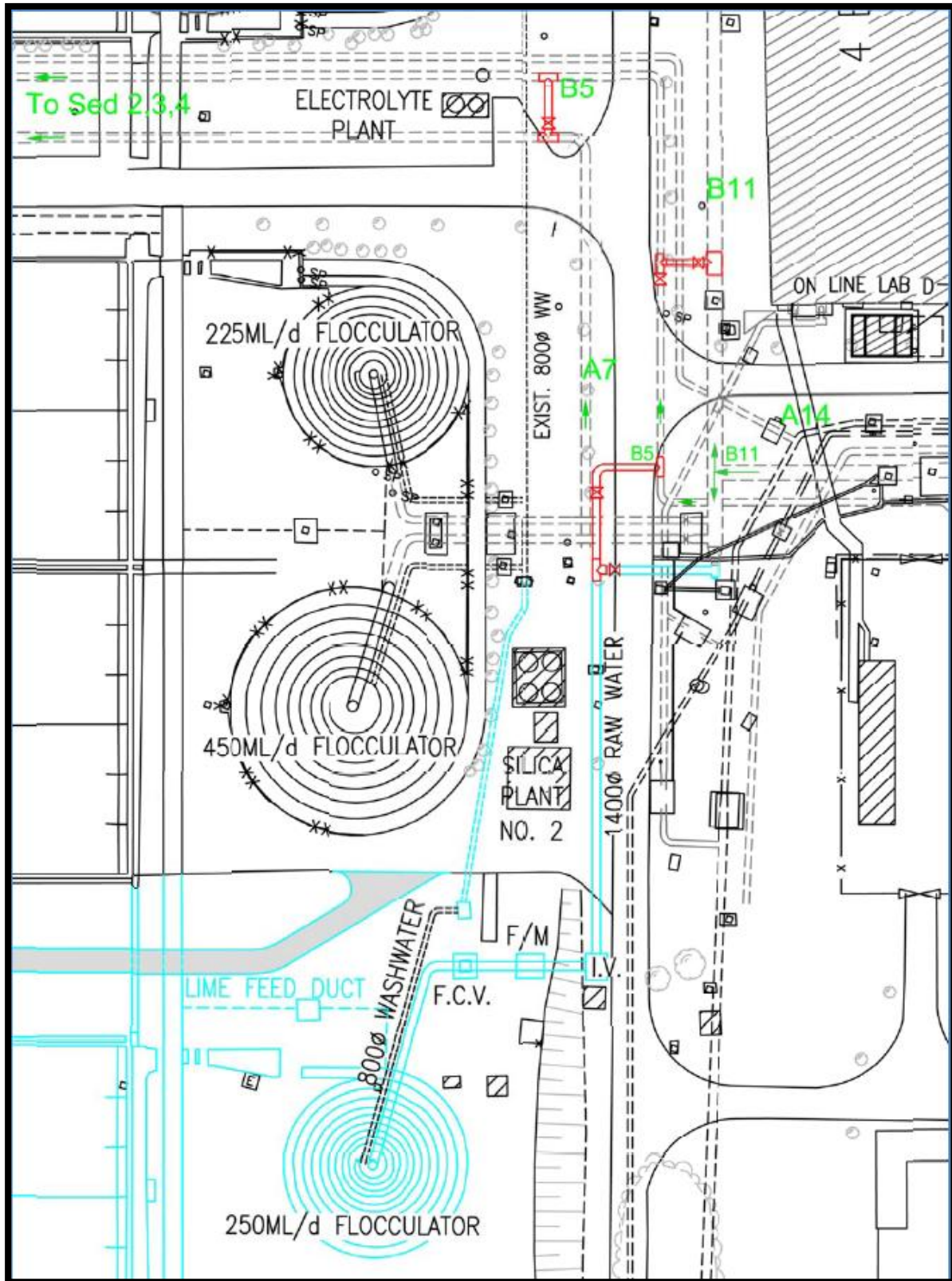


Figure 4: Flocculators design with its associated infrastructure

- **No-Go Alternative**

The No-Go Alternative refers to the scenario in which the proposed construction and maintenance of New System 1 at the Rand Water Vereeniging Treatment Works, the installation of the Phase 2 Sludge Pipeline, Panfontein Sludge Line, and Associated Infrastructure, do not proceed. The no-go alternative is not preferred.

Should this alternative be considered, the sites would remain in their current state, characterised by outdated infrastructure, non-functional systems. Such conditions would obstruct effective maintenance, limit treatment capacity, and elevate both health and environmental risks. Furthermore, it would also conflict with national goals for water infrastructure development and fail to meet growing water demands. Consequently, this alternative is deemed not viable, as it would adversely affect operational reliability, compromise water quality.

VI. Public Participation

The Public Participation Process was undertaken as part of the Basic Assessment Process for the Proposed Developments. The process was undertaken to ensure compliance regarding the requirements in terms of the EIA Regulations, 2014 (as amended), published under the National Environmental Management Act (Act No. 107 of 1998, as amended).

The Public Participation Process (PPP) was undertaken to ensure compliance with Regulation 19(1)(a) of the EIA Regulations, 2014 (as amended). The PPP was conducted between 16 April 2025 – 22 May 2025, and documents that were submitted to the Organs of State, Stakeholders, and Interested & Affected Parties were:

- Background Information Documents that were accompanied by the comment sheet were distributed to all Interested and Affected Parties, Organs of State, and other Stakeholders between 16 April 2025 – 22 May 2025.
- A mandatory advertisement, to announce the intention to conduct a Basic Assessment process, was published on the Southern Star and Northern Star on the editions that were published on 15 and 16 April 2025, respectively.
- Site notices were erected on 16 April 2025.
- Interested and Affected Parties and other key stakeholders were directly informed of the proposed development by e-mail on 17 April 2025.

The CRR will be updated continuously and will be presented to the authorities and other I&APs together with the consultation and final reports as a full record of issues raised, including responses on how the issues were considered during the application process.

VII. Specialist Studies

Specialist Studies and Compliance statements were conducted for the Proposed Construction and Maintenance of New System 1 at Rand Water Vereeniging Treatment Works, Installation of approximately 7 Km Phase 2 Sludge Pipeline in Vereeniging, 1.5 Km Sludge line in Panfontein and

associated infrastructure within the jurisdiction of Sedibeng District Municipality, Gauteng Province. The specialist reports were conducted in line with the protocol requirements in accordance with Government Notice No. 648 and Appendix 6 of the EIA Regulations, 2014 as amended. The findings and recommendations from the specialists were included in this report as well as the EMP. The impacts were incorporated to assess and decide on the best practicable environmental option.

AGRICULTURAL COMPLIANCE STATEMENT

An agricultural Compliance Statement was undertaken on the 9th of April 2025 by KMG Environmental Solutions Services. This study was an exemption from a full impact assessment study, as it was the opinion of the specialist to exempt a full study but to give a compliance statement of the same. This study was done in line with the protocol requirement in terms of Government Notice No. 648, Gazetted on 10 May 2019 have been undertaken accordingly.

During the inspection the Specialist confirmed that the proposed developments (New System 1, Phase 2 Sludge pipeline and the Panfontein Sludge pipeline) are situated on land that is either urban and industrial in nature which are classified as low-potential agricultural land, with no current or foreseeable agricultural activities taking place in any of the affected zones. The key findings of the compliance assessment indicated that no high-value agricultural land will be affected, and no land currently under cultivation or formal agricultural production will be disturbed. The construction footprint falls largely within existing servitudes, disturbed zones, and built-up areas. The impact on soil structure, fertility, or future agricultural use is considered temporary and reversible, provided that proper rehabilitation practices are implemented.

The impact of the proposed developments on the agricultural production potential of the site has been assessed and is considered to be acceptable, with no significant impact anticipated on agricultural potential or ongoing production. Provided that the recommended mitigation measures are implemented, the site can be restored to a stable condition post-construction, thereby ensuring long-term environmental sustainability and land use compatibility.

TERRESTRIAL BIODIVERSITY ASSESSMENT STUDY

The terrestrial Biodiversity Assessment for all proposed development sites was conducted on the 16th of April 2025, by Eco-Sentle Pty Ltd below are the findings per proposed development site.

- Proposed New System 1 in Vereeniging

The New System 1 site at the Rand Water Vereeniging Treatment Works falls within the Soweto Highveld Grassland ecosystem and is characterised by Habitat Unit 1, a moderately transformed depression that resembles an incomplete aeration basin. This habitat supports wetland vegetation at the base and alien-invaded grassland along the periphery. Dominant plant species include *Searsia lancea*, *Pinus palustris*, *Phragmites australis*, and grasses like *Themeda triandra* and *Eragrostis curvula*. The terrestrial ecological condition is impacted by existing infrastructure from the water treatment works. No species of conservation concern were identified during the field survey, but the presence of invasive species such as bug weed and pampas grass was noted. The site was assigned a low to moderate ecological sensitivity due to its altered condition.

- Phase 2 Sludge Pipeline – Vereeniging

The proposed Phase 2 sludge pipeline falls within the Soweto Highveld Grassland ecosystem, and the route intersects Habitat Units 2 and 3. Habitat Unit 2 includes grassland disturbed by historic sand mining activities, while Habitat Unit 3 features riparian characteristics due to proximity to the Vaal River. Both habitats show signs of urban impact, including illegal dumping and industrial activity. Despite the transformed nature of the landscape, these units retain moderate ecological importance because of their partial connectivity to the Vaal River ecosystem. No faunal species of conservation concern were recorded during the field visit. However, the habitat still plays a role in supporting the fauna and flora and thus requires mitigation during construction.

- Panfontein Sludge Pipeline

The Panfontein sludge pipeline is situated within the Central Free State Grassland ecosystem and traverses Habitat Unit 4, a highly disturbed area dominated by artificial sludge ponds and surrounded by agricultural land. The vegetation is largely limited to low shrubs and ruderal grasses, with no conservation-important species detected. The site exhibits low ecological sensitivity and importance, with little to no functional biodiversity value. Despite the low rating, it is recommended that good environmental practice be maintained to prevent further degradation and the spread of invasive species.

WETLAND ASSESSMENT STUDY

The Wetland Assessment for all proposed development sites was conducted on the 09th of April 2025, by the Biodiversity Company Pty Ltd below are the findings per proposed development site.

- Proposed New System 1 in Vereeniging and Phase 2 Sludge Pipeline

The site inspection identified multiple freshwater features within the 500m of the Project Area of Influence, including the Vaal River (classified as HGM 1) and several seep wetlands (HGM 1–4). The Vaal River was rated with high ecological importance and sensitivity, while the seeps were rated moderate. The Present Ecological State scores ranged from Category D (largely modified) to Category F (critically modified), indicating heavy transformation but also ecological relevance. The Recommended Ecological Category for the Vaal River was Category C/D, with an objective to maintain current conditions. Furthermore, the Phase 2 Sludge pipeline traverses several seep wetlands and runs parallel to the Vaal River. The ecological role of these features such as sediment trapping, flow attenuation, and habitat provision remains important, even though their current condition is degraded.

- Panfontein Sludge Pipeline

The site inspection for the Panfontein site revealed a seep wetland (HGM 5-10), though they are in a poor ecological state (Category E/F) and show low functionality. These features are heavily degraded due to historical disturbance from water treatment infrastructure and agriculture.

GEOTECHNICAL ASSESSMENT STUDY

The Geotechnical assessment studies for the proposed developments were undertaken by different consultants across the various components of the project. Knight Piésold conducted the geotechnical investigation for the New System 1 in May 2019. The Phase 2 Sludge Pipeline study was carried out by Lilibara Projects (Pty) Ltd in November 2016, while the assessment for the Panfontein Sludge Pipeline was undertaken by Mbali Industrial Solutions CC in July 2023. The findings for each proposed development site are summarised below.

- Proposed New System 1 in Vereeniging

The site is underlain by variable soil profiles associated with the Vryheid Formation of the Ecca Group, comprising interbedded sandstone, mudrock, and shale. Subsurface investigations identified inconsistent stratigraphy, with fill materials, alluvium, residual soils, and highly expansive clays, especially prominent on the western side of the footprint. These clayey soils exhibit high plasticity, posing a risk of significant volume change under varying moisture conditions. Compounding the design complexity is the shallow water table, encountered within 1.6 meters below ground level, creating the need for targeted dewatering during construction. Notably, large portions of the old System 1 structures remain only partially demolished, and their presence influences both foundation preparation and excavation logistics.

The reuse of concrete rubble from demolished structures is also encouraged where feasible, provided it is adequately processed and reinforcement is removed.

- Phase 2 Sludge Pipeline

The Phase 2 Sludge Pipeline involved test pit excavations every 250 meters along the pipeline route, supported by a desktop study and laboratory testing. The area is underlain by Quaternary deposits including alluvium and aeolian sands, along with shales, mudstones, and sandstones of the Ecca Group from the Karoo Supergroup. The soils were predominantly silt- and clay-rich, which rendered them unsuitable for use as bedding material, with most classified as G9 or worse according to TRH14 guidelines. Groundwater seepage was encountered in several locations, indicating the need for dewatering during construction. Although the soils were generally classified as soft and excavatable by TLB, unstable trench walls were reported at some locations, necessitating sloping (battering) or shoring for safety. Laboratory analysis confirmed moderate soil corrosivity, implying a need for corrosion protection of buried steel components.

- Panfontein Sludge Pipeline

The Panfontein site revealed that the subsurface profile consists of fill material, aeolian sands, residual soils, and basalt bedrock belonging to the Kliprieviersberg Group. The investigation involved test pits, Dynamic Cone Penetration (DCP) testing, percolation tests, and laboratory analysis of soil samples. The findings indicated highly variable soil strength across the site, as reflected by fluctuating EASBP values, which suggest the presence of potentially weak zones requiring ground improvement prior to foundation construction. The soils showed moderate to high expansivity and corrosivity, posing significant risks to unprotected concrete, steel, and fibre cement infrastructure. No groundwater was encountered within the depth of investigation (1.5 m), and soils were generally

excavatable using a Tractor-Loader-Backhoe (TLB). Due to the presence of aggressive soils, corrosion protection measures are essential for all buried infrastructure. The environmental and construction implications include risks of foundation instability, accelerated material degradation, poor surface water drainage, and trench collapse due to inconsistent soil strength.

The Hydrology, Geohydrology, Floodline assessments and the Stormwater Management Plan for the proposed developments were undertaken by Aryis Consulting (Pty) Ltd on the 9th of April 2025. Below the findings for each proposed development site per the study are summarised below.

STORM WATER MANAGEMENT PLAN

- Proposed New System 1 in Vereeniging

At the New System 1 site in Vereeniging, the SWMP identified a high potential for runoff generation due to the presence of paved surfaces, rooftops, and large buildings associated with the Vereeniging Treatment Water Works. The area is part of a developed urban zone with an existing stormwater network. However, the construction of new infrastructure such as the flocculators and the Sedimentation tanks and other associated infrastructures will introduce the risk of increased runoff velocity, erosion, and contamination if not properly addressed. The nearby Vaal River is a key receptor and must be protected against suspended solids and chemical runoff.

- Phase 2 Sludge Pipeline

In the case of the Phase 2 sludge pipeline the stormwater challenge are particularly noticeable during construction due to the linear and exposed nature of the trenching activities. The Phase 2 Sludge Pipeline crosses both urban and peri-urban areas, some with existing stormwater infrastructure, while others are entirely undeveloped. This variation increases the complexity of stormwater management across the alignment. Uncontrolled runoff from site clearing, vehicle movement, stockpiling of materials, and accidental spills of hydrocarbons pose a significant risk to surface water receptors.

- Panfontein Sludge Pipeline

In the Panfontein area, the surrounding region is generally less urbanised and has a more rural character, there is still a clear risk of sediment-laden runoff, especially during the construction phase. The drying beds and related infrastructure are expected to influence local drainage patterns, with potential flow of stormwater into adjacent catchments if not properly managed. The topography suggests that water drains away from the drying ponds, however, this could change if heavy storm events or poor site practices alter natural flow paths.

HYDROLOGICAL ASSESSMENT STUDY

- Proposed New System 1 in Vereeniging

The hydrological study that was conducted on the 9th of April 2025 revealed that the infrastructure is situated near a moderately sensitive surface water environment. The Vaal River, which runs adjacent to the proposed development, is a significant receptor that could be affected by project-related

activities. During construction, clearance of topsoil and vegetation, along with machinery movement, could lead to sedimentation and water quality deterioration. The proposed development will introduce the risk of effluent spills and hydrocarbon leakage from storage areas, all of which can impact downstream watercourses.

- Phase 2 Sludge Pipeline

The assessment indicated that the Phase 2 Sludge Pipeline is situated closer to surface water-sensitive zones, particularly the Vaal River. The area's Present Ecological State (PES) is classified as Category C, suggesting that it is moderately modified and therefore vulnerable to further degradation. During the construction phase, major impacts identified include erosion, surface water pollution from machinery and hydrocarbons, and potential interference with natural drainage patterns. The downstream areas of the Phase 2 sludge pipeline, the area has flat terrain and proximity to aquatic systems heighten the risk of cumulative surface water impacts. The loosely compacted soils in these areas, present a risk of sedimentation and erosion.

- Panfontein Sludge Pipeline

The hydrological assessment revealed that the Panfontein section of the sludge line lies outside the 500 m buffer zones of identified wetlands, indicating a relatively lower surface water sensitivity compared to other parts of the project. However, the presence of construction activities still presents potential risks to water quality, particularly from accidental hydrocarbon spillages and sedimentation due to vegetation clearance and soil disturbance. While the general hydrological regime does not suggest a high flood risk for this area, the possibility of localized impacts, such as erosion and pollution, remains if unmanaged.

FLOODLINE ASSESSMENT STUDY

- Proposed New System 1 in Vereeniging

According to the floodline assessment conducted on the 9th of April 2025 shows that the New System 1 site lies within the broader floodplain of the Vaal River and is potentially affected during flood releases from the Vaal Dam. While the Vaal Dam itself attenuates flood volumes significantly, the assessment confirmed that under extreme events, certain sections of the proposed infrastructure may experience partial flood. The flat topography further compounds flood risks, as water is likely to accumulate in low-gradient zones without efficient drainage.

- Phase 2 Sludge Pipeline

The floodline study revealed that significant portions of the Phase 2 sludge pipeline, particularly those adjacent to the Vaal River, are at considerable risk of inundation during medium (1:10-year) and high (1:100-year) flow scenarios. Hydraulic simulations using peak flows of 1 800 m³/s demonstrated that many low-lying segments could be flooded, which may jeopardize pipeline integrity and operation. The modelling was based on 5 m contour data and terrain analysis, but uncertainties remain due to interpolation errors. The section of the Phase 2 sludge pipeline where the topography flattens out and approaches natural watercourses, the model predicts notable flood risk. These areas are highly

vulnerable to inundation when the Vaal Dam releases floodwaters exceeding operational thresholds. Due to modelling limitations such as lack of high-resolution survey data and incomplete representation of bridges and culverts the exact extent of the flooding remains uncertain.

- Panfontein Sludge Pipeline

The floodline assessment for the Panfontein sludge pipeline showed that this area is less susceptible to direct flooding from the Vaal River, largely due to its distance from the main river channel and slightly elevated terrain. The modelling did not identify significant inundation risks at this particular section under medium flow release scenarios from the Vaal Dam. However, some uncertainty remains due to the lack of high-resolution topographic data

HERITAGE IMPACT ASSESSMENT STUDY

- Proposed New System 1 in Vereeniging

The Heritage impact assessment conducted on the 11th of July 2025 revealed that the New System 1 site at the Vereeniging Treatment Works is located within a landscape of historical and industrial significance. The area contains demolished building foundations, old, rusted infrastructure, water canals, and structures associated with water treatment systems. According to archival sources, the Rand Water system in Vereeniging dates back to the 1920s, having evolved into a critical infrastructure component in response to water demand in Johannesburg. Although the structures exceed 60 years in age, they are not associated with any notable historical events or individuals and do not hold significant architectural or cultural value. Consequently, the site was assessed as having medium local significance due to its age but limited broader heritage importance. No artefacts were found on the surface, and no fatal heritage constraints were identified that would hinder development.

- Phase 2 Sludge Pipeline

The assessment of the Phase 2 Sludge Pipeline revealed that the proposed route traverses a highly disturbed industrial landscape, often running alongside or across existing infrastructure such as roads and water pipelines. During the field survey, a few old buildings exhibiting Edwardian architectural features were observed a few metres away from the proposed pipeline route. These buildings, while architecturally interesting and dating to a period of historical relevance, do not fall within the actual development footprint and are therefore not under direct threat from construction activities. No archaeological materials or heritage resources were identified within the proposed development area itself. The heritage and cultural significance of the site was assessed to be low, with no notable archaeological features or structures located on-site. As such, the potential impact to heritage resources is minimal.

- Panfontein Sludge Pipeline

The Panfontein Sludge Pipeline lies in a geologically and archaeologically significant region shaped by the Vaal River and its tributaries, the site is heavily disturbed and overgrown in places, with visible signs of infrastructure development and erosion. During the field investigation, no surface artefacts or indicators of cultural heritage resources, including those from the Stone Age or Iron Age, were

observed within the proposed development footprint. The absence of archaeological materials may be attributed to existing infrastructure and soil disturbance. The site's cultural and heritage significance was therefore deemed low, with no mitigation required beyond standard precautionary measures.

ACRONYMS & ABBREVIATIONS

CA	Competent Authority
CBA	Critical Biodiversity Area
CRR	Comment & Response Report
DBAR	Draft Basic Assessment Report
DFFE	Department of Forestry, Fisheries and the Environment (National)
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
ECA	Environment Conservation Act, 1989 No. 73 of 1989)
EMPr	Environmental Management Programme
ESA	Ecological Support Area
GDEnv	Gauteng Department of Environment
GNR	Government Notice Regulation
HIA	Heritage Impact Assessment
I&AP	Interested and Affected Party
IAP	Invasive Alien Plants
IDP	Integrated Development Plan
IEM	Integrated Environmental Management
NDP	National Development Plan
NEMA	National Environmental Management Act, 1998 (Act No. 107 of 1998)
NEMBA	National Environmental Management: Biodiversity Act, (Act No. 10 of 2004)
NFEPA	National Freshwater Ecosystem Priority Area
NHRA	National Heritage Resources Act, 1999 (Act No. 25 of 1999)
NWA	National Water Act, 1998 (Act No. 36 of 1998)
PES	Present Ecological State
PPP	Public Participation Process
SAHRA	South African Heritage Resources Agency
SANBI	South African National Biodiversity Institute
SANS	South African National Standards
SCP	Selahle Consultancy & Projects
SDF	Spatial Development Framework
SEA	Strategic Environmental Assessment
SIA	Social Impact Assessment
SWMP	Storm Water Management Plan
UVB	Unchanneled Valley Bottom
WULA	Water Use License Application

TERMS OF REFERENCE

The primary objective of the Basic Assessment Process is to present sufficient information to the competent authority (DFFE) and interested and affected parties (I&APs) on predicted potential impacts and associated mitigation measures required to avoid or mitigate potential negative impacts, as well as to improve or maximise the potential benefits of the development.

In terms of legal requirements, the EIA Regulations 2014, as amended, regulate and prescribe the content of the Basic Assessment report and specify the type of supporting information that must accompany the submission of the report to the authorities. The table below shows how and where the legal requirements are addressed in this Basic Assessment report. This Draft Basic Assessment report contains the Public Participation undertaken to date. As comments are received on the Basic Assessment Process, these will be consolidated and included in the final Basic Assessment Report.

INFORMATION REQUIRED BY THE COMPETENT AUTHORITY

The Environmental Impact Assessment (EIA) Regulations, promulgated in terms of the National Environmental Management Act (NEMA, Act no. 107 of 1998 as amended) dated 8th of December 2014, were amended in April 2017. In terms of Appendix 1 (3) of the EIA Regulations (2014 and subsequent 2017 amendments), a Basic Assessment Report (BAR) must contain the information that is necessary for the competent authority to consider and come to a decision on the application and must include –

SCOPE OF ASSESSMENT & CONTENT OF BASIC ASSESSMENT REPORTS	Sections
a) Details of - (i) The EAP who prepared the report; and (ii) The expertise of the EAP, including a curriculum vitae.	Section 1
b) The location of the activity, including – (i) The 21-digit Surveyor General code of each cadastral land parcel. (ii) Where available, the physical address and farm name; and (iii) Where the required information in items (i) and (ii) is not available, the coordinates of (iv) the boundary of the property or properties.	Section 3
c) A plan that locates the proposed activity, or activities applied for as well as associated structures and infrastructure at an appropriate scale, or, if it is – (i) A linear activity, a description, and coordinates of the corridor in which the proposed activity or activities is to be undertaken; or (ii) On land where the property has not been defined, the coordinates within which the (iii) activity is to be undertaken.	Section 3
d) A description of the scope of the proposed activity, including – (i) All listed and specified activities triggered and being applied for; and (ii) A description of the activities to be undertaken, including associated structures and	Section 3

SCOPE OF ASSESSMENT & CONTENT OF BASIC ASSESSMENT REPORTS	Sections
(iii) infrastructure.	
<p>e) A description of the policy and legislative context within which the development is proposed including:</p> <ul style="list-style-type: none"> (i) An identification of all legislation, policies, plans, guidelines, spatial tools, municipal development planning frameworks, and instruments that are applicable to this activity and have been considered in the preparation of the report; and (ii) How the proposed activity complies with and responds to the legislation and policy. (iii) context, plans, guidelines, tools frameworks, and instruments. 	Section 4
f) A motivation for the need and desirability for the proposed development including the need and desirability of the activity in the context of the preferred location.	Section 5
g) A motivation for the preferred site, activity, and technology alternative.	Section 6
<p>h) A full description of the process followed to reach the proposed preferred alternative within the site, including –</p> <ul style="list-style-type: none"> (i) Details of all the alternatives considered. (ii) Details of the public participation process undertaken in terms of regulation 41 of the Regulations, including copies of the supporting documents and inputs; (iii) A summary of the issues raised by interested and affected parties, and an indication of the way the issues were incorporated, or the reasons for not including them; (iv) The environmental attributes associated with the alternatives focusing on the geographical, physical, biological, social, economic, heritage and cultural aspects; (v) The impacts and risks which have informed the identification of each alternative, including the nature, significance, consequence, extent, duration and probability of such identified impacts, including the degree to which these impacts – <ul style="list-style-type: none"> (vi) aa. Can be reversed. (vii) bb. May cause irreplaceable loss of resources, and cc. Can be avoided, managed or mitigated; (viii) The methodology used in identifying and ranking the nature, significance, consequences, extent, duration and probability of potential environmental impacts and risks associated (ix) with the alternatives; (x) Positive and negative impacts that the proposed activity and alternatives will have on the environment and on the community that may be affected focusing on geographical, physical, biological, social, economic, heritage and cultural aspects; (xi) The possible mitigation measures that could be applied and level of residual risk; (xii) The outcome of the site selection matrix; 	<p>Section 6, 7 & 8</p> <p>Section 9</p>

SCOPE OF ASSESSMENT & CONTENT OF BASIC ASSESSMENT REPORTS	Sections
<p>(xiii) If no alternatives, including alternative locations for the activity were investigated, the motivation for not considering such; and</p> <p>(xiv) A concluding statement indicating the preferred alternatives, including the preferred</p> <p>(xv) location of the activity.</p>	
<p>i) A full description of the process undertaken to identify, assess and rank the impacts the activity will impose on the preferred location through the life of the activity, including –</p> <p>(i) A description of all environmental issues and risks that were identified during the environmental impact assessment process; and</p> <p>(ii) An assessment of the significance of each issue and risk and an indication of the extent to which the issue and risk could be avoided or addressed by the adoption of mitigation</p> <p>(iii) measures.</p>	Section 9
<p>j) An assessment of each identified potentially significant impact and risk, including –</p> <p>(i) Cumulative impacts;</p> <p>(ii) The nature, significance and consequences of the impact and risk;</p> <p>(iii) The extent and duration of the impact and risk;</p> <p>(iv) The probability of the impact and risk occurring;</p> <p>(v) The degree to which the impact and risk can be reversed;</p> <p>(vi) The degree to which the impact and risk may cause irreplaceable loss of resources; and</p> <p>(vii) The degree to which the impact and risk can be avoided, managed or mitigated.</p>	Section 10
<p>k) Where applicable, a summary of the findings and impact management measures identified in any specialist report complying with Appendix 6 to these Regulations and an indication as to how these findings and recommendations have been included in the final report.</p>	Section 8
<p>l) An environmental impact statement which contains –</p> <p>(i) A summary of the key findings of the environmental impact assessment;</p> <p>(ii) A map at an appropriate scale that superimposes the proposed activity and its associated structures and infrastructure on the environmental sensitivities of the preferred site indicating any areas that should be avoided, including buffers; and</p> <p>(iii) A summary of the positive and negative impacts and risks of the proposed activity and</p> <p>(iv) identified alternatives.</p>	Section
<p>m) Based on the assessment, and where applicable, impact management measures from specialist reports, the recording of the proposed impact management outcomes for inclusion in the EMPr.</p>	Section 10
<p>n) Any aspects which were conditional to the findings of the assessment either by the EAP or specialist which are to be included as conditions of the authorisation.</p>	Section 11

SCOPE OF ASSESSMENT & CONTENT OF BASIC ASSESSMENT REPORTS	Sections
o) A description of any assumptions, uncertainties, and gaps in knowledge which relate to the assessment and mitigation measures proposed.	Section 12
p) A reasoned opinion as to whether the proposed activity should or should not be authorised, and if the opinion is that it should be authorised, any conditions that should be made in respect of that authorisation.	Section 12
q) Where the proposed activity does not include operational aspects, the period for which the environmental authorisation is required, the date on which the activity will be concluded, and the post-construction monitoring requirements finalised.	Section 13
r) An undertaking under oath or affirmation by the EAP in relation to – (i) The correctness of the information provided in the reports; (ii) The inclusion of comments and inputs from stakeholders and I&APs; (iii) The inclusion of inputs and recommendations from the specialist reports where relevant; and (iv) Any information provided by the EAP to interested and affected parties and any responses by the EAP to comments or inputs made by interested and affected (v) parties.	Appendix B
s) Where applicable, details of any financial provision for the rehabilitation, closure, and ongoing post-decommissioning management of negative environmental impacts.	<i>None to date</i>
t) Any specific information that may be required by the competent authority.	Appendix G
u) Any other matters required in terms of section 24 (4)(a) and (b) of the Act.	<i>None to date</i>

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1 DETAILS OF THE EAP

Table 1: Details of EAP

Name of the Environmental Assessment Practitioner	Shonisani Selahle
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1.1 Expertise of the EAP

1.1.1 EAPASA Registered EAP

1.1.2 SACNASP Registered Scientist

1.1.3 SACPCMP Registered Safety Manager

Qualifications

- University of South Africa, BSc Honours, Environmental Management- 2025
- Tshwane University of Technology, N. Diploma Geology – 2010
- NOSA, Implementation of ISO 45001:2018 & ISO 14001:2015

Summary of the EAP's experience

Shonisani Selahle is an Environmental Consultant with more than 14 years of experience in applying the principles of Integrated Environmental Management and in applying the Environmental Legislation to several development projects and initiatives in Southern Africa. She has coordinated and managed several diverse projects and programs related to the Environment and Waste within both the public and private sectors for national and international companies. She has a great understanding of relevant legislation about environment management (NEMA, ECA, NWA, MPRDA, etc).

Curriculum Vitae Shonisani Selahle

- Ability to carry out international environmental legislation research to interpret and incorporate it in proposals/EIAs/BAs
- Understanding and implementation of World Bank Guidelines and Equator Principles into EIA reports
- Technicalities of EIA Guidelines (Pre-consultation; Exemption of Environmental Authorisation, Environmental Screening Studies, Feasibility Studies, Fatal Flaw Studies, Basic Assessment, EIA, Scoping, EIA Public Participation and Appeals)
- Ability to undertake Environmental Authorisation Amendments (Minor and Substantive) Application
- Ability to carry out Occupational Health and Safety Compliance Monitoring and Audits in terms of the Occupational Health and Safety Act and Construction Regulations

- Ability to do EIA Reports independently and incorporate specialist input into reports.
- Ability to compile Environmental Management Plans
- Ability to coordinate Public Participation from call to register to compile issues and response Reports.
- Ability to undertake EIA's/BAs for Renewable energy projects.
- Ability to carry out Environmental Control Officer (ECO) duties (site inspection and site/client auditing) and work independently.
- Ability to liaise with clients and authorities.
- Ability to undertake site rehabilitation using Bioremediation methods for contaminated sites,
- Ability to carry out Occupational Health and Safety Audits,
- Ability to apply Construction Health and Safety Permits with swift responses from the Department of Employment and Labour
- Ability to implement ISO 45001:2018 and ISO 18001:2015 standards per project description for companies.

2 INTRODUCTION & PROJECT BACKGROUND

Rand Water proposes the construction and maintenance of the New System 1 at the Vereeniging Water Treatment Works, along with the installation of an approximately 7 km sludge pipeline (Phase 2) in Vereeniging and a 1.5 km sludge line in Panfontein. These developments are located within the jurisdiction of the Sedibeng District Municipality in the Gauteng Province and span across three distinct sites: the New System 1 at the Vereeniging Water Treatment Works (within Emfuleni Local Municipality), the Phase 2 Sludge Pipeline (also within Emfuleni Local Municipality), and the Panfontein Sludge Pipeline (within Midvaal Local Municipality). The proposed infrastructure upgrades are necessitated by current operational inefficiencies, the deterioration of ageing infrastructure, and the resultant risks posed to water quality and supply.

2.1 New System 1 at Vereeniging Water Treatment Works

The Vereeniging Water Treatment Works was originally designed with five treatment systems (Systems 1–5), collectively capable of producing 1,300 megalitres per day (ML/day). System 1, however, was decommissioned in the early 2000s due to severe structural degradation, including leaking sedimentation tanks, compromised outlet flumes, and ground instability caused by a high-water table and expansive clay soils. These issues led to the tanks lifting out of the ground and necessitated backfilling to prevent further displacement. Additionally, System 1 was constructed using an outdated hopper tank design, which rendered sludge removal labour-intensive and inefficient.

Given that rehabilitating the old system would be nearly as costly as constructing a new one, Rand Water proposes the development of a new, modernised System 1. The proposed infrastructure will consist of a linear horizontal sedimentation tank with a capacity of 225 ML/day, an increase from the previous 90 ML/day and will incorporate an automated de-sludging mechanism. This upgrade is expected to improve operational efficiency significantly and provide adequate standby capacity, enabling the treatment facility to maintain a reliable production output of 1,400 ML/day even when one unit is taken offline for cleaning and maintenance.

2.2 7 km Phase 2 Sludge Pipeline

In support of the New System 1 development, Rand Water also proposes the completion of Phase 2 of the sludge pipeline from Vereeniging to Zuikerbosch. This phase involves the installation of a new section of pipeline extending from the Vereeniging Pumping Station to the Vaal River crossing at Maccauvlei. The purpose of this pipeline is to transport sludge, a by-product of the sedimentation process containing both organic and inorganic matter to the Zuikerbosch facility for further treatment.

The existing sludge pipeline is severely deteriorated and presents a major operational risk. A potential failure could lead to a sludge backlog within three to four days, thereby compromising water quality and possibly necessitating the shutdown of the Vereeniging Treatment Works. The new pipeline will therefore serve as a critical intervention to enhance system resilience and ensure uninterrupted sludge removal and water treatment processes.

2.3 1.5 km Panfontein Sludge Pipeline

The third component of the project entails the construction of a new sludge line from Zuikerbosch to the Panfontein Sludge Disposal Site, located in the Midvaal Local Municipality. Currently, only one sludge pipeline connects Vereeniging to Zuikerbosch, creating limited redundancy and operational risk in the event of pipeline leaks or power failures.

At Zuikerbosch, sludge from both the Vereeniging and Zuikerbosch Water Treatment Works is received at the Sludge Pumphouse, where it is transferred to Panfontein for final processing and disposal. The proposed development will include the installation of a sludge cross-connection at Zuikerbosch and an 800 mm extension of the sludge pipeline to Panfontein. This upgrade is intended to increase operational flexibility, improve reliability, and facilitate more efficient maintenance scheduling.

It is important to note that the Panfontein Sludge Disposal Site is a permitted facility. A permit for the site was issued on 12 November 2003 by the then Department of Water Affairs and Forestry (now the Department of Forestry, Fisheries and the Environment (DFFE) under Section 20 of the Environment Conservation Act (Act 73 of 1989). The permit number is **16/2/7/C212/W157/Y1/P491**.

In November 2023, a Waste Assessment and Classification Study was conducted to evaluate the sludge generated from Rand Water's drinking water treatment processes at both the Zuikerbosch and Vereeniging Water Treatment Works. The sludge, which is pumped to the Panfontein Sludge Disposal Site, was assessed in accordance with physical, health, and environmental hazard criteria.

From a physical hazard perspective, the sludge was found to be non-explosive, non-flammable, and did not exhibit properties of self-ignition upon contact with air or oxidising agents. Furthermore, it does not release toxic gases when exposed to water or acid. In terms of health hazards, the analysis confirmed that the sludge does not contain carcinogenic or mutagenic substances at concentrations of concern. Regarding environmental hazards, the study found that the solubility of hazardous constituents within the sludge is generally low, thereby minimising potential environmental risks under normal disposal conditions. Therefore, the sludge is non-hazardous.

Lastly, a request for a Pre-Application Meeting was submitted to the DFFE on 24 March 2025 after which the EAP received a response from the DFFE on 27 March 2025 (Reference Number: 2025-03-0025). Then DFFE later confirmed via email that a Pre-Application Meeting was scheduled for 23 April 2025. The Pre-Application Meeting was undertaken in order to discuss and agree on various aspects prior to release of the EA application and Draft Basic Assessment Report.

3 PROPOSED DEVELOPMENT DESCRIPTION

3.1 Project Location

The proposed project spans three locations but remains within the jurisdiction of the Servitude of Rand Water within the Sedibeng District Municipality, Gauteng Province, South Africa. The coordinates to the three sites are as follows (refer to the locality maps and the tables below).

3.1.1 New System 1 Vereeniging

The Vereeniging New System 1 at Rand Water Vereeniging Treatment Works will consist of the following infrastructure but not limited to:

- Construction of a new 250 MLD flocculator and 225 MLD sedimentation tank.
- Installation of the de-sludge bridge.
- Construction of access roads.
- Installation of a raw water pipeline.
- Installation of a sludge pipeline.
- Demolition of System 1 tank (90 MLD) to allow for the installation of a new automated system capable of producing 1400 MLD.
- Construction of a Laboratory and
- The installation of a new Carbon Dioxide dosing Carbonisation Bay.

Table 2: Vereeniging New System 1 Location

PROJECT LOCATION	
Province	Gauteng
District	Sedibeng District Municipality
Local Municipalities	Emfuleni Local Municipality
Ward Numbers	15
Nearest Town	Vereeniging
Farm Names and Numbers	LEEUWKUIL 596 IQ
Portion Numbers	Portion 111 of 596
SG Code	T0IQ0000000059600111
Co-ordinates	26°41'15.46" S 27°55'06.63" E

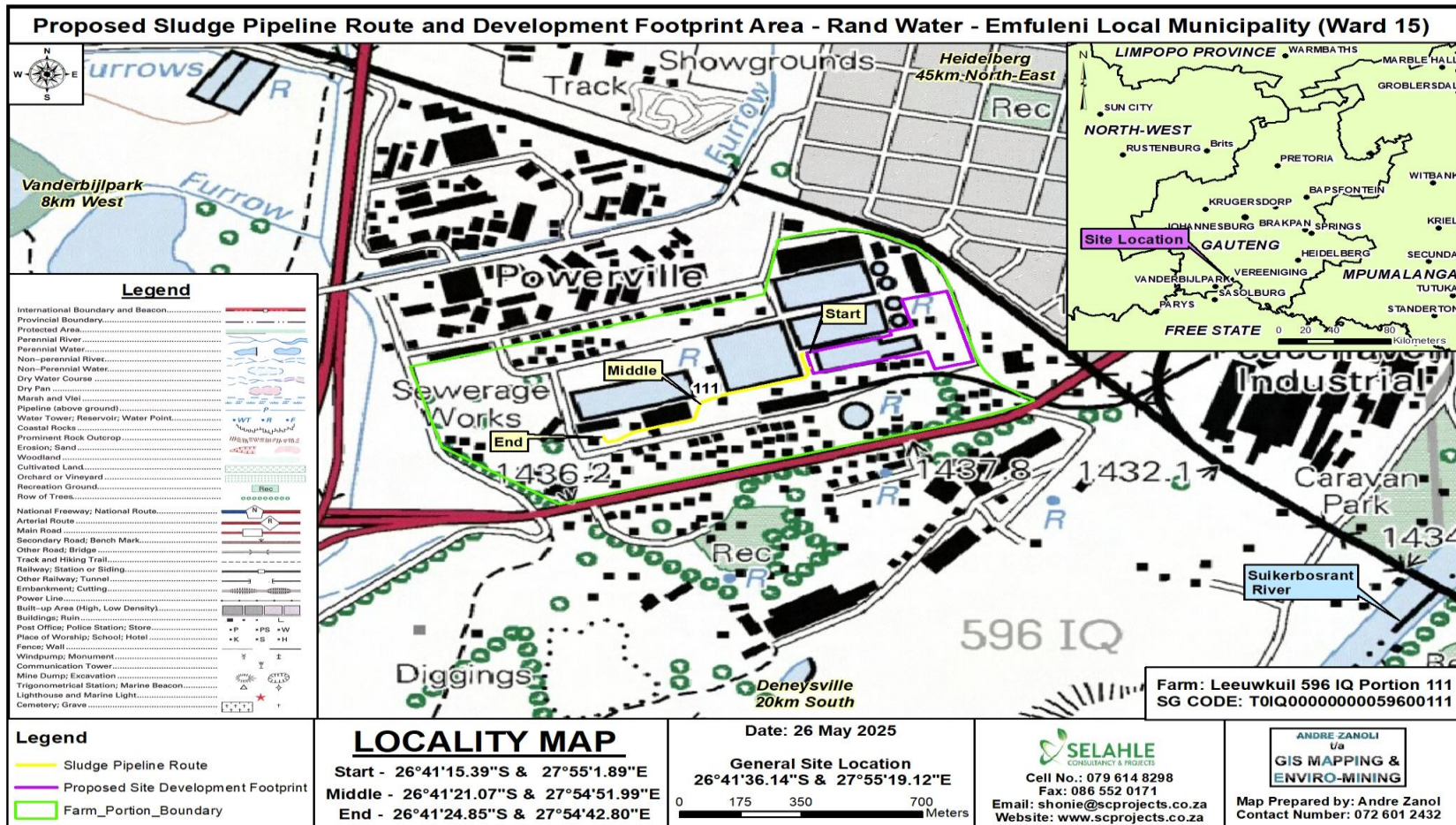


Figure 5: Vereeniging New System 1 Locality Map

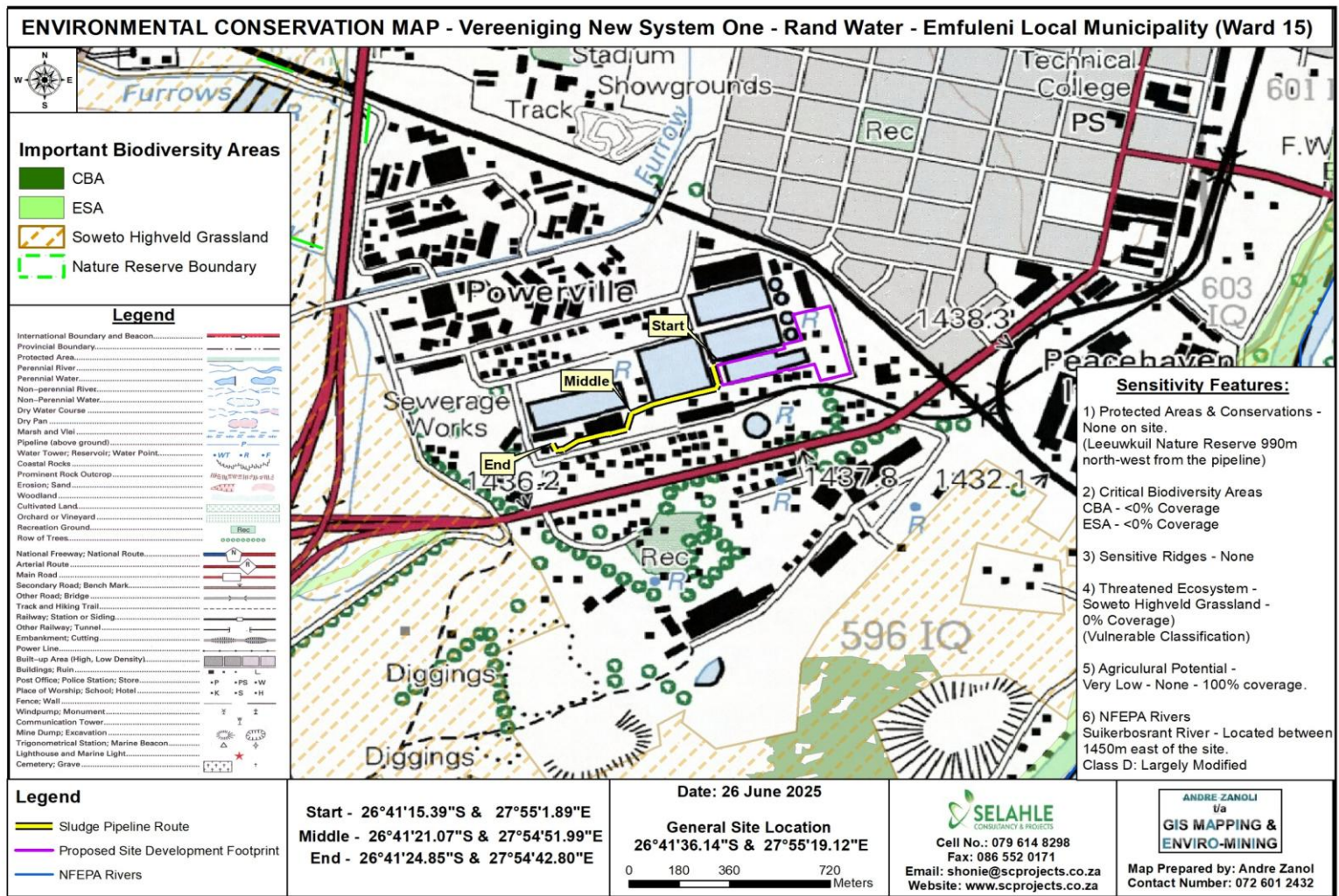


Figure 6: Environmental Conservation Map for New System 1

3.1.2 Phase 2 Sludge Pipeline in Vereeniging

- Phase 2 of the sludge pipeline starts from the sludge pumping station inside Vereeniging Treatment Works and runs through mostly an established industrial area in the south of Vereeniging.
- The proposed sludge pipeline runs alongside as well as across some of these services, which also include Rand Water Bulk Water Pipelines to the Vaal River Crossing.
- The installation of approximately 7 km in length of 1000mm nominal internal diameter steel sludge pipe with an 8mm wall thickness to be laid from the Vereeniging Pumping Station to the Vaal River Crossing.

The sludge pipeline will comprise, but not be limited to, steel pipe sections, cathodic protection (CP) units, valves, and other associated infrastructure.

Table 3: Phase 2 Sludge pipeline location

PROJECT LOCATION	
Province	Gauteng
District	Sedibeng District Municipality
Local Municipalities	Emfuleni Local Municipality
Ward Numbers	15
Nearest Town	Vereeniging
Farm Names and Numbers	LEEJWKUIL 596 IQ KLIPPLAATDRIFT 601 IQ USCO 603 IQ UITVLUGT 434 IR
Portion Numbers	Portion 60 of 596 Portion 81 of 596 Portion 98 of 596 Portion 117 of 596 Portion 122 of 596 Portion 111 of 596 Portion 160 of 596 Portion 251 of 596 Portion 255 of 596 Portion 260 of 596 Portion 0 of 601 Portion 72 of 601 Portion 0 of 603
SG Code	T0IQ0000000059600060 T0IQ0000000059600081 T0IQ0000000059600098 T0IQ0000000059600117 T0IQ0000000059600111 T0IQ0000000059600122 T0IQ0000000059600160

	T0IQ0000000059600251 T0IQ0000000059600255 T0IQ0000000059600260 T0IQ0000000060100000 T0IQ0000000060100072 T0IQ0000000060300000
Co-ordinates	Start Point: 26°41'26.16"S & 27°54'42.79"E Middle Point: 26°41'42.71"S & 27°55'12.21"E End Point: 26°40'55.84"S & 27°56'13.16"E

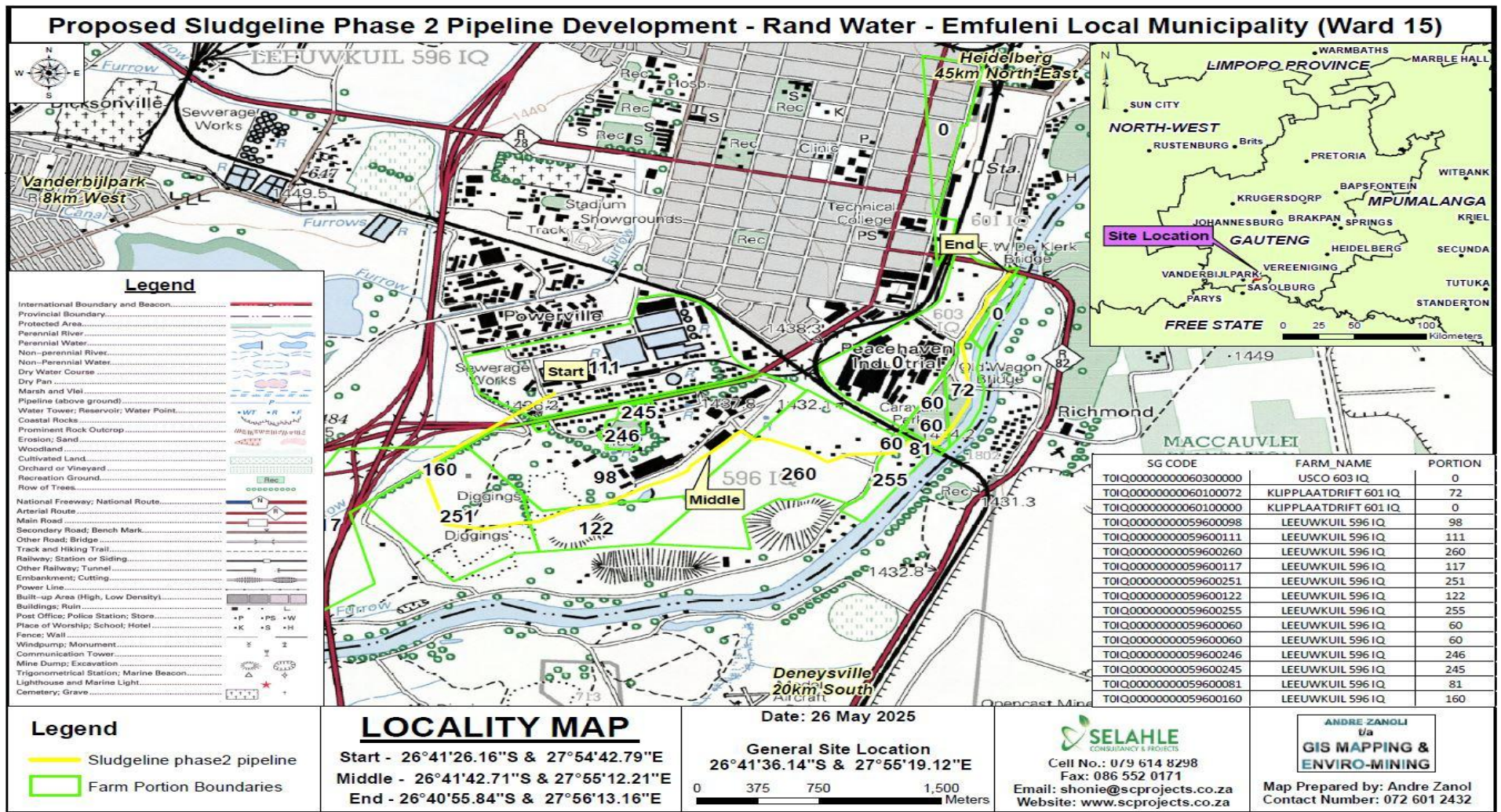


Figure 7: Proposed Phase 2 Sludge

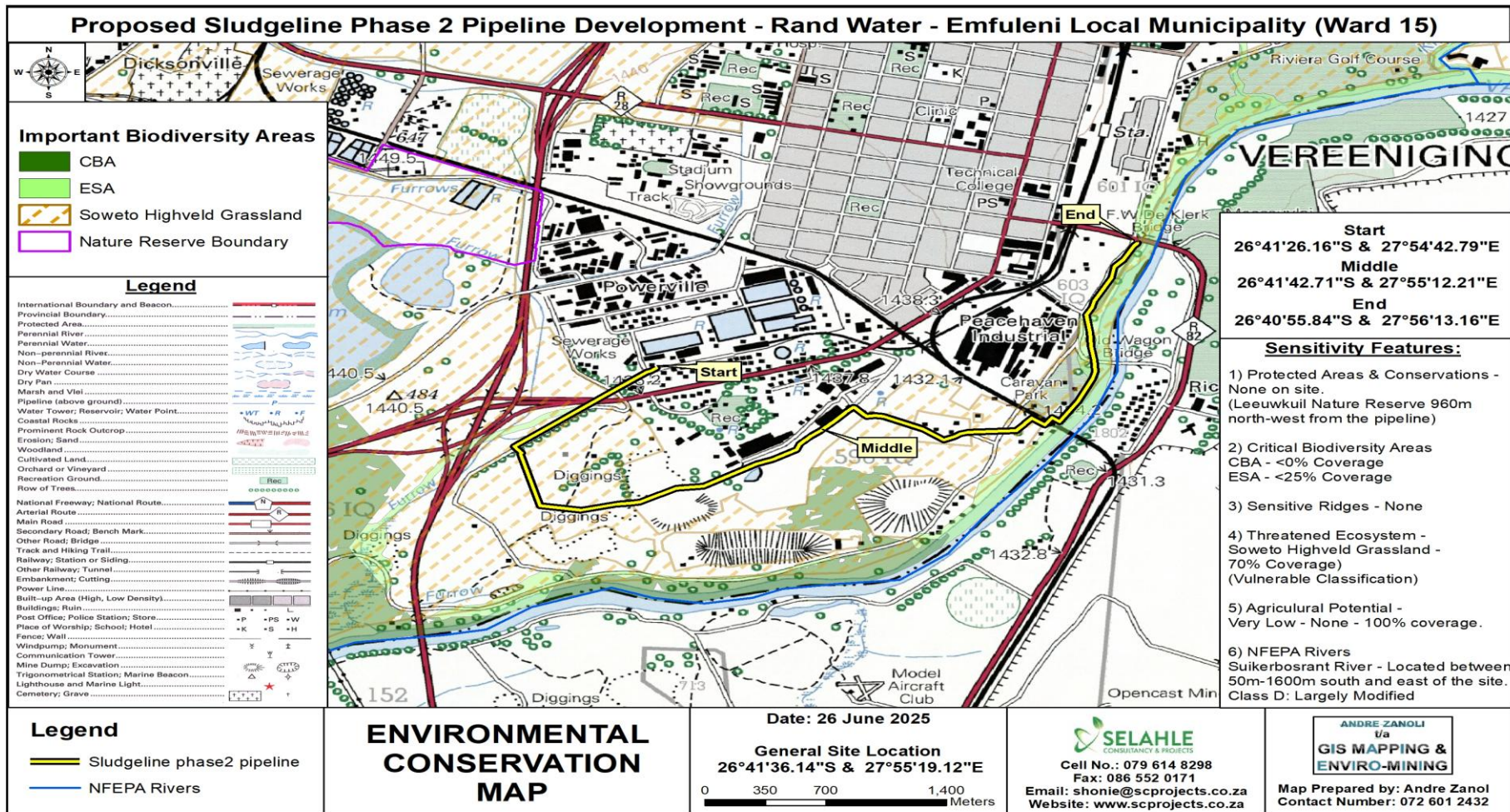


Figure 8: Environmental Conservation Map for Phase 2 Sludge Pipeline

3.1.3 1.5km Panfontein Sludge Pipeline

The proposed Panfontein Sludge Pipeline will consist of the installation of a new interconnecting sludge pipeline, approximately 1.5 km in length and 800 mm in diameter. The pipeline will comprise, but not be limited to, steel pipe sections, cathodic protection (CP) units, valves, and other associated infrastructure.

Table 4: Panfontein 1.5km Sludge Pipeline

PROJECT LOCATION	
Province	Gauteng
District	Sedibeng District Municipality
Local Municipalities	Midvaal Local Municipality
Ward Numbers	1
Nearest Town	Panfontein
Farm Names and Numbers	PANFONTEIN 437 IR UITVULGT 434 IR
Portion Numbers	Portion 77 of 434 Portion 1 of 437 Portion RE of 437 Portion 6 of 437
Co-ordinates	Start Point: 26° 42' 15.72" S 28° 01' 40.08" E Middle Point: 26° 42' 51.76" S 28° 02' 08.18" E End Point: 26° 42' 32.01" S 28° 02' 05.84" E
SG Code	T0IR00000000043400077 T0IR00000000043700001 T0IR00000000043700006 T0IR00000000043700000

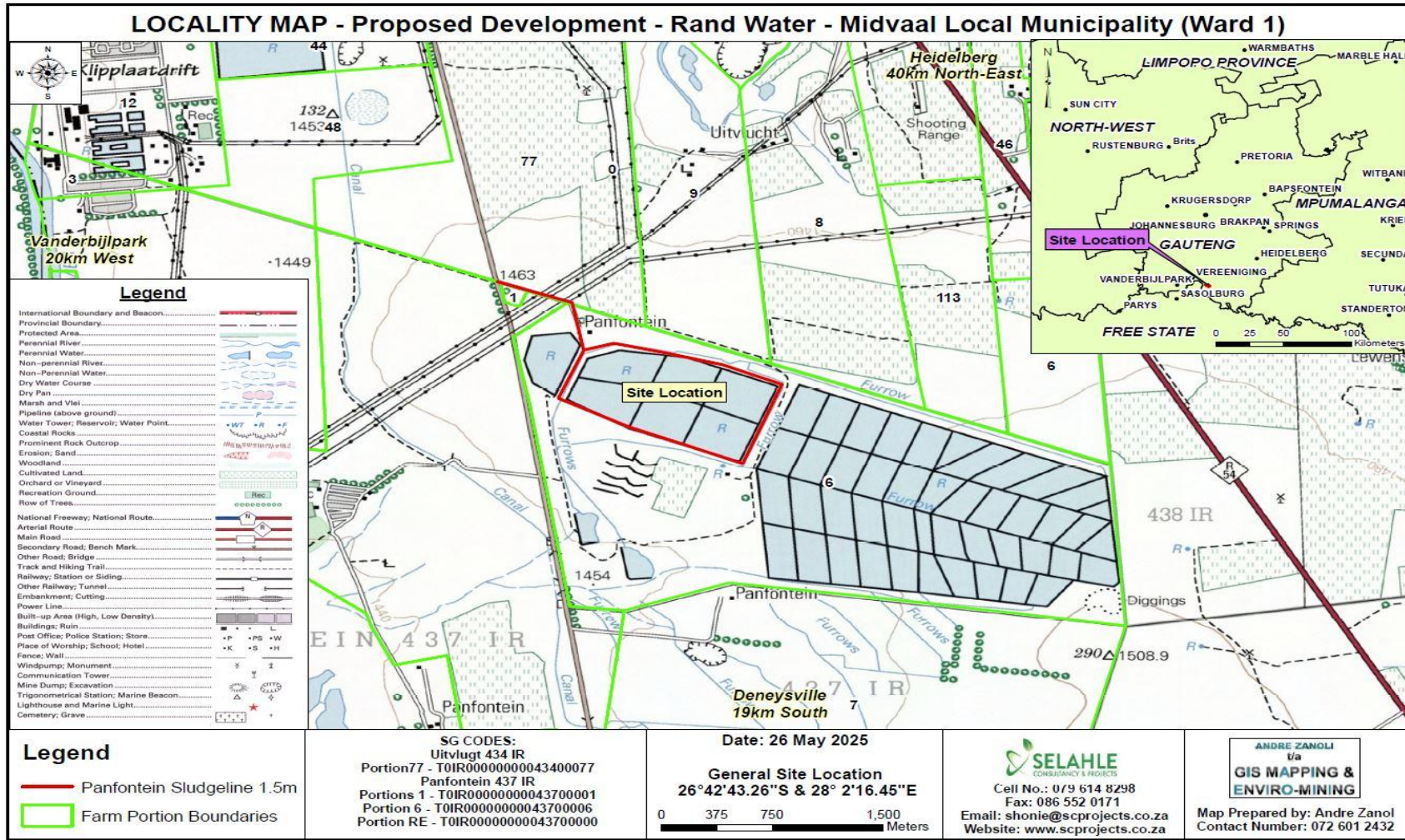


Figure 9: Panfontein Locality Map

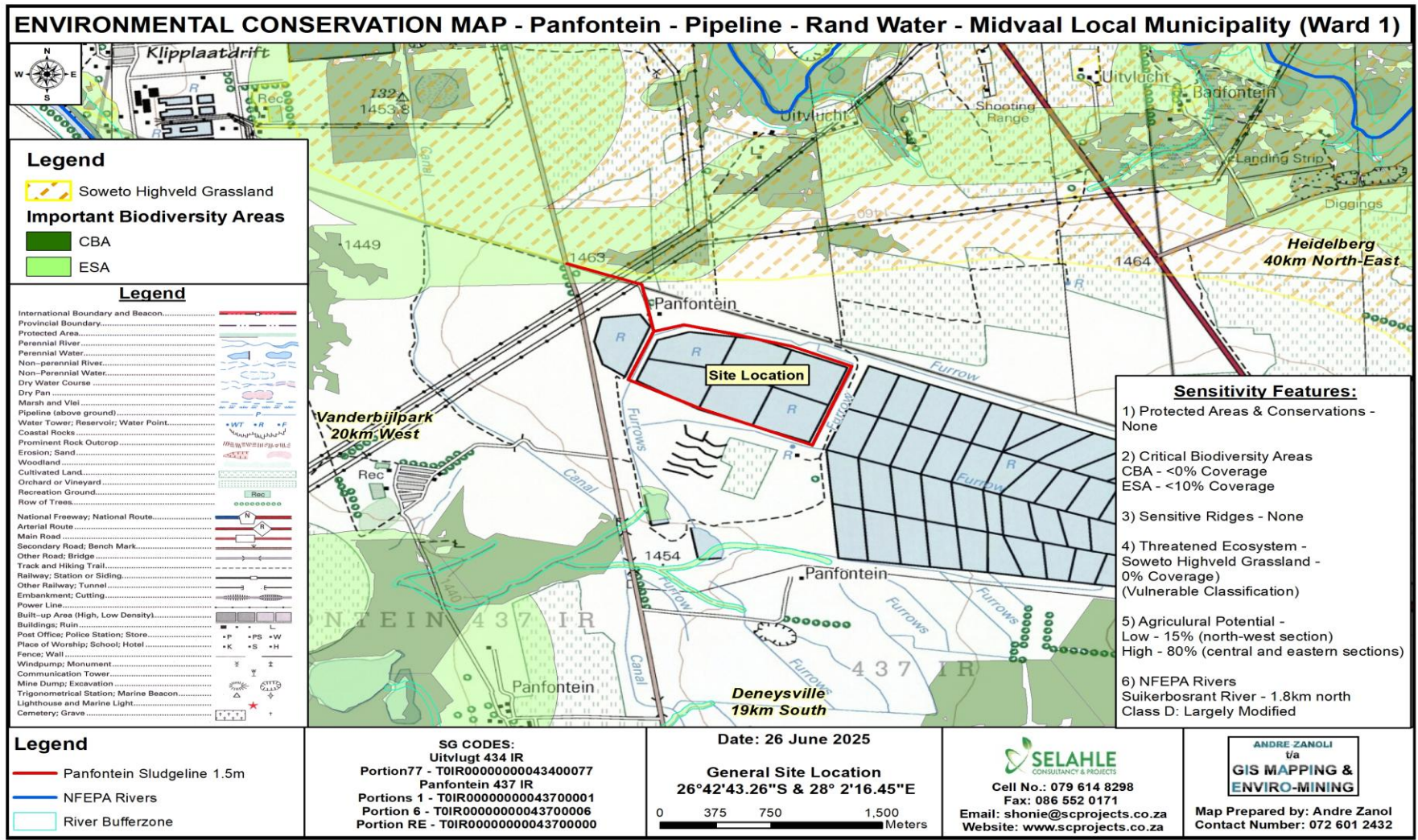


Figure 10: Panfontein Environmental Conservation Map

3.2 Listed and Specific Activities

Table 5: Listed and Specific Activities

Activity No(s)	Listed Activity	Description of project activity that triggers listed activity
Listing Notice 1 of the EIA Regulations, 2014 as amended		
Activity 9	The development of infrastructure exceeding 1 000 metres in length for the bulk transportation of water or storm water - (i) with an internal diameter of 0.36 metres or more;	The proposed development entails the installation of Sludge Pipelines that are 1500 and 7000 metres in length with internal diameters of 800mm and 1000mm respectively.
Activity 10(i)	The development and related operation of infrastructure exceeding 1 000 metres in length for the bulk transportation of sewage, effluent, process water, wastewater, return water, industrial discharge or slimes - (i) with an internal diameter of 0.36 metres or more	The proposed development entails the installation of Sludge Pipelines that are 1500 and 7000 metres in length with internal diameters of 800mm and 1000mm respectively.
Activity 12 (ii)(c)	The development of- (ii) infrastructure or structures with a physical footprint of 100 square metres or more, where such development occurs- (c) if no development setback exists, within 32 metres of a watercourse, measured from the edge of a watercourse,	The proposed installation of Phase 2 Sludge Pipeline will occur within 32 metres of a watercourse, measured from the edge of a watercourse.
Activity 13	The development of facilities or infrastructure for the off-stream storage of water, including dams and reservoirs, with a combined capacity of 50 000 cubic metres or more, unless such storage falls within the ambit of activity 16 in Listing Notice 2 of 2014.	The proposed Construction of the Vereeniging New System 1 entails the capacity of storing 1400 ML/D(Megalitres Per day) of water pumped from the Vaal River.
Activity 19	The infilling or depositing of any material of more than 10 cubic metres into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles or rock of more than 10 cubic metres from a watercourse; but excluding where such infilling, depositing, dredging, excavation, removal or moving-	The proposed installation of the Sludge Pipelines will entail the infilling or depositing of any material of more than 10 cubic meters into, or the dredging, excavation, removal or moving of soil, sand, shells, shell grit, pebbles, or rock of more than 10 cubic meters from a watercourse
Activity 27	The clearance of an area of 1 hectare or more, but less than 20 hectares of indigenous vegetation.	The proposed development of the Vereeniging New System 1 and the pipelines entails the clearance of

Activity No(s)	Listed Activity	Description of project activity that triggers listed activity
		approximately 2.85 hectares of indigenous vegetation.
Listing Notice 3 of the EIA Regulations, 2014 as amended		
Activity 12(c)(ii)	The clearance of an area of 300 square metres or more of indigenous vegetation except where such clearance of indigenous vegetation is required for maintenance purposes undertaken in accordance with a maintenance management plan (c) Gauteng- (ii) Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan	The Phase 2 Sludge pipeline entails the clearance of an area of approximately 500 square metres within the Gauteng Province where the development occurs Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans
Activity 14(ii)(c)	The development of— (ii) infrastructure or structures with a physical footprint of 10 square metres or more. (c) Within 32 metres of a watercourse, measured from the edge of a watercourse (c) Gauteng- (iv) Sites identified as Critical Biodiversity Areas (CBAs) or Ecological Support Areas (ESAs) in the Gauteng Conservation Plan or in bioregional plans	The proposed installation of Phase 2 Sludge Pipeline will occur within 32 metres of a watercourse, measured from the edge of a watercourse within the Gauteng Province where the development occurs Within Critical Biodiversity Areas or Ecological Support Areas identified in the Gauteng Conservation Plan or bioregional plans.

3.3 Other Authorisations Required

3.3.1 Water Use License Application

The proposed installation of the Sludge pipelines development will occur within the buffer zone of a watercourse. In terms of the National Water Act, 1998 (Act No. 36 of 1998), any activities within a watercourse and/or its regulated area require authorisation through a Water Use License. As such, the development triggers Section 21 of the National Water Act.

The specific water uses applicable to this project include:

- Section 21(c): Impeding or diverting the flow of water in a watercourse; and
- Section 21(i): Altering the bed, banks, course, or characteristics of a watercourse.

The Water Use License application process for these activities is currently in progress.

3.3.2 Heritage Impact Permits

The activities that will be undertaken at the Rand Water Vereeniging Treatment Works will require a Heritage Permit, which is believed to be over 100 years old and holds significant historical importance in South Africa's water supply history. Therefore, a Heritage Permit process, the Vereeniging New System 1, is also underway in terms of Section 34(1) of the National Heritage Resource Act, 1999 (Act No. 25 of 1999), which mandates that any proposed modifications to the facility require prior approval from the competent authority. The application will be submitted to the Gauteng Provincial Heritage Resources Authority (PHRA-G). A heritage specialist has been appointed to conduct a heritage impact assessment study for the proposed development site.

Furthermore, the South African Heritage Resource Authority will be notified in terms of Section 38(1)(a) and Section 38(c)(i), which mandates that every linear development exceeding 300m in length, the authority should be notified.

4 POLICY AND LEGISLATIVE CONTEXT

Table 6: Policy and Legislation

Title of legislation, policy, or guideline:	Administering authority:	Promulgation Date:
National Environmental Management Act, 1998 (Act No. 107 of 1998 as amended).	National & Provincial	1998
Environmental Impact Assessment Regulations, 2014 as amended.	National & Provincial	2014
National Heritage Resources Act 25 of 1999	SAHRA	2000
National Water Act (Act No: 36 of 1998)	DWA	1998
National Environmental Management: Waste Act: 2008 (Act No. 59 of 2008)	National & Provincial	2008
Occupational Health and Safety Act (Act No: 58 of 1993)	National & Provincial	2014
National Environmental Management Act: Air Quality, 2004	National & Provincial	2004
National Environmental Management Act: Biodiversity Act (Act No: 10 of 2004)	National and Provincial	2004
National Appeal Regulations, 2014 and Amendments	National and Provincial	2014
DEA Guidelines on Public Participation	National (DFFE)	2012
DEA Guidelines on Need and Desirability	National (DFFE)	2004
DEA Guidelines on Alternatives	National (DFFE)	2004
Gauteng Conservation Plan version 3.3 & 4	Provincial	2012

Title of legislation, policy, or guideline:	Administering authority:	Promulgation Date:
Water Use Licence Applications & Appeal Regulations, 2017	National & Provincial	2017
Gauteng Provincial Environmental Management Framework	Gauteng Provincial	2021
Sedibeng District Municipality Integrated Development Plan 2023-2024	Local/District	2023
Midvaal Local Municipality Spatial Development Framework 2022-2027	Local	2022
Emfuleni Local Municipality Spatial Development Framework 2017-2025	Local	2017

4.1 Description of compliance with the relevant legislation, policy, or guideline

Table 7: Description of compliance with the relevant legislation, policy, or guideline

Legislation, policy of guideline	Description of compliance
National Environmental Management Act No.107 of 1998 as amended.	<p>A Basic Assessment process is required to obtain authorisation for the activities, as per the EIA Regulations (2014) promulgated in terms of NEMA.</p> <p>Section 24C(2)(d)(iii) of NEMA applies to the proposed development.</p> <p>The proposed development triggers Activity No. 9, 10, 12, 13, 19, 27 of Listing Notice 1 and Activities No. 12 & 14 of Listing Notice 3 of the Environmental Impact Assessment Regulations, 2014 (as amended), published under the National Environmental Management Act (NEMA), 1998 (Act No. 107 of 1998, as amended).</p>
Municipal Systems Act, 2000 (Act 32 of 2000)	By-laws, Policies and Legislation would be adhered to.
National Heritage Resources Act, 1999 (25 of 1999)	<p>This Act defines a heritage resource as any place or object of cultural significance i.e., of aesthetic, architectural, historical, scientific, social, spiritual, linguistic or technological value or significance. Therefore, the Heritage authority will be notified about the proposed development in terms of Section 38(1)(a) and Section 38(c)(i) which mandates that every linear development exceeding 300m in length the SAHRA should be notified. Furthermore, a heritage permit is also underway.</p>

Legislation, policy of guideline	Description of compliance
National Water Act (Act No: 36 of 1998)	The proposed activities trigger Section 21(c) & (i) of the National Water Act. Therefore, a Water use license application is underway.
National Environmental Management Act: Air Quality, 2004	The Proposed developments should not result in the creation of excessive amounts of dust during the construction phase, since the working conditions will be wet. However, some dust might be created by the vehicles travelling along the access roads to site.
National Environmental Management Act: Biodiversity Act (Act No: 10 of 2004)	The site falls within a Vulnerable ecosystem due to extensive transformation from urbanization, industrial development, agriculture, and mining activities.
DEA Guidelines on Public Participation	Public participation was undertaken in accordance with the EIA regulations 2014, as amended before the submission of this report to the competent authority.
DEA Guidelines on Need and Desirability	The need and desirability of this activity are discussed in the report supported by the market study, GPEMF and surrounding areas. The proposed activity will support sustainable development.
DEA Guidelines on Alternatives	According to the regulations and this guideline, it is mandatory to investigate different alternatives and the no-go option as part of the assessment. Therefore, alternatives were investigated for this proposed development.
Procedures for the assessment and minimum criteria for reporting on identified environmental themes in terms of Section 24(5)(a) and (h) and 44 of the National Environmental Management Act, 1998 when applying for Environmental Authorisation (GN 320 of 20 March 2020 and GN 1150 of 30 October 2020).	<p>In terms of Government Notice (GN) 320 of 20 March 2020, the Site Sensitivity Verification may be undertaken by either an Environmental Assessment Practitioner (EAP) or a specialist, using the prescribed methodology. The process for determining the environmental sensitivity of a specific area of land involves the following steps a desktop analysis using satellite imagery, a preliminary on-site inspection, and the collection of any other available and relevant information.</p> <p>The outcome of this verification must be recorded in a report that confirms or disputes the land use and environmental sensitivity as identified by the National Web-Based Screening Tool. This report must take into consideration any new developments or infrastructure, changes in vegetation cover or condition, and other relevant environmental factors. It must also include a motivation and supporting evidence, such as photographs, to substantiate the verified or differing land use and environmental sensitivity. The site sensitivity verification report is submitted together with</p>

Legislation, policy of guideline	Description of compliance
	<p>the relevant environmental assessment report, in accordance with the Environmental Impact Assessment (EIA) Regulations. In line with these requirements, specialist assessments have been compiled where applicable and in accordance with the legislative provisions.</p> <p>Therefore, a Site Sensitivity Verification report is attached to this Draft Basic Assessment Report.</p>
Gauteng Provincial Environmental Management Framework	<p>The EMF aims to guide the protection and enhancement of environmental assets and natural resources along with development patterns to ensure sustainable environmental management and development patterns within and around the Gauteng Province. Therefore, in terms of the GPEMF, the proposed developments fall within Zones 1 and 3. The specific GPEMF requirements in this regard are that no listed activities may be excluded from environmental assessment requirements in these zones.</p>
C Plan version 3.3 & 4	<p>Gauteng Conservation Plan (C-Plan) 3.3. & 4 is based on the systematic conservation protocol developed by Margules & Pressey (2000) and is based on the principles of complementarity, efficiency, defensibility and flexibility, irreplaceability, retention, persistence and accountability.</p> <p>The main purpose of the C-Plan is to serve as the primary decision support tool for the biodiversity component of the EIA process, to inform protected area expansion and biodiversity stewardship programmes in the province and to serve as a basis for the development of Bioregional Plans in municipalities within the province.</p> <p>According to the Gauteng C-Plan, some section of the Phase 2 Sludge Pipeline fall within the Ecological Support Area (ESA) and the Critical Biodiversity Areas.</p>

5 NEED AND DESIRABILITY

The proposed developments respond to urgent infrastructure, operational, and environmental challenges faced by Rand Water. This initiative is aligned with the national and provincial policy

frameworks, including the National Development Plan (NDP) and the Gauteng Environmental Management Framework (GEMF), which collectively advocate for sustainable infrastructure investment, water security, and improved service delivery. Below is the breakdown of each framework in terms of the proposed development.

Table 8: Needs and Desirability for the proposed development

NATIONAL DEVELOPMENT PLAN (NDP)
<p>The need for the proposed Rand Water project is strongly supported by the objectives of the National Development Plan (NDP) 2030, which identifies infrastructure development, particularly in the water sector, as a key enabler for achieving inclusive economic growth, reducing poverty, and improving living standards. The decommissioning of System 1 at the Vereeniging Water Treatment Works due to structural failure and outdated design has created operational limitations and risks that threaten water security in the region. In response, the proposed construction of a new, modernised System 1 and associated sludge management infrastructure is a critical intervention. From a desirability perspective, the project aligns with the NDP’s strategic outcomes by ensuring the delivery of sustainable and reliable water services, creating short-term employment opportunities, and supporting the resilience of key public infrastructure. These improvements will contribute to long-term water security and service delivery, which are central to the NDP’s vision for a capable and development-oriented state.</p>
GAUTENG ENVIRONMENTAL MANAGEMENT FRAMEWORK (GPEMF)
<p>In terms of the Gauteng Province Environmental Management Framework (GPEMF), the need for the project stems from the deterioration of existing sludge infrastructure and the lack of redundancy in critical pipeline systems. This poses risks of environmental contamination and service disruption. The proposed sludge pipelines will address these needs by enhancing the capacity and resilience of sludge handling systems in a manner that minimises environmental impact. The desirability of the project is reinforced by its strategic location within already established and disturbed industrial areas, as encouraged by the GPEMF. The project does not encroach on environmentally sensitive zones and is being implemented alongside environmental screening processes, site sensitivity verifications, and specialist assessments. By supporting efficient land use and environmentally responsible infrastructure upgrades, the project aligns with the GPEMF’s objective to balance development with ecological sustainability.</p>
MIDVAAL SPATIAL DEVELOPMENT FRAMEWORK (MSDF)
<p>Within the Midvaal Local Municipality, the need for improved waste and sludge management infrastructure is clearly articulated in the Spatial Development Framework (SDF), which emphasises service expansion in support of long-term urban growth and industrial development. The proposed extension of the sludge pipeline from Zuikerbosch to the Panfontein Sludge Disposal Site responds directly to this need by increasing the reliability, capacity, and operational flexibility of the sludge disposal system. The desirability of the project is demonstrated by its alignment with the Midvaal SDF’s spatial planning principles, including the integration of essential bulk services to support future development nodes. By modernising waste infrastructure in an existing permitted facility and improving operational sustainability, the project promotes responsible development and strengthens the municipality’s ability to accommodate future growth without compromising environmental integrity.</p>

EMFULENI SPATIAL DEVELOPMENT FRAMEWORK (ESDF)

The Emfuleni Local Municipality SDF identifies the urgent need for infrastructure revitalisation, particularly in ageing urban areas such as Vereeniging, where critical water treatment facilities have deteriorated. The replacement of the decommissioned System 1 and the installation of a new sludge pipeline are essential to address long-standing inefficiencies and mitigate the risk of system failure. These infrastructure upgrades are needed to restore the reliability and effectiveness of the Vereeniging Water Treatment Works, which serves a large urban and industrial population. The desirability of the project is closely linked to its alignment with Emfuleni's spatial and service delivery goals. By modernising outdated infrastructure, reducing pollution risks, and ensuring uninterrupted service delivery, the project supports the municipality's broader development vision of sustainable urban growth, improved public health, and enhanced quality of life for residents.

SEDIBENG INTEGRATED DEVELOPMENT PLANNING (IDP)

The Sedibeng District Municipality's IDP highlights a critical need for investment in bulk infrastructure to address service backlogs, aging assets, and growing urban and industrial demand, particularly in areas such as Vereeniging and Vanderbijlpark. The Rand Water project directly addresses this need by replacing outdated treatment infrastructure and improving sludge transport and disposal systems. These improvements are necessary to ensure reliable, uninterrupted water supply and treatment services for current and future users. The desirability of the project is further underpinned by its support for the IDP's long-term vision of sustainable service delivery and economic development. By strengthening regional infrastructure, the project contributes to Sedibeng's goal of creating a well-served, economically viable, and environmentally sustainable district. Additionally, the project's ability to reduce the risk of treatment failure and environmental degradation makes it both a practical and strategic development priority in the district.

6 PROJECT ALTERNATIVES

In terms of the EIA Regulations of 2014 (as amended), consideration needs to be given to all possible alternatives. The assessment of alternatives allows different approaches and ways of meeting the need, purpose and objectives of a proposed activity to be explored, allowing for the identification and selection of the best practicable environmental option for the implementation. Alternatives for consideration may include location or route alternatives, site alternatives, design/layout alternatives, activity alternatives and process or technology alternatives.

An alternative can be defined as an option that will meet the general purpose and requirements of the activity, which may include alternatives to:

- The property on which, or location where it is proposed to undertake the activity.
- The type of activity to be undertaken.
- The design or layout to be used in the activity.
- The technology to be used in the activity, and
- The operational aspects of the activity.
- The "No-Go" alternative must also be assessed.

Therefore, after exploring various possible alternatives for the proposed project, no other options were found to be practical or suitable. Only the preferred alternative (the proposed development) and the no-go alternative (not proceeding with the project) were investigated. Since the proposed developments are located within the Rand Water servitude, no alternative land uses have been considered.

6.1 The Preferred Alternative (The Proposal)

The preferred alternative for the Rand Water project has been selected based on a balanced consideration of technical viability, operational efficiency, environmental sensitivity, and long-term infrastructure planning. The proposed design has been strategically aligned with existing infrastructure corridors and operational servitudes wherever possible, thereby minimising land acquisition requirements and reducing potential impacts on adjacent land uses and communities. In cases where deviations are required, the alignments have been confined to areas within Rand Water's jurisdiction or low-sensitivity environments, ensuring that the environmental and social footprint of the project remains limited.

6.1.1 New System 1 at Vereeniging Water Treatment Works

At the Vereeniging Water Treatment Works, the preferred alternative involves the reconstruction of the decommissioned System 1 using a modern, linear horizontal sedimentation tank system. This alternative was selected due to its technical superiority and alignment with current best practices in water treatment. The proposed system will increase treatment capacity from 90 ML/day to 225 ML/day and includes automated sludge removal mechanisms, improving operational efficiency and reducing labour intensity. From an operational standpoint, this alternative supports Rand Water's objective of ensuring resilience and redundancy in the treatment process. The modernised system enables the facility to maintain its production capacity even during maintenance intervals, thus avoiding interruptions in water supply. The use of a modern design also addresses historical issues related to ground instability and structural failure, as the new system will incorporate engineering solutions that are adapted to the challenging subsoil conditions of the area.

6.1.2 Phase 2 Sludge Pipeline

The Phase 2 sludge pipeline commences at the sludge pumping station within the Vereeniging Water Treatment Works and extends through a predominantly industrial zone, following existing service corridors where feasible. This layout minimises the need for new servitudes and reduces potential impacts on communities and the environment. From a technical perspective, the selected pipeline design includes critical components such as valve chambers, air release valves, and cathodic protection (CP) units to enhance system integrity and prolong the lifespan of the infrastructure. The use of a steel pipeline with appropriate wall thickness ensures durability and reduces maintenance needs over time. Operationally, this alternative addresses a major risk to the sludge management system namely, the deterioration of the existing pipeline and the absence of system redundancy. By establishing a new, dedicated sludge pipeline, this alternative ensures the continuous and reliable removal of sludge from the Vereeniging plant, thereby reducing the likelihood of process disruptions and environmental incidents.

6.1.3 Panfontein sludge Pipeline

The preferred alternative for the Panfontein Sludge Pipeline involves the construction of a new pipeline segment from Zuikerbosch to the Panfontein Sludge Disposal Site, as well as the integration of a cross-connection pipeline at the No. 2 Central Sludge Pumphouse. This option was selected based on both technical merit and operational necessity. Currently, only one pipeline connects Vereeniging and Zuikerbosch, creating a single point of failure that limits system flexibility and increases operational risk. The proposed cross-connection will introduce vital redundancy, enabling continuous sludge transfer operations even during maintenance or unforeseen system failures. The 800 mm extension to the Panfontein site will allow for more efficient sludge transfer from both treatment facilities and better load distribution. This infrastructure enhancement supports Rand Water's long-term goal of achieving a fully integrated and resilient sludge management system. Furthermore, the Panfontein site is already permitted for sludge disposal, and the proposed works remain within the authorised footprint, thereby avoiding new environmental authorisation or land use change requirements.

Overall, the preferred alternative offers a technically sound, operationally efficient, and environmentally responsible solution for Rand Water's sludge and water treatment infrastructure upgrade. By addressing the current challenges associated with aging infrastructure and limited system redundancy, this alternative ensures continued service delivery, regulatory compliance, and alignment with Rand Water's strategic infrastructure development objectives.

6.2 Design Alternative (Demolition of old System 1)

The decision to demolish and replace the existing System 1 at the Vereeniging Water Treatment Works is informed by a comprehensive evaluation of its outdated design, structural degradation, and operational limitations. Originally constructed as one of five treatment systems at the facility, the old System 1 had a treatment capacity of 90 ML/day and relied on vertical sedimentation tanks with hopper-bottom configurations. This older design required manual sludge removal, making operations labour-intensive, inefficient, and costly. Over time, the infrastructure experienced significant structural failure, including leaking sedimentation tanks, cracked outlet flumes, and upliftment of tank bases due to high groundwater levels and expansive clay soils. These geotechnical challenges ultimately led to the backfilling of the tanks to prevent further damage, resulting in the full decommissioning of System 1 in the early 2000s. The open design of the tanks further contributed to environmental exposure risks and hindered effective control of the treatment process.

In contrast, the proposed New System 1 presents a modernised and technically advanced solution tailored to meet current and future operational needs. The new design includes a horizontal linear sedimentation layout with enclosed systems that mitigate contamination risks and improve safety. A key improvement is the introduction of 250 ML/day flocculators and the 225 ML/day sedimentation tanks, which will significantly enhance the coagulation and flocculation stages of the treatment process by improving particle aggregation efficiency ahead of sedimentation. These flocculators will support increased throughput, bringing the system's treatment capacity to 225 ML/day, more than doubling the original capacity of the decommissioned system. The new infrastructure also incorporates automated de-sludging mechanisms and robust structural designs suited for challenging ground conditions.

Overall, the proposed New System 1 offers a technically superior, environmentally compliant, and operationally efficient solution. It directly addresses the failures of the original infrastructure and aligns with Rand Water's strategic objective of modernising its treatment facilities to ensure reliability, sustainability, and adaptability to increasing water demand. The replacement of the old system, rather than its refurbishment, is thus considered the most appropriate design alternative to meet both current service requirements and future infrastructure planning targets.

6.3 No-Go Alternative

The No-Go Alternative refers to the scenario in which the proposed construction and maintenance of New System 1 at the Rand Water Vereeniging Treatment Works, along with the installation of the Phase 2 sludge pipeline, Panfontein sludge line, and associated infrastructure, do not proceed.

Should this alternative be considered, the existing challenges faced by the Vereeniging Treatment Works would remain a status quo. The current infrastructure has significantly aged and is no longer able to meet operational demands effectively. System 1 has been non-operational for over two decades, and the lack of redundancy in the sludge transportation network continues to pose a serious operational risk, including potential service disruptions and system failure in the event of pump or pipeline breakdowns.

The No-Go option of the proposed upgrades to the sludge handling system would result in continued reliance on limited infrastructure, impeding Rand Water's ability to perform routine maintenance or respond to emergencies without compromising the treatment process. Therefore, the treatment plant would remain vulnerable to inefficiencies in water quality control, reduced treatment capacity, and increased health risks.

Furthermore, the No-Go Alternative would contradict national and provincial water management and infrastructure development objectives aimed at improving service delivery, ensuring environmental sustainability, and securing long-term water supply for the region. The inability to modernise and expand the treatment capacity at Vereeniging would also limit Rand Water's ability to meet growing water demands across its supply area.

Therefore, while the No-Go Alternative has been considered as part of the environmental assessment process, it is not a viable option due to its significant negative implications for operational reliability, water quality management, environmental protection, and service delivery.

7 PUBLIC PARTICIPATION PROCESS

This section of the report describes the process that was and will be followed for consultation of Interested and Affected Parties (I&APs)/stakeholders and government authorities as per the EIA Regulations, 2014 as amended.

7.1 DFFE Pre-Application Meeting

A request for a Pre-Application Meeting was submitted to the DFFE on 24 March 2025 after which the EAP received a response from the DFFE on 27 March 2025 (Reference Number: 2025-03-0025). Then DFFE later confirmed via email that a Pre-Application Meeting was scheduled for 23 April 2025.

The Pre-Application Meeting was undertaken in order to discuss and agree on various aspects prior to release of the EA application and Draft Basic Assessment Report.

7.2 Public Participation Process undertaken To Date

The Public Participation Process was undertaken as part of the Basic Assessment Process for the Proposed Developments. The process was undertaken to ensure compliance regarding the requirements in terms of the EIA Regulations, 2014 (as amended), published under the National Environmental Management Act (Act No. 107 of 1998, as amended).

The Public Participation Process (PPP) was undertaken to ensure compliance with Regulation 19(1)(a) of the EIA Regulations, 2014 (as amended). The PPP was conducted between 16 April 2025 – 22 May 2025, and documents that were submitted to the Organs of State, Stakeholders, and Interested & Affected Parties were:

- Background Information Documents that were accompanied by the comment sheet were distributed to all Interested and Affected Parties, Organs of State, and other Stakeholders between 16 April 2025 – 22 May 2025.
- A mandatory advertisement, to announce the intention to conduct a Basic Assessment process, was published on the Southern Star and Northern Star on the editions that were published on 15 and 16 April 2025, respectively.
- Site notices were erected on 16 April 2025.
- Interested and Affected Parties and other key stakeholders were directly informed of the proposed development by e-mail on 17 April 2025.

7.3 Comments and Responses Report

Comments received from the registered I&APs during the Public Participation Process will be addressed in a Comments and Responses Report (CRR) that will be included in the Basic Assessment Report and submitted to the DFFE for review and decision-making.

The CRR will be updated continuously and will be presented to the authorities and other I&APs together with the consultation and final reports as a full record of issues raised, including responses on how the issues were considered during the application process.

7.4 Review of the Draft Basic Assessment Report

The Draft Basic Assessment Report will be made available for public review for 30 days at the following public venues:

- Library
- Clinic
- Schools etc.

In addition, the Draft Basic Assessment Report will be made available to Stakeholders, Organs of State, and adjacent landowners. This report will be made available via electronic copies and/or hard copies to the following stakeholders:

- Department of Agriculture, Land Reform, and Rural Development
- Department of Defence Force

- Gauteng Department of Environment
- Department of Water and Sanitation
- Gauteng Provincial Heritage Resources Authority
- South African Heritage Resource Agency
- Midvaal Local Municipality
- Emfuleni Local Municipality
- Sedibeng District Municipality
- South African Civil Aviation Authority

8 DESCRIPTION OF THE RECEIVING ENVIRONMENT

8.1 Topography

8.1.1 New System 1 in Vereeniging

The topography of the site is undulating moderate slopes with a gradient that falls between 1437m to 1441m above seas level. Refer the figure below.

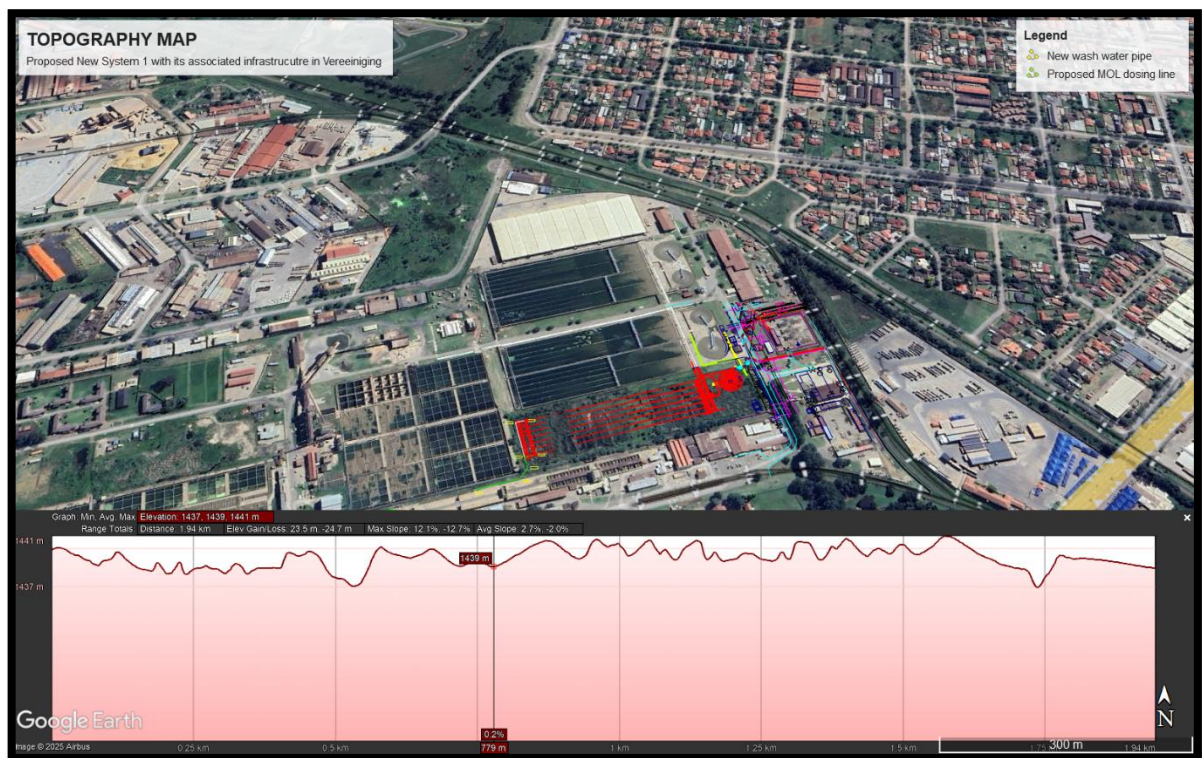


Figure 11: New System Topography Map

8.1.2 Phase 2 Sludge Pipeline

The topography of the site is undulating with steep slopes where it increases with the gradient, the gradually decreases, ranging from 1425m to 1442m above sea level. Refer to the figure below.



Figure 12: Phase 2 Sludge Pipeline Topography Map

8.1.3 Panfontein Sludge Pipeline

The site is undulating gentle slope where towards the end the slope gradient is increasing by moving upwards, ranging from 1464 m to 1477 m above sea level. Refer to the figure below.



8.2 Geology

8.2.1 Proposed New System 1 and Phase 2 Sludge Pipeline

The proposed sites are underlain by shale, sandstone and coal seams from the Vryheid Formation of the Ecca Group, Karoo Sequence overlain by soil cover and alluvial quaternary sediments of the Vaal River. The Vryheid Formation quality is mostly acceptable for any use and yield potential is considered to be low. The localized geology around the New System 1 and Phase 2 Sludge Pipeline is shown in the figure below.

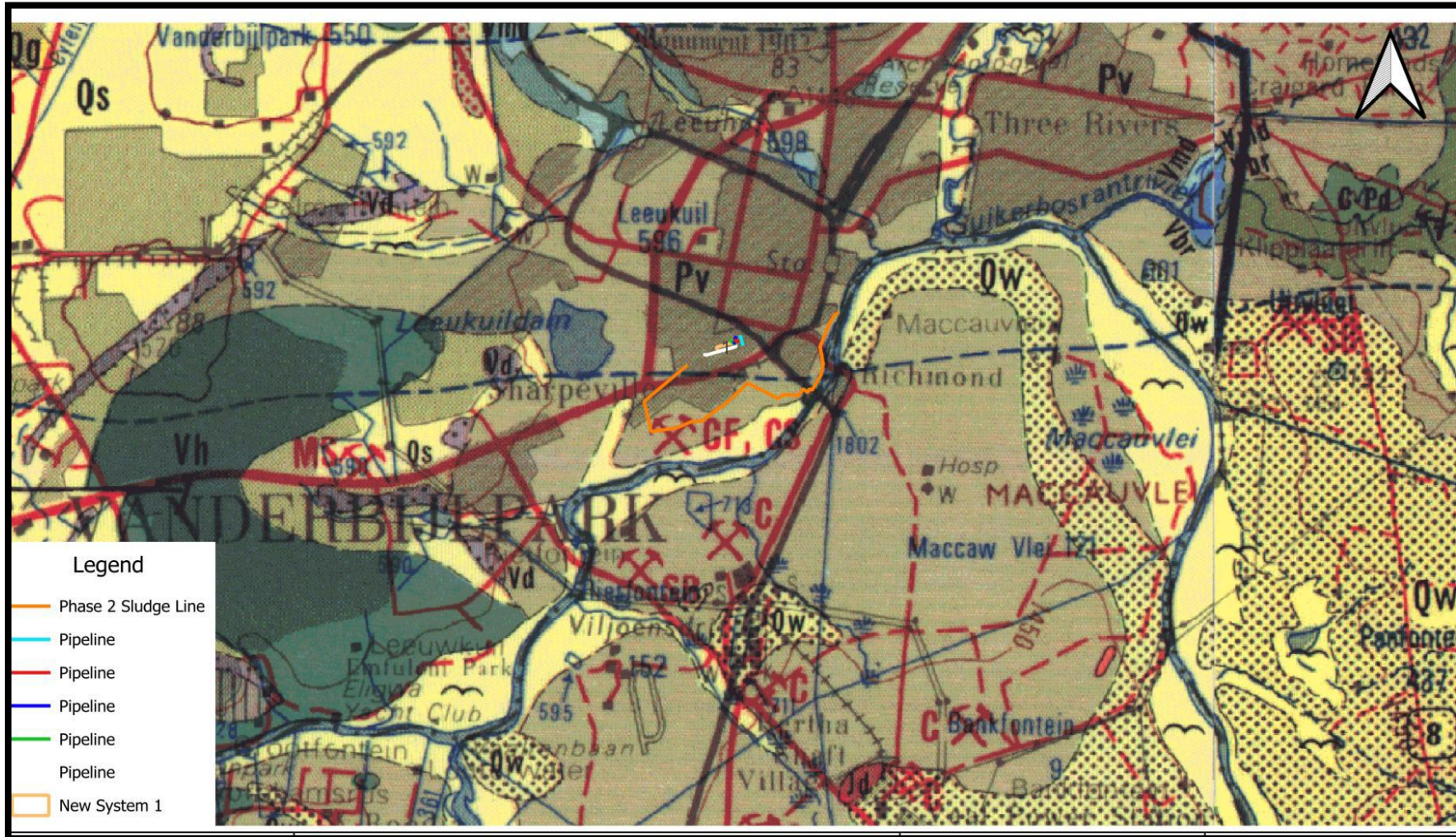


Figure 13: Geological Map for New System 1 & Phase 2 Sludge Pipeline

8.2.2 Panfontein Sludge Pipeline

The Panfontein site is underlain by Aeolian Sand, consisting of wind-deposited sediments, and Quaternary Sediments, which are predominantly unconsolidated aeolian sands characterised by high permeability and conductivity. These sediments, among the youngest geological formations in southern Africa, typically form excellent primary aquifers due to their inert nature and high permeability. They are often associated with a shallow, flat water table, which can create swampy or marshy conditions. The geological strata beneath the site are partially weathered within the first few metres below the surface, with this weathered zone allowing for higher recharge rates as well as increased primary porosity and permeability. See the figure below.

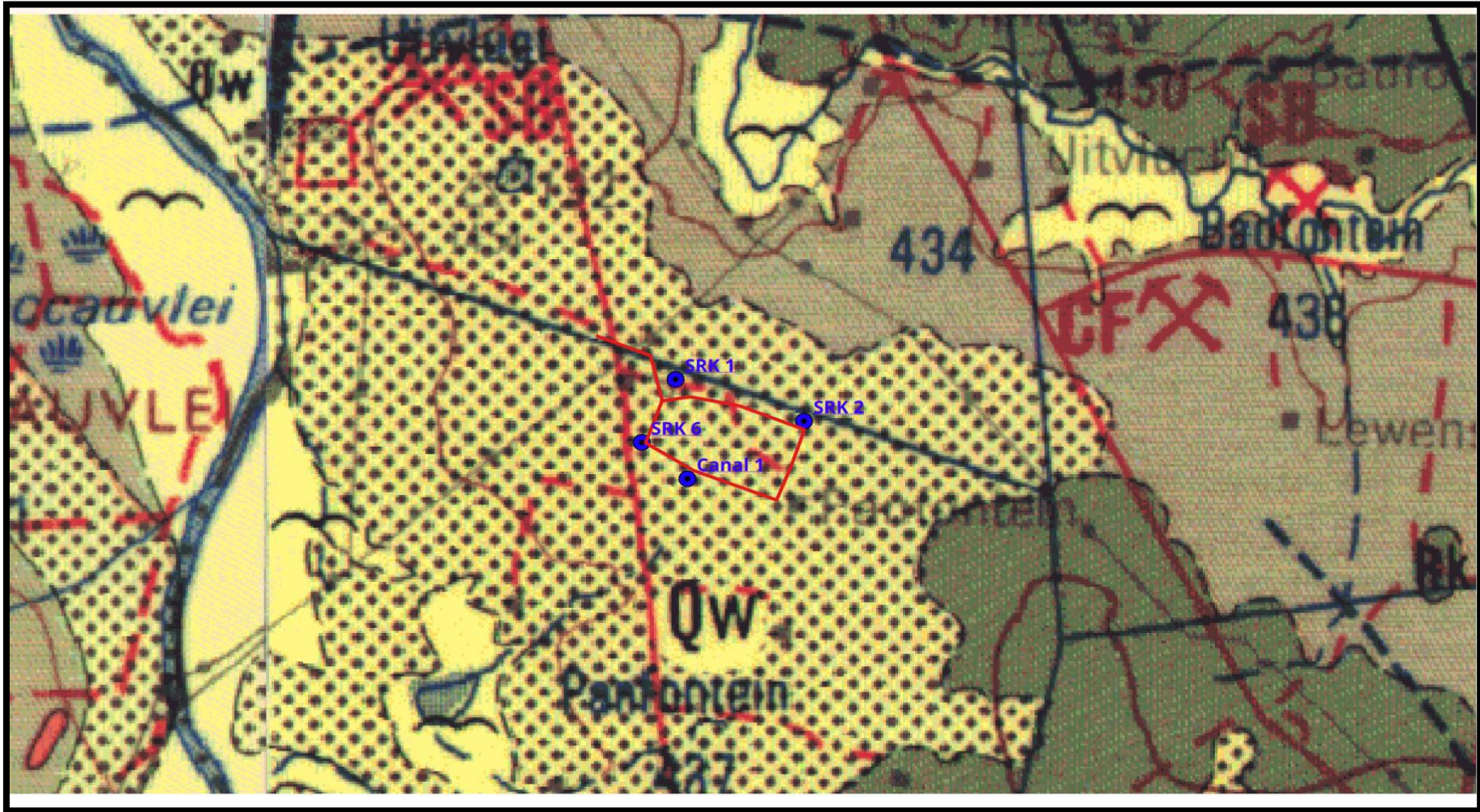


Figure 14: Panfontein Sludge Pipeline Geological Map

8.3 Climate

The climatic conditions prevailing in Sedibeng District Municipality are characterized by a warm and moderate temperature. In Sedibeng District Municipality, the level of precipitation during summers surpasses that of winters. The Köppen-Geiger climate classification identifies this particular weather pattern as belonging to the category of temperate highland climate with dry winters and warm summers. The average annual temperature is 17.0 °C in Vereeniging. The annual rainfall is 752 mm.

This location is situated in the southern region of the globe. The commencement of summer is observed at the conclusion of January and its culmination takes place in December. The months that constitute this season are known as December, January, February, and March. In terms of precipitation, the month with the lowest amount of rainfall is July, recording a mere 4 mm in its entirety. This denotes an exceptionally dry period within that particular time frame. The highest amount of precipitation occurs during the month of December, with an average quantity reaching up to 143 mm.

The month that experiences the highest temperatures throughout the year is referred to as January, with an average temperature of 21.1 °C prevails. The month of July registers the most frigid temperatures throughout the year, with an average low temperature of 10.2 °C.

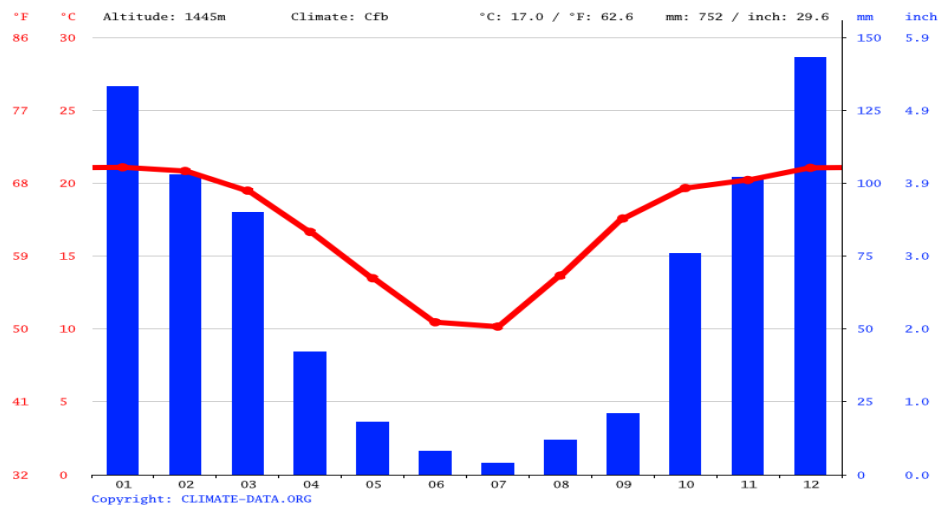


Figure 15: Average Rainfall (www.worldweatheronline.com)

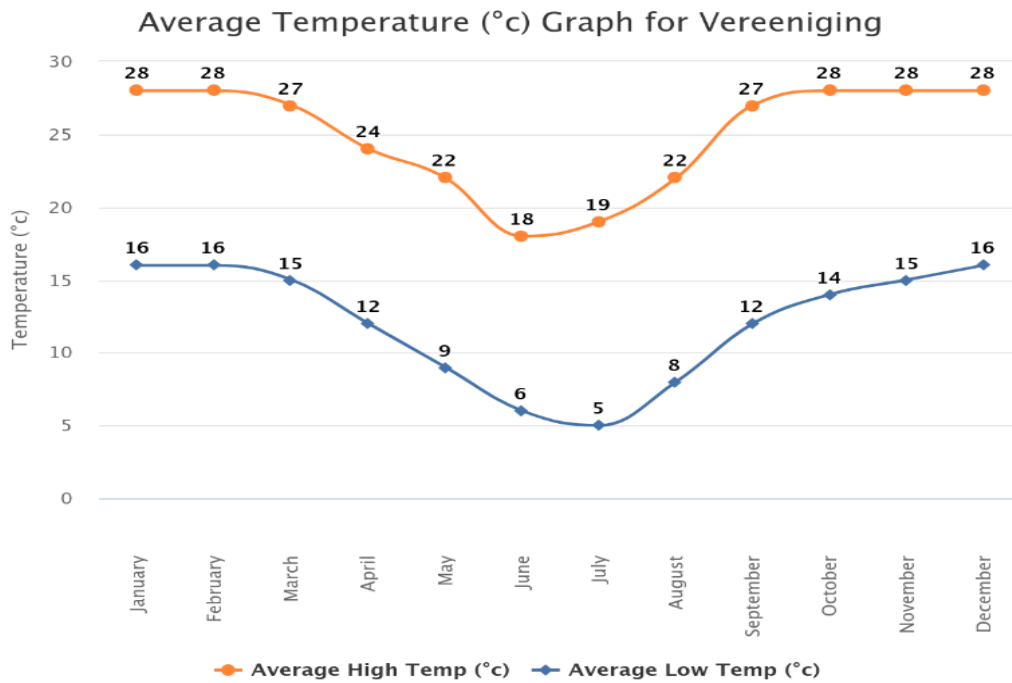


Figure 16: Average Minimum and Maximum temperatures for Vereeniging

8.4 Specialist studies undertaken for the proposed developments

Specialist Studies and Compliance statements were conducted for the Proposed Construction and Maintenance of New System 1 at Rand Water Vereeniging Treatment Works, Installation of approximately 7 Km Phase 2 Sludge Pipeline in Vereeniging, 1.5 Km Sludge line in Panfontein and associated infrastructure within the jurisdiction of Sedibeng District Municipality, Gauteng Province. The specialist reports were conducted in line with the protocol requirements in accordance with Government Notice No. 648 and Appendix 6 of the EIA Regulations, 2014 as amended. The findings and recommendations from the specialists were included in this report as well as the EMP. The impacts were incorporated to assess and decide on the best practicable environmental option.

8.4.1 Agricultural Compliance Statement

An agricultural Compliance Statement was undertaken by KMG Environmental Solutions Services. This study was an exemption from a full impact assessment study, as it was the opinion of the specialist to exempt a full study but to give a compliance statement of the same. This study was done in line with the protocol requirement in terms of Government Notice No. 648, Gazetted on 10 May 2019 have been undertaken accordingly.

During the inspection conducted on 9th of April 2025 the Specialist confirmed that the proposed developments are situated on land that is either urban and industrial in nature which are classified as low-potential agricultural land, with no current or foreseeable agricultural activities taking place in any of the affected zones. The key findings of the compliance assessment indicated that no high-value agricultural land will be affected, and no land currently under cultivation or formal agricultural production will be disturbed. The construction footprint falls largely within existing servitudes, disturbed zones, and built-up areas. The impact on soil structure, fertility, or future agricultural use is considered temporary and reversible, provided that proper rehabilitation practices are implemented.

KMG further recommended the following:

- Limit construction activities to clearly defined servitudes and disturbed zones to avoid unnecessary disturbance of adjacent areas.
- Strip and store topsoil separately and reinstate it during the rehabilitation phase to preserve soil structure and seed banks.
- Implement erosion and dust control measures, particularly in areas with exposed soil or slight slopes.
- Rehabilitate disturbed areas promptly using indigenous seed mixes suitable for local conditions and stabilise soils using mulch or biodegradable erosion control mats where necessary.
- Monitor rehabilitation success quarterly for at least 12 months, addressing any signs of erosion, invasive species encroachment, or poor vegetative recovery.
- Maintain recorded photographic and spatial evidence of pre- and post-construction site conditions as proof of agricultural and environmental compliance.

The impact of the proposed development on the agricultural production potential of the site has been assessed and is considered to be acceptable, with no significant impact anticipated on agricultural potential or ongoing production. Provided that the recommended mitigation measures are implemented, the site can be restored to a stable condition post-construction, thereby ensuring long-term environmental sustainability and land use compatibility

8.4.2 Terrestrial Biodiversity Assessment Study

The terrestrial Biodiversity Assessment for all proposed development sites was conducted on the 16th of April 2025, by Eco-Sentle Pty Ltd below are the findings per proposed development site.

- **Proposed New System 1 in Vereeniging**

The New System 1 site at the Rand Water Vereeniging Treatment Works falls within the Soweto Highveld Grassland ecosystem and is characterised by Habitat Unit 1, a moderately transformed depression that resembles an incomplete aeration basin. This habitat supports wetland-like vegetation at the base and alien-invaded grassland along the periphery. Dominant plant species include *Searsia lancea*, *Pinus palustris*, *Phragmites australis*, and grasses like *Themeda triandra* and *Eragrostis curvula*. The terrestrial ecological condition is impacted by existing infrastructure from the water treatment works, but ecological sensitivity is elevated due to the site's proximity to the Vaal River. No species of conservation concern were identified during the field survey, but the presence of invasive species such as bug weed and pampas grass was noted. The site was assigned a low to moderate ecological sensitivity due to its altered condition, although management is still required to avoid indirect impacts on the adjacent riparian corridor.

- **Phase 2 Sludge Pipeline – Vereeniging**

The proposed Phase 2 sludge pipeline falls within the Soweto Highveld Grassland ecosystem and the route intersects Habitat Units 2 and 3. Habitat Unit 2 includes grassland disturbed by sludge stockpiling and historic sand mining activities, while Habitat Unit 3 features riparian characteristics due to proximity to the Vaal River. Both habitats show signs of urban impact, including illegal dumping and industrial activity. Despite the transformed nature of the landscape, these units retain moderate ecological importance because of their partial connectivity to the Vaal River ecosystem. No faunal

species of conservation concern were recorded during the field visit. However, the habitat still plays a role in supporting generalist fauna and flora and thus requires mitigation during construction.

- **Panfontein Sludge Pipeline**

The Panfontein sludge pipeline is situated within the Central Free State Grassland ecosystem and traverses Habitat Unit 4, a highly disturbed area dominated by artificial sludge ponds and surrounded by agricultural land. Vegetation here is largely limited to low shrubs and ruderal grasses, with no conservation-important species detected. The site exhibits low ecological sensitivity and importance, with little to no functional biodiversity value. Despite the low rating, it is recommended that good environmental practice be maintained to prevent further degradation and the spread of invasive species.

The specialist further recommended the following:

- Avoid unnecessary vegetation clearing during construction, especially near riparian and sensitive areas.
- Rehabilitate all disturbed areas post-construction using locally indigenous grass species appropriate to the ecosystem (e.g., *Themeda triandra*, *Eragrostis curvula*).
- No construction material or waste must be stockpiled in vegetated or riparian zones.
- Implement measures such as silt fences, sediment traps, and erosion blankets where necessary to prevent erosion and sedimentation, particularly near the Vaal River.
- Construct temporary stormwater diversion channels if working during rainy seasons.
- Avoid development that may lead to further fragmentation of natural habitats, especially near the Vaal River corridor.
- While no Species of Conservation Concern (SCC) were observed, any wildlife encountered during construction must be allowed to escape unharmed or relocated by a qualified professional.
- No hunting, trapping, or collection of wildlife is permitted on site.
- All mitigation and biodiversity protection measures must be included in the project's Environmental Management Programme (EMPr) and enforced by an appointed Environmental Control Officer (ECO).

8.4.3 *Wetland Assessment Study*

The Wetland Assessment for all proposed development sites was conducted on the 09th of April 2025, by the Biodiversity Company Pty Ltd below are the findings per proposed development site.

- **Proposed New System 1 in Vereeniging and Phase 2 Sludge Pipeline**

The site inspection identified multiple freshwater features within the 500m of the Project Area of Influence, including the Vaal River (classified as HGM 1) and several seep wetlands (HGM 1–4). The Vaal River was rated with high ecological importance and sensitivity, while the seeps were rated moderate. The Present Ecological State scores ranged from Category D (largely modified) to Category F (critically modified), indicating heavy transformation but also ecological relevance. The Recommended Ecological Category for the Vaal River was Category C/D, with an objective to maintain current conditions. Furthermore, the Phase 2 Sludge pipeline traverses several seep wetlands and runs parallel to the Vaal River. The ecological role of these features such as sediment

trapping, flow attenuation, and habitat provision remains important, even though their current condition is degraded.

- **Panfontein Sludge Pipeline**

The site inspection for the Panfontein site revealed a few seep wetlands (HGM 5-10), though they are in a poor ecological state (Category E/F) and show low functionality. These features are heavily degraded due to historical disturbance from water treatment infrastructure and agriculture. Despite their condition, the wetlands retain some limited role in local hydrological and nutrient regulation.

The specialist further recommended the following:

- Apply a 25-meter post-mitigation buffer for the Vaal River and a 15-meter buffer around all identified seep wetlandFs.
- Avoid the construction and storage of materials within these regulated buffer zones.
- Maintain natural hydrological flow paths and avoid altering wetland and riparian hydrodynamics through infrastructure or compaction.
- Ensure that all disturbed soils are quickly stabilised and rehabilitated using appropriate vegetation.
- Rehabilitate any temporary crossings or impacted wetland areas with indigenous wetland vegetation.

8.4.4 Socio-economic assessment study

The Socio-economic assessment for all proposed development sites was conducted on the 09th of April 2025, by KMG Environmental Solutions Services. Below are the findings per proposed development site.

Sedibeng District Municipality

The Sedibeng District Municipality (SDM) is located in the southern part of Gauteng Province and comprises three local municipalities: Emfuleni, Midvaal, and Lesedi. It spans an area of approximately 4,185 km² and is strategically positioned along the Vaal River system, which forms a vital water source for Gauteng and neighbouring provinces. Sedibeng hosts critical bulk water infrastructure, including the Rand Water Vereeniging Water Treatment Works, multiple sludge pipelines, reservoirs, and wastewater treatment facilities.

This infrastructure is crucial for regional water security but is under pressure due to ageing systems and rising demand. Settlement patterns in Sedibeng are largely urban, with formal housing dominating areas such as Vereeniging, Vanderbijlpark, Meyerton, and Heidelberg. About 85% of households live in formal dwellings, over 90% have access to electricity for lighting, and 88% have piped water on-site or in their dwellings. However, some areas, notably Sebokeng, Boipatong, and Evaton, continue to experience infrastructure backlogs, informal housing growth, and sanitation challenges.

Economically, Sedibeng has historically functioned as Gauteng's heavy industry hub, supporting steel production, logistics, and utilities. It is now transitioning toward infrastructure renewal, local economic development (LED), and environmentally sustainable services. The Vaal River Special Economic Zone (SEZ) and proximity to the N1 and R59 highways further enhance its industrial potential

Emfuleni Local Municipality

Emfuleni is the largest and most densely populated municipality within the Sedibeng District, encompassing key urban centres such as Vereeniging and Vanderbijlpark. As of 2023, Emfuleni had an estimated population of approximately 721,663 people. The racial composition is predominantly Black African (85.1%), followed by White (9.7%), Coloured (3.2%), and Indian/Asian (1.8%). Unemployment levels in Emfuleni remain high, with the broad unemployment rate recorded at 45.3%, and youth unemployment exceeding 55%.

The municipality's economic activity is centred on manufacturing, public administration, construction, and utilities, supported by a mix of formal and informal sectors such as spaza shops, waste recycling, and service trades. Despite its industrial base, approximately 31% of households live below the upper-bound poverty line. Household income distribution indicates that 22% of households earn less than R1,600 per month, and 18% earn between R1,601 and R3,200. Access to services is relatively high in formal areas, with 88.3% of households having piped water, 91.6% with electricity, and 81.4% connected to flush sewerage systems. However, informal settlements in areas such as Sebokeng and Evaton face challenges with road infrastructure, stormwater systems, and sewerage connections. Education levels also reflect structural inequalities, with only 11% of the population having post-secondary qualifications.

The area has seen investments in social development programmes, including IT skills development, agri-business summits, and public health services, which provide a foundation for socio-economic alignment with the proposed Rand Water infrastructure project

Midvaal Local Municipality

Midvaal Local Municipality, situated north-east of Emfuleni within Sedibeng, represents a contrasting socio-economic profile. Although less densely populated, Midvaal has emerged as a growth node due to its proximity to Johannesburg, access to major road corridors like the R59, and availability of industrial and agricultural land.

The municipality exhibits a mix of urban and rural characteristics, with formal residential settlements in Meyerton and agricultural holdings in outlying areas. Midvaal's economy is driven by manufacturing, commercial agriculture, logistics, and warehousing. It has experienced consistent population growth and infrastructure investment, making it one of the better-performing municipalities in Gauteng.

Infrastructure access is relatively high, and service delivery indicators are well above the national average. However, spatial inequality and affordability barriers remain in peripheral and informal areas, where in-migration and housing demand are outpacing service delivery. Midvaal's strategic location near the Panfontein sludge pipeline segment makes it relevant to the Rand Water project, particularly in ensuring alignment with municipal land-use plans and future development strategies.

8.4.5 Geotechnical Assessment Study

The Geotechnical assessment studies for the proposed developments were undertaken by different consultants across the various components of the project. Knight Piésold conducted the geotechnical investigation for the New System 1 in 2019. The Phase 2 Sludge Pipeline study was carried out by Lilibara Projects (Pty) Ltd, while the assessment for the Panfontein Sludge Pipeline was undertaken by Mbali Industrial Solutions CC. The findings for each proposed development site are summarised below.

▪ **Proposed New System 1 in Vereeniging**

The site is underlain by variable soil profiles associated with the Vryheid Formation of the Ecca Group, comprising interbedded sandstone, mudrock, and shale. Subsurface investigations identified inconsistent stratigraphy, with fill materials, alluvium, residual soils, and highly expansive clays, especially prominent on the western side of the footprint. These clayey soils exhibit high plasticity, posing a risk of significant volume change under varying moisture conditions. Compounding the design complexity is the shallow water table, encountered within 1.6 meters below ground level, creating the need for targeted dewatering during construction. Notably, large portions of the old System 1 structures remain only partially demolished, and their presence influences both foundation preparation and excavation logistics.

The specialist further recommended the following:

- Remove all unsuitable expansive clay beneath the proposed sedimentation tank and flocculator.
- The eastern, western portion of the Sedimentation tank and the Flocculator must be excavated to 1434.50 m, 1433.00 m and 1435.00 m respectively.
- Implement a herringbone drain system feeding into a sump at the northwest corner.
- Maintain excavation water levels at or below 1433.00 m during works.
- Avoid dewatering post-construction to reduce risk of heave beneath adjacent tanks.
- Monitor settlement and movement of nearby tanks (System 3 and System 5) using survey targets.
- Conduct geotechnical inspections throughout excavation and backfill stages.
- Cease dewatering temporarily if excessive movement is detected in adjacent infrastructure.

The reuse of concrete rubble from demolished structures is also encouraged where feasible, provided it is adequately processed and reinforcement is removed.

▪ **Phase 2 Sludge Pipeline**

The Phase 2 Sludge Pipeline involved test pit excavations every 250 meters along the pipeline route, supported by a desktop study and laboratory testing. The area is underlain by Quaternary deposits including alluvium and aeolian sands, along with shales, mudstones, and sandstones of the Ecca Group from the Karoo Supergroup. The soils were predominantly silt- and clay-rich, which rendered them unsuitable for use as bedding material, with most classified as G9 or worse according to TRH14 guidelines. Groundwater seepage was encountered in several locations, indicating the need for dewatering during construction. Although the soils were generally classified as soft and excavatable by TLB, unstable trench walls were reported at some locations, necessitating sloping (battering) or shoring for safety. Laboratory analysis confirmed moderate soil corrosivity, implying a need for corrosion protection of buried steel components.

The specialist further recommended the following:

- Use Imported Bedding Material due to native soils being unsuitable.
- Groundwater management through temporary dewatering systems for areas where seepage was observed.

- The trenches should be designed with safety in mind, incorporating sloping at a 1:2 ratio or structural shoring.
 - To protect pipeline integrity, the use of corrosion-resistant coatings or protective sleeves on steel pipes is required.
 - Road crossings can be completed using open trench or trenchless methods depending on ground conditions.
- **Panfontein Sludge Pipeline**

The Panfontein site revealed that the subsurface profile consists of fill material, aeolian sands, residual soils, and basalt bedrock belonging to the Kliprieversberg Group. The investigation involved test pits, Dynamic Cone Penetration (DCP) testing, percolation tests, and laboratory analysis of soil samples. The findings indicated highly variable soil strength across the site, as reflected by fluctuating EASBP values, which suggest the presence of potentially weak zones requiring ground improvement prior to foundation construction. The soils showed moderate to high expansivity and corrosivity, posing significant risks to unprotected concrete, steel, and fibre cement infrastructure. No groundwater was encountered within the depth of investigation (1.5 m), and soils were generally excavatable using a Tractor-Loader-Backhoe (TLB). Due to the presence of aggressive soils, corrosion protection measures are essential for all buried infrastructure. The environmental and construction implications include risks of foundation instability, accelerated material degradation, poor surface water drainage, and trench collapse due to inconsistent soil strength.

The specialist further recommended the following:

- Using reinforced strip or raft foundations combined with soil improvement measures such as compaction or chemical stabilization.
- Proper surface and subsurface drainage systems must be installed to manage water flow and prevent erosion or ponding.
- In corrosive zones, sulphate-resistant cement and protective coatings for steel structures are necessary.
- Excavations should be monitored closely, and trenches should be supported or battered back as per safety guidelines.
- Planting of trees should be carefully managed to avoid structural damage from roots, adhering to minimum setback distances.

The Hydrology, Geohydrology, Floodline assessments and the Stormwater Management Plan for the proposed developments were undertaken by Aryis Consulting (Pty) Ltd. Below the findings for each proposed development site per the study are summarised below.

8.4.6 Storm Water Management Plan

- **Proposed New System 1 in Vereeniging**

At the New System 1 site in Vereeniging, the SWMP identified a high potential for runoff generation due to the presence of paved surfaces, rooftops, and large buildings associated with the Vereeniging Treatment Water Works. The area is part of a developed urban zone with an existing stormwater network. However, the construction of new infrastructure such as the flocculators and the Sedimentation tanks and other associated infrastructures will introduce the risk of increased runoff

velocity, erosion, and contamination if not properly addressed. The nearby Vaal River is a key receptor and must be protected against suspended solids and chemical runoff.

The specialist further recommended the following:

- The stormwater infrastructure must be designed to prevent mixing of clean and dirty water flows.
- In case of accidental spillages of oils, hydrocarbons, and hazardous waste, emergency response procedures (e.g., spillage control kits) should be implemented to contain and dispose of the spillage immediately.
- Construction material on site and removed topsoil must be stored in minimally designated areas to reduce contamination, compaction and erosion.
- Regular monitoring and maintenance of stormwater management infrastructure to ensure efficiency and reduce environmental spillages to the clean environment.
- Implementing temporary attenuation and runoff routing measures to retain and redirect surface runoff as necessary.
- Decommissioning should include thorough revegetation and post-rehabilitation audits to confirm surface water recovery and prevent long-term siltation impacts.
- Clearing and keeping drains and outlets clean.
- Monitoring should be undertaken monthly during the wet season and after heavy storm events or per the site management schedule.

▪ **Phase 2 Sludge Pipeline**

In the case of the Phase 2 sludge pipeline the stormwater challenge are particularly pronounced during construction due to the linear and exposed nature of the trenching activities. The Phase 2 Sludge Pipeline crosses both urban and peri-urban areas, some with existing stormwater infrastructure, while others are entirely undeveloped. This variation increases the complexity of stormwater management across the alignment. Uncontrolled runoff from site clearing, vehicle movement, stockpiling of materials, and accidental spills of hydrocarbons pose a significant risk to surface water receptors.

The specialist further recommended the following:

- Incorporating erosion control measures along sloped and exposed areas.
- Reinforcing diversion channels, and proper design of site access routes.
- Stormwater water runoff must be diverted from active construction zones.
- All site personnel must adhere to designated no-go zones especially near drainage lines.
- The construction schedules should prioritise low-rainfall periods.
- Monitoring dust generation (suppress), erosion, topsoil stockpile locations and handling procedures.
- Implementing a phased construction schedule with progressive rehabilitation of disturbed areas.
- Proper bunding and impermeable surfaces must be used for all chemical and fuel storage locations.
- Erosion and sediment control mechanisms such as silt traps, sediment fences, and outlet energy dissipaters should be included along the pipeline route.

▪ **Panfontein Sludge Pipeline**

In the Panfontein area, the surrounding region is generally less urbanised and has a more rural character, there is still a clear risk of sediment-laden runoff, especially during the construction phase. The drying beds and related infrastructure are expected to influence local drainage patterns, with potential flow of stormwater into adjacent catchments if not properly managed. The topography suggests that water drains away from the drying ponds, however, this could change if heavy storm events or poor site practices alter natural flow paths.

The specialist further recommended the following:

- The establishment of vegetated berms is encouraged to prevent erosion.
- Areas potentially contaminated by machinery or construction activities must be diverted away from clean environments.
- Incorporating erosion control measures along sloped and exposed areas.
- Reinforcing diversion channels, and proper design of site access routes.
- Stormwater runoff must be diverted from active construction zones.
- Monitoring dust generation (suppress), erosion, topsoil stockpile locations and handling procedures.

8.4.7 Hydrological Assessment Study

- **Proposed New System 1 in Vereeniging**

The hydrological study conducted on the 9th of July 2025 revealed that at New System 1 the infrastructure is situated near a moderately sensitive surface water environment. The Vaal River, which runs adjacent to the proposed development, is a significant receptor that could be affected by project-related activities. During construction, clearance of topsoil and vegetation, along with machinery movement, could lead to sedimentation and water quality deterioration. The proposed development will introduce the risk of effluent spills and hydrocarbon leakage from storage areas, all of which can impact downstream watercourses.

The specialist further recommended the following:

- Construction material on site and removed topsoil must be stored in minimally designated areas to reduce contamination, compaction and erosion.
- Regular monitoring and maintenance of stormwater management infrastructure to ensure efficiency and reduce environmental spillages to the clean environment.
- Implementing temporary attenuation and runoff routing measures to retain and redirect surface runoff as necessary.
- Monitoring should be undertaken monthly during the wet season and after heavy storm events or per the site management schedule.
- The scheduling of the earthworks should be implemented to minimize the footprint at risk of erosion at any given time.
- Servicing of construction vehicles and equipment and refuelling station areas must be bundled with completely contained compact surfaces to contain all waste in the storage facility, like sumps, for proper disposal per waste handling protocols.
- Infrastructure such as bunded chemical storage areas and sediment control measures must be maintained continuously to prevent contamination of the Vaal River and associated wetlands.

- In case of accidental spillages of oils, hydrocarbons, and hazardous waste, emergency response procedures (e.g., spillage control kits) should be implemented to contain and dispose of the spillage immediately.

- **Phase 2 Sludge Pipeline**

The assessment indicated that the Phase 2 Sludge Pipeline is situated closer to surface water-sensitive zones, particularly the Vaal River. The area's Present Ecological State (PES) is classified as Category C, suggesting that it is moderately modified and therefore vulnerable to further degradation. During the construction phase, major impacts identified include erosion, surface water pollution from machinery and hydrocarbons, and potential interference with natural drainage patterns. The downstream areas of the Phase 2 sludge pipeline, the area has flat terrain and proximity to aquatic systems heighten the risk of cumulative surface water impacts. The loosely compacted soils in these areas, present a risk of sedimentation and erosion.

The specialist further recommended the following:

- The long-term recovery of surface water quality and hydrological function must be monitored until stability is achieved.
- The construction activities be undertaken with comprehensive erosion control measures in place.
- Construction activities should avoid the rainy season.
- Machinery routes must be minimized.
- A surface water monitoring program must be implemented, including baseline data collection and post-event sampling to ensure early detection of contaminants.
- The pipeline route should avoid low-lying or flood-prone zones where possible.

- **Panfontein Sludge Pipeline**

The hydrological assessment revealed that the Panfontein section of the sludge line lies outside the 500 m buffer zones of identified wetlands, indicating a relatively lower surface water sensitivity compared to other parts of the project. However, the presence of construction activities still presents potential risks to water quality, particularly from accidental hydrocarbon spillages and sedimentation due to vegetation clearance and soil disturbance. While the general hydrological regime does not suggest a high flood risk for this area, the possibility of localized impacts, such as erosion and pollution, remains if unmanaged.

The specialist further recommended the following:

- Construction activities to be restricted to the dry season to minimise the risk of erosion and sediment transport.
- Storage and handling of all hazardous substances should occur on impervious and bunded surfaces to prevent contamination on land.
- The site should also be subjected to regular water quality monitoring during construction and operation phases. Post-construction rehabilitation using indigenous vegetation is essential to restore natural surface water flow patterns and enhance catchment recovery.
- Keeping the construction footprint limited to a small area (i.e., development footprint).

8.4.8 *Floodline Assessment Study*

- **Proposed New System 1 in Vereeniging**

According to the floodline assessment conducted on the 9th of April 2025 revealed that the New System 1 site lies within the broader floodplain of the Vaal River and is potentially affected during flood releases from the Vaal Dam. While the Vaal Dam itself attenuates flood volumes significantly, the assessment confirmed that under extreme events, certain sections of the proposed infrastructure may experience partial flood. The flat topography further compounds flood risks, as water is likely to accumulate in low-gradient zones without efficient drainage.

The specialist further recommended the following:

- Any new structures must be positioned above the modelled floodline or be flood-proofed using resilient designs.
- Detailed topographic surveys should be conducted to verify elevation data and guide infrastructure placement.
- The inclusion of stormwater management features and real-time flood warning systems may also assist in reducing long-term flood damage and ensure operational continuity during extreme events.

- **Phase 2 Sludge Pipeline**

The floodline study revealed that significant portions of the Phase 2 sludge pipeline, particularly those adjacent to the Vaal River, are at considerable risk of inundation during medium (1:10-year) and high (1:100-year) flow scenarios. Hydraulic simulations using peak flows of 1 800 m³/s demonstrated that many low-lying segments could be flooded, which may jeopardize pipeline integrity and operation. The modelling was based on 5 m contour data and terrain analysis, but uncertainties remain due to interpolation errors and absence of infrastructure like culverts in the model. The section of the Phase 2 sludge pipeline where the topography flattens out and approaches natural watercourses, the model predicts notable flood risk. These areas are highly vulnerable to inundation when the Vaal Dam releases floodwaters exceeding operational thresholds. Due to modelling limitations such as lack of high-resolution survey data and incomplete representation of bridges and culverts the exact extent of the flooding remains uncertain.

The specialist further recommended the following:

- The pipeline sections be reassessed with the support of detailed terrain surveys to resolve the gaps in the flood simulation.
- Where risk is confirmed, physical relocation or structural elevation of the pipeline should be prioritised.
- Where relocation is not feasible, adequate embankment reinforcement, erosion control, and periodic flood resilience checks are vital to prevent long-term infrastructure damage.
- A detailed terrain and infrastructure survey is urgently required to refine the flood model and improve the accuracy of risk predictions.
- Until then, it is essential that no critical infrastructure be located directly within the 1:100-year floodline envelope.

- **Panfontein Sludge Pipeline**

The floodline assessment for the Panfontein section of the sludge pipeline showed that this area is less susceptible to direct flooding from the Vaal River, largely due to its distance from the main river channel and slightly elevated terrain. The modelling did not identify significant inundation risks at this

particular section under medium flow release scenarios from the Vaal Dam. However, some uncertainty remains due to the lack of high-resolution topographic data, and as such, conservative planning remains prudent.

The specialist further recommended the following:

- Maintaining the pipeline alignment away from any low-lying or potentially saturated zones.
- While immediate flood risk may be low, flood-resilient construction designs are encouraged.
- To improve the accuracy of future assessments, a detailed topographic survey is suggested to validate the floodplain elevation relative to the proposed infrastructure.

8.4.9 Heritage Impact Assessment Study

▪ **Proposed New System 1 in Vereeniging**

The New System 1 site at the Vereeniging Treatment Works is located within a landscape of historical and industrial significance. The area contains demolished building foundations, old, rusted infrastructure, water canals, and structures associated with water treatment systems. According to archival sources, the Rand Water system in Vereeniging dates back to the 1920s, having evolved into a critical infrastructure component in response to water demand in Johannesburg. Although the structures exceed 60 years in age, they are not associated with any notable historical events or individuals and do not hold significant architectural or cultural value. Consequently, the site was assessed as having medium local significance due to its age but limited broader heritage importance. No artefacts were found on the surface, and no fatal heritage constraints were identified that would hinder development.

The specialist further recommended the following:

- Rand Water is advised to incorporate the proposed development infrastructure into the existing treatment works with minimal demolition or disturbance to the remaining structures, thereby preserving the historical integrity of the site where feasible.
- If the project requires the demolition of any structures older than 60 years, Rand Water must apply for a demolition permit from the Provincial Heritage Resources Authority of Gauteng (PHRAG).
- If further structural modifications are planned beyond maintenance, a Phase 2 Heritage Impact Assessment is recommended.
- The old building foundations, already in a dilapidated state, may be safely removed without the need for a demolition permit, as they no longer possess salvageable heritage value.
- Lastly, the EMPr must include the Chance Finds Procedure, and all site personnel should be made aware of legal obligations regarding the discovery and handling of any unexpected heritage materials

▪ **Phase 2 Sludge Pipeline**

The assessment of the Phase 2 Sludge Pipeline revealed that the proposed route traverses a highly disturbed industrial landscape, often running alongside or across existing infrastructure such as roads and water pipelines. During the field survey, a few old buildings exhibiting Edwardian architectural features were observed a few metres away from the proposed pipeline route. These buildings, while

architecturally interesting and dating to a period of historical relevance, do not fall within the actual development footprint and are therefore not under direct threat from construction activities. No archaeological materials or heritage resources were identified within the proposed development area itself. The heritage and cultural significance of the site was assessed to be low, with no notable archaeological features or structures located on-site. As such, the potential impact to heritage resources is minimal.

The specialist further recommended the following:

- It is recommended that Rand Water avoid disturbing the old Edwardian buildings observed near the pipeline route, even though they fall outside the development footprint. No demolition permits are required as long as these structures remain untouched.
- Should any graves or archaeological materials be unearthed during construction, work must stop immediately, and the SAHRA or a qualified heritage specialist must be notified.
- A Chance Finds Procedure must be followed, and construction crews should be made aware of the legal responsibilities and penalties involved in disturbing heritage materials. These measures should be incorporated into the EMPr to ensure legal compliance and cultural resource protection.

Panfontein Sludge Pipeline

The Panfontein Sludge Pipeline lies in a geologically and archaeologically significant region shaped by the Vaal River and its tributaries, the site is heavily disturbed and overgrown in places, with visible signs of infrastructure development and erosion. During the field investigation, no surface artefacts or indicators of cultural heritage resources, including those from the Stone Age or Iron Age, were observed within the proposed development footprint. The absence of archaeological materials may be attributed to existing infrastructure and soil disturbance. The site's cultural and heritage significance was therefore deemed low, with no mitigation required beyond standard precautionary measures.

The specialist further recommended the following:

- The construction activities may proceed as planned, provided the Chance Finds Procedure is implemented and enforced.
- Should any graves, human remains, or artefacts be discovered during the construction phase, work must cease immediately in the affected area, and SAHRA must be informed for further investigation.
- All personnel must be trained on the importance of preserving potential archaeological finds, and no materials may be removed or disturbed without proper authorization. These protocols are to be included in the EMPr to ensure responsible development.

9 DESCRIPTION OF THE PROCESS UNDERTAKEN TO IDENTIFY, ASSESS AND RANK THE IMPACTS AND RISKS THE ACTIVITY WILL IMPOSE ON THE PREFERRED SITE THROUGH THE LIFE OF THE ACTIVITY

9.1 Approach to the EIA

An Environmental Impact Assessment (EIA) is a good planning tool. It identifies the environmental impacts of a proposed development and assists in ensuring that a project will be environmentally acceptable and integrated into the surrounding environment in a sustainable way.

The Basic Impact Assessment for this project complies with the National Environmental Management Act (1998) (as amended) and the NEMA EIA Regulations (2014) and guidelines of the Department of Environmental Affairs (DEA). The guiding principles of an EIA are listed below.

9.2 Guiding principles for an EIA

The EIA must take an open participatory approach throughout. This means that there should be no hidden agendas, no restrictions on the information collected during the process and an open-door policy by the proponent. Technical information must be communicated to stakeholders in a way that is understood by them and that enables them to meaningfully comment on the project.

There should be ongoing consultation with interested and affected parties representing all walks of life. Sufficient time for comment must be allowed. The opportunity for comment should be announced on an ongoing basis. There should be opportunities for input by specialists and members of the public. Their contributions and issues should be considered when technical specialist studies are conducted and when decisions are made.

9.3 Information gathering

Early in the Basic Assessment process, the Environmental Assessment Practitioner (EAP) identified the information that would be required for the impact assessment and the relevant data were obtained. In addition, available information about the receiving environment was gathered from reliable sources, interested and affected parties, previous documented studies in the area and previous EIA Reports. The project team visited the site to gain first-hand information and an understanding of the existing operations and the proposed project.

9.4 Specialist Assessments

Specialist Studies and Compliance statement were conducted for the Proposed Construction and Maintenance of New System 1 at Rand Water Vereeniging Treatment Works, Installation of Approximately 7 Km Phase 2 Sludge Pipeline in Vereeniging, 1.5 Km Sludge Line in Panfontein and Associated Infrastructure. These specialist reports findings and recommendations have been included as part of this Draft Basic Assessment. Hence, the impacts were incorporated to assess and decide in the best practicable environmental option. In addition to these, a site verification report is also appended for reference.

9.5 Description and assessment of impacts identified.

A comprehensive list of all potential impacts of the proposed development as identified by the EAP and the specialists, are provided, and are assessed.

9.6 Environmental Management Programme

An Environmental Management Programme (EMPr) containing mitigation, management and monitoring measures and specifying roles and responsibilities was compiled with specialist input and is included in this report.

9.7 Stakeholder engagement

Registered Interested and Affected Parties including relevant Organs of State, are consulted during the process. All their comments will be formally responded to and incorporated into the Draft Basic Assessment Report (DBAR) and Environmental Management Programme (EMPr) that will be submitted to the competent authority.

9.8 Assessment of each identified potentially significant impact and risk.

Potential impacts that may be caused by the proposed development will be identified using input from the following:

- Views of I&APs;
- Existing information.
- Site visit with the project team; and
- Legislation

10 IMPACT ASSESSMENT

10.1 Assessment Methodology

Table 9: Methodology utilised in the rating of significance of impacts.

NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity.		
GEOGRAPHICAL EXTENT		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY		
This describes the chance of occurrence of an impact		

1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).

REVERSIBILITY

This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.

1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.

IRREPLACEABLE LOSS OF RESOURCES

This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.

1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.

DURATION

This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity

1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).
3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).


CUMULATIVE EFFECT		
This describes the cumulative effect of the impacts on the environmental parameter. A cumulative effect/impact is an effect which in itself may not be significant but may become significant if added to other existing or potential impacts emanating from other similar or diverse activities as a result of the project activity in question.		
1	Negligible Cumulative Impact	The impact would result in negligible to no cumulative effects
2	Low Cumulative Impact	The impact would result in insignificant cumulative effects
3	Medium Cumulative impact	The impact would result in minor cumulative effects
4	High Cumulative Impact	The impact would result in significant cumulative effects
INTENSITY/ MAGNITUDE		
Describes the severity of an impact		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/ component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: (Extent + probability + reversibility + irreplaceability + duration + cumulative effect) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact Significance Rating	Description
6 to 28	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
6 to 28	Positive Low impact	The anticipated impact will have minor positive effects.

29 to 50	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
29 to 50	Positive Medium impact	The anticipated impact will have moderate positive effects.
51 to 73	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
51 to 73	Positive High impact	The anticipated impact will have significant positive effects.
74 to 96	Negative very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
74 to 96	Positive Very high impact	The anticipated impact will have highly significant positive effects.

ENVIRONMENTAL RATING SIGNIFICANCE KEY:

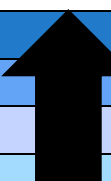
NEGATIVE IMPACTS

SIGNIFICANCE	RATING	FINAL RATING SCORE / VALUE RANGE
Very Significant	Very High	74 – 96
Significant	High	51 – 73
Increasing Significance	Medium	29 – 50
Insignificant	Low	6 – 28



POSITIVE IMPACTS

SIGNIFICANCE	RATING	FINAL RATING SCORE / VALUE RANGE
Very Significant	Very High	74 – 96
Significant	High	51 – 73
Increasing Significance	Medium	29 – 50
Insignificant	Low	6 – 28



The Following potential major direct, indirect, and cumulative impacts were identified.

- Soil disturbance and erosion.
- Dust Generation.
- Surface and groundwater contamination.
- Biodiversity disturbance and habitat loss
- Loss of vegetation and topsoil from construction vehicles.
- Increased sedimentation.
- Interruption of existing services and traffic flow due to the Installation of pipelines near or across roads.
- Loss and displacement of fauna.

- Impacts on the existing land use of the study and the surrounding area.
- Destruction or loss of heritage features, including graves and other historically significant sites that may be uncovered during excavations.
- Soil compaction in semi-vegetated zones.
- Poor air quality and reduced visibility due to dust pollution.
- Noise and vibration disturbance to nearby communities and fauna.
- Generation of waste.
- Alien Invasive Species.
- Vegetation clearing
- Loss of soil productivity.
- Alteration of surface topography
- Soil stockpiling and building material stockpiles.

Table 10: Potential Impacts during Pre- construction, Construction and Operational Phases (Vereeniging New System 1)

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
PRE- CONSTRUCTION PHASE				
<p>Non-compliance with the Environmental Management Plan, Permits and Environmental Authorisation. / Relevant Site Documentation</p>	<p>Negative Very High</p>	<ul style="list-style-type: none"> ▪ All relevant authorisations (e.g. Environmental Authorisation, Water Use Licence/General Authorisation) must be obtained before construction commences. ▪ The applicant must comply with the conditions of the issued Environmental Authorisation. ▪ A Water Use Licence in terms of the National Water Act, 1998 (Act 36 of 1998) is to be obtained before the Phase 2 Sludge pipeline is constructed and installed. A Rehabilitation and Monitoring Plan to be included as part of the Water Use Licence application. ▪ The need for a Heritage Permit should be confirmed with Provincial Competent Authority (PHRA-G) before demolition of infrastructure could take place. 	<p>Positive Medium</p>	<p>Failure to comply with legislation & policies will lead to fines and conflicts with local, provincial and national stakeholders</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ The Environmental Authorisation must be obtained from the competent Authority before any activities occur in terms of the EIA regulations 2014, amended. ▪ The Environmental Management Plan must be made binding in all contracts concerning the proposed project. ▪ Method statements (or SOPs) must be developed and approved by the applicant, ECO, Engineer and Contractor. 		
Non-viable design and selection of technology	Negative Medium	<ul style="list-style-type: none"> ▪ The best reasonable and feasible infrastructure and technology for the proposed developments must be employed. ▪ Technology that meets approved acceptable technical standards such as SABS must be selected. ▪ During the planning and design phase, the development must adhere to the relevant legislation and/or policies. 	Positive Low	Poor design and selection of technology will lead to poor operation, and contamination of groundwater and the surrounding land.
CONSTRUCTION PHASE				

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
Geology and soils	Negative High	<ul style="list-style-type: none"> ▪ All soil compacted because of construction activities falling outside of development footprint areas should be ripped and profiled. ▪ Proper stormwater management measures must be put in place. Stormwater runoff shall be considered and its flow controlled on the construction site. ▪ Any deep excavations must not be left open for extended periods ▪ No further vegetation clearance is to be allowed near the wetland areas. ▪ Permeable paving: infiltration trenches or swales should be installed if necessary. ▪ Strip and store topsoil separately and reinstate it during the rehabilitation phase to preserve soil structure and seed banks. ▪ Appropriate erosion control measures must be implemented to ensure that no erosion is taking place. At the first sign 	Negative Medium	Site clearing and the removal of vegetation may lead to increased runoff, erosion and sedimentation.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>of erosion, the necessary remedial action must be taken.</p> <ul style="list-style-type: none"> Disturbed areas, that will not form part of the operational footprint, but which were disturbed as part of the construction activities, should be rehabilitated and re-vegetated using site-appropriate indigenous vegetation and/or seed mixes. 		
Fauna and flora	Positive Medium	<ul style="list-style-type: none"> The construction area must be demarcated and fenced off. All construction activities should be kept outside of Wetlands/Riparian Habitat. Watercourses must be demarcated to prevent workers from encroaching into sensitive areas. Do not clear the vegetation outside of the development footprint area. Should any animals (e.g. reptiles or mammals) be found during the construction phase, the ECO or relevant specialist should be contacted 	Positive Low	<p>Loss of sensitive habitat, particularly relating to the loss of micro-habitat for both faunal and floral species.</p> <p>The construction of permanent structures (New System 1) on site will result in the loss of vegetation due to foundation excavation.</p> <p>Destruction or alteration of critical habitats can lead to the displacement or local extinction of</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>immediately to ensure the safe removal of the specimen.</p> <ul style="list-style-type: none"> ▪ No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this. ▪ The duration of the construction should be minimised to as short term as possible, to reduce the period of disturbance on fauna. ▪ The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. ▪ No littering by construction workers is permitted. Any litter will be collected and removed off-site to a registered waste site. ▪ Stockpiles of vegetation are only to be in areas approved by the ECO and may not exceed 2m in height. ▪ Methods of stacking must take cognizance of the possible creation of a fire hazard. 		Species of Conservation Concern (SCC).

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ No burning of stockpiled vegetation is permitted. ▪ None of these species may be introduced and they must all be controlled. ▪ The alien plants on site will be removed during construction. ▪ Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported materials). ▪ Any Species of Conservation Concern, flora, or protected plants observed on site must be demarcated before clearing activities begin. ▪ If construction activities are likely to impact any Species of Conservation Concern or protected plants, these must be relocated, and a relevant permit must be obtained prior to any relocation activities. 		

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Rehabilitation and invasive plant species management plans must be developed and implemented. 		
Topography	Negative Medium	<ul style="list-style-type: none"> Excavations to be limited to the construction. All stockpiles must be restricted to designated areas and not to exceed a height of 2 metres. Stockpiles are not to remain during the operational phase. 	Positive Low	Alteration of topography due to excavations and the need to level the site in order to enable construction.
Waste Management	Negative Medium	<ul style="list-style-type: none"> General waste should be placed in watertight containers and disposed of on a regular basis. Construction rubble must be disposed of at a registered site. No Construction rubble may be used for infilling. Waste skips to be covered with a net to prevent windblown waste. No waste to be burnt, buried or dumped on site or the surrounding area. Waste may not be placed on the soil stockpiles or disposed in a haphazard way in the surrounding area resulting in 	Positive Low	Waste will be generated on site during the construction phase, if not disposed of correctly it will become a nuisance within the area

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>the contamination of the soil and the environment</p> <ul style="list-style-type: none"> ▪ Disposal certificates must be obtained for all waste disposals. ▪ Records of all waste taken off-site and disposed of must be kept as evidence. ▪ No waste must be disposed off within the watercourse or its buffer. 		
Hazardous chemicals and waste	Negative Medium	<ul style="list-style-type: none"> ▪ A register of all hazardous substances stored on site must be kept. Relevant Material Safety Data Sheets (MSDS) must be available on site for all potentially hazardous substances. ▪ Proper bunded storage facilities must be provided for the storage of oils, grease fuels, chemicals and any hazardous materials to be used during the construction phase. ▪ Hazardous waste must be separated from general waste, stored separately in appropriate containers and disposed of at a licensed hazardous waste disposal facility. 	Positive Low	Waste generation during the construction phase will harm the environment, if not controlled adequately.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Cover any wastes that are likely to wash away or contaminate storm water. ▪ The drip trays must be placed underneath vehicles and machinery waiting for maintenance, repair or standing for long periods of time. ▪ All spills of chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) should be cleaned with the use of suitable absorbent materials. ▪ Certificates of hazardous waste disposal are to be kept. ▪ Maintenance or re-fueling of vehicles may not be conducted on site. ▪ No waste (hazardous or general) will be disposed of in excavated trenches. ▪ All personnel are to be trained on how to clean up spillages ▪ Spill kits to be made available at areas of possible spillages of hazardous. ▪ Routinely check machinery/plant for oil or fuel leaks each day before construction activities begin and 		

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> implement remedial action as necessary. No waste must be disposed off within the watercourse or its buffer. 		
Traffic	Negative High	<ul style="list-style-type: none"> Manage the increase in construction traffic in terms of congestion, road surface damage, safety concerns, dust and erosion. Only designated roads should be used for construction vehicles, and Ensure drivers and operators of equipment are familiar with the safety policies and regulations. Traffic calming measures and appropriate signage to be implemented. Avoid transportation of construction material during peak hours. 	Positive Medium	The construction phase is likely to generate additional traffic in terms of construction vehicles and heavy vehicles delivering materials to the site.
Stormwater run-off	Negative High	<ul style="list-style-type: none"> Permeable paving should be used to reduce runoff and increase infiltration and groundwater recharge. As much water as possible should be retained on site to be reused again for irrigation and habitat creation. 	Positive Low	Contaminated water would runoff the site and eventually into the nearby watercourse (Vaal River).

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Natural stormwater must flow freely, either as sheet flow or where necessary, in open grass swales, to allow for infiltration and retention. Natural veld grass must be left undisturbed as far as possible, to allow natural drainage. ▪ Where feasible, the use of vegetated swales should be used to accommodate surface runoff, to increase infiltration into the soil. ▪ Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMPr. 		
Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	Negative High	<ul style="list-style-type: none"> ▪ Limit clearing of vegetation and associated soil disturbances to essential areas only. ▪ Sediment depositions should be regularly removed from the swale, to prevent pollution of the runoff from contaminants contained therein ▪ Cover any waste that are likely to wash away or contaminate storm water 	Positive Medium	<ul style="list-style-type: none"> ▪ Groundwater contamination might occur through seepage of hazardous materials into the soil or through stormwater runoff. ▪ Possible contaminated water entering the river leading to reduced ability to support biodiversity.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Ensure handling, transport and disposal of hazardous substances are adequately controlled and managed. Provide containment areas for potential pollutants at construction camps, refueling depots and concrete batching plants. Cement mixing shall be done only at specifically selected sites. After construction activities end, the cement shall be crushed and removed from the site. This mixing area shall then be ripped and rehabilitated. 		<ul style="list-style-type: none"> Disturbances of soils leading to increased alien vegetation proliferation, and in turn to altered riparian habitat. Altered runoff patterns, leading to increased erosion and sedimentation of riparian habitat.
Noise Pollution	Positive Low	<ul style="list-style-type: none"> All plant and construction equipment to be kept in good repair to ensure that point source noise emissions are reduced. Working outside the regular working hours (weekdays 8am – 5pm) must be approved, and adjacent property owners must be notified. Strive for compliance with the relevant South African National Standards (e.g., SANS 10103) and other noise control 	Negative Low	During the construction phase, there will be an increase in the ambient noise level on-site and on surrounding properties.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		legislation such as the Occupational Health and Safety Act (Act No. 85 of 1993).		
Land pollution, degradation	Negative High	<ul style="list-style-type: none"> ▪ Rubble and general construction waste on site should be removed at regular intervals. ▪ All waste must be separated according to type and stored in separate drums, adequately marked according to waste sort. ▪ Random littering and discarding of solid waste on the site must be prevented. ▪ Provision of adequate numbers of litter bins throughout the development; and Implementation of an appropriate collection and disposal strategy to ensure regular removal of waste to a permitted waste disposal facility. ▪ Hazardous waste not to be mixed with general waste and be disposed of at permitted site. ▪ Records of all waste being taken off site must be recorded and kept as evidence. 	Positive Medium	<p>Land Pollution due to the improper handling of waste during the construction phase.</p> <p>The remaining concrete mixture can degrade the environment if not properly managed. Cement and liquid concrete are hazardous to the natural environment on account of the high pH of the mixed material, and the chemicals contained therein.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Concrete must only be mixed on mortarboards (where small quantities of onsite mixing are required) or other impermeable surfaces, and not directly on the ground. The visible remains of concrete, either solid or from washings, shall be physically removed immediately and disposed of as waste, (washing of visible signs into the ground is not acceptable). All excess aggregates shall also be removed and suitably disposed of. 		
Dust	Negative Medium	<ul style="list-style-type: none"> Machinery or equipment used on the site must not constitute a pollution hazard in respect of air pollution via excessive exhaust fumes. This shall be inspected regularly by the contractor and rectified immediately. Display the contact details of the environmental site office and manager at the site entrance. Construction activities should be limited to 07:00 to 17:00 daily. 	Positive Low	The construction activities will increase the potential for dust especially from the clearing of vegetation. During the construction phase of the activity, materials will be moved to and from the project site and this could result in dust not only from the materials, but also from the construction vehicles which will be operating on site. The effects of dust will be worsened during high wind conditions

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Ensure an adequate water supply on the site for effective dust particulate matter suppression. ▪ Always impose and regulate a speed limit of 30 km/h on the site. ▪ Ensure that all vehicles are switched off when stationary, no vehicles should be idling for extended periods. ▪ Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable. 		
Impact on Archaeological and/or Paleontological Resources	Positive Very High	<ul style="list-style-type: none"> ▪ Based on the study conducted by Tsimba Archaeological it proposed that chance find procedure to cater for accidental finds must be utilised. ▪ Before any demolition or alteration of any building, a Heritage permit must be obtained from the Provincial Heritage Authority of Gauteng. ▪ However, if any archaeological remains or historical material are exposed during the construction phase, construction at the affected area must cease 	Positive Medium	Absence of proper surveys can lead to delays, potential damage to valuable heritage resources

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>immediately and the Provincial Heritage Resources Authority must be notified.</p> <ul style="list-style-type: none"> The area should be demarcated in order to prevent any further work until an investigation has been completed. 		
Employment/job opportunities created	Positive Very High	<ul style="list-style-type: none"> No mitigation required due to the fact that the proposed development will have a positive impact on the local and regional socio-economic conditions by means of job creation. 	Positive Very High	The proposed development will create more employment opportunities during the construction phase.
Crime, Safety and Security	Positive Medium	<ul style="list-style-type: none"> No construction activities are to be allowed after hours during weekdays, or over weekends. Only a limited number of two-night watchmen are to be allowed on the property to ensure the safety of equipment stored on site overnight. The nearest emergency service provider must be identified, and Emergency contact numbers are to be displayed conspicuously at prominent position. The site camp to be fenced off to prohibit unauthorized entry. 	Negative Low	There would be an increase in the probability of crime in the area, especially at the site.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Signs should be erected to warn of construction activities. All construction staff must have the appropriate PPE. Staff handling chemicals or hazardous materials must be trained in the use of the substances and the environmental, health and safety consequences of incidents. 		
Operational Phase				
Fauna and flora	Positive Medium	<ul style="list-style-type: none"> Maintenance activities shall occur frequently to ensure that there is no invasion by alien vegetation. Compile an alien and invasive species control and monitoring plan. Areas bare of vegetation must be revegetated with indigenous vegetation as soon as possible. The adjacent natural habitat must be protected in order to provide displaced fauna the opportunity to disperse into the surrounding area. 	Positive Low	<p>Failure to remove alien and invasive plant species after the construction phase, leading to the further spread of these species to the surrounding areas.</p> <p>Increased introduction and proliferation of alien plant species due to a lack of maintenance activities leading to further transformation of natural vegetation and faunal habitat.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Pipelines must be regularly monitored for leaks. 		Improper implementation of rehabilitation plan leading to increased alien invasive plant proliferation and loss of natural vegetation.
Topography	Positive Low	<ul style="list-style-type: none"> Minimal disturbance of the topography practices shall be implemented. 	Negative Low	<p>Surface disturbance during maintenance.</p> <p>The pipeline will be located underground will not have a direct impact on the topography.</p>
Waste Management	Positive Low	<ul style="list-style-type: none"> General waste should be placed in watertight containers and disposed of on a regular basis. 	Negative Low	Improper disposal of waste
Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	Positive Medium	<ul style="list-style-type: none"> Frequent routine inspection and maintenance of the Sedimentation tanks and the flocculator. 	Negative Low	Contamination from sludge leaks or spills. However, the sludge is classified as non-hazardous, this impact is unlikely.
Noise Pollution	Positive Low	<ul style="list-style-type: none"> Noise control must be enforced to control the level of noise during the use 	Negative Low	Disturbing noise from the operation of the facility and its associated infrastructure.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		of the facility and its associated infrastructures.		
Stormwater run-off	Negative High	<ul style="list-style-type: none"> ▪ Permeable paving should be used to reduce runoff and increase infiltration and ground water recharge. ▪ Natural storm water must flow freely, either as sheet flow or where necessary in open grass swales, to allow for infiltration and retention. Natural veld grass must be left undisturbed as far as possible, to allow natural drainage. 	Negative Low	
Decommissioning/ Demolition Phase				
Soil Contamination	Positive Medium	<ul style="list-style-type: none"> ▪ Excavate and dispose of contaminated soil. ▪ Store demolition materials on an impermeable surface. 	Positive Low	Residual oil and chemical seepage into the soil.
Dust (Air Quality)	Positive Medium	<ul style="list-style-type: none"> ▪ Machinery or equipment used on the site must not constitute a pollution hazard in respect of air pollution via excessive exhaust fumes. This shall be inspected regularly by the contractor and rectified immediately. 	Positive Low	Th demolition activities will increase the potential for dust and the effects of dust will be worsened during high wind conditions

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Ensure an adequate water supply on the site for effective dust particulate matter suppression. Always impose and regulate a speed limit of 30 km/h on the site. Ensure that all vehicles are switched off when stationary no vehicles should be idling for extended periods. 		
Geohydrological, hydrological & Geological (Groundwater water disturbance function)	Negative High	<ul style="list-style-type: none"> Cover any waste that is likely to wash away or contaminate storm water Ensure handling, transport and disposal of hazardous substances are adequately controlled and managed. Provide containment areas for potential pollutants at construction camps, refueling depots and concrete batching plants. Identify and remove contaminated underground structures. Monitor any seepage during works. 	Positive Medium	Groundwater contamination might occur through seepage of hazardous materials into the soil or through stormwater runoff.
Stormwater Runoff	Positive Medium	<ul style="list-style-type: none"> Separate clean and dirty water areas. Avoid work during heavy rain. 	Positive Low	Sediment or contaminants will be washed into nearby watercourses.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
Noise	Positive Medium	<ul style="list-style-type: none"> All plant and construction equipment to be kept in good repair to ensure that point source noise emissions are reduced. Working outside the regular working hours (weekdays 8am – 5pm) must be approved, and adjacent property owners must be notified. 	Positive Low	Disruption of Rand Water Vereeniging Treatment Works operations due to demolition noise.
Visual impact	Positive High	<ul style="list-style-type: none"> Complete demolition process and remove all the debris. Level and stabilize site/ ground 	Negative Low	Unfinished demolition structure creates an eyesore.
Flora and Fauna	Negative Medium	<ul style="list-style-type: none"> Do not clear the vegetation outside of the footprint area. Should any animals (e.g. reptiles or mammals) be found during the demolition activities, the ECO or relevant specialist should be contacted immediately to ensure the safe removal of the specimen. Limit footprint of work areas. 	Positive Low	Destruction of natural regrowth fauna in previously demolished areas.
Waste Management	Negative Medium	<ul style="list-style-type: none"> Demolition rubble/ debris must be disposed of at a registered landfill site Waste skips to be covered with a net to prevent windblown waste. 	Positive Low	Illegal dumping or unsafe disposal of demolition waste

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Disposal certificates must be obtained for all waste disposals. 		
Traffic	Negative High	<ul style="list-style-type: none"> Manage the increase in traffic in terms of congestion, road surface damage, safety concerns, dust and erosion. Only designated roads should be used for construction vehicles, and Ensure drivers and operators of equipment are familiar with the safety policies and regulations. Traffic calming measures and appropriate signage to be implemented. Avoid transportation of demolished material during peak hours. 	Positive Medium	The demolition phase is likely to generate additional traffic in terms of disposal of the demolished material.
Impact on Archaeological and/or Paleontological Resources	Positive High	<ul style="list-style-type: none"> Permit to demolish must be obtained from the Provincial Heritage Resources Authority. if any archaeological remains or historical material are exposed during the construction phase, construction at the affected area must cease immediately and the Provincial Heritage Resources Authority must be notified 	Positive Low	Irreversible loss of heritage resources.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> The area should be demarcated in order to prevent any further work until an investigation has been completed. 		

Table 11: Potential Impacts during Pre-Construction, Construction and Operational Phases (Phase 2 Sludge Pipeline)

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
PRE- CONSTRUCTION PHASE				
Non-compliance with the Environmental Management Plan, Permits and Environmental Authorisation. / Relevant Site Documentation	Negative Very High	<ul style="list-style-type: none"> All relevant authorisations (e.g. Environmental Authorisation, Water Use Licence/General Authorisation) must be obtained before construction commences. 	Positive Medium	Failure to comply with legislation & policies will lead to fines and conflicts with local, provincial and national stakeholders

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ The applicant must comply with the conditions of the issued Environmental Authorisation. ▪ A water use licence in terms of the National Water Act, 1998 (Act 36 of 1998) to be obtained before the Phase 2 Sludge pipeline is installed. A Rehabilitation plan to be included as part of the water use licence application. ▪ An Environmental Authorisation in terms of the EIA regulation 2014 as amended must be obtained before any commencement of Activities. ▪ The Environmental Management Plan must be made binding in all contracts concerning the proposed project. ▪ Method statements (or SOPs) must be developed and approved by the applicant, ECO, Engineer and Contractor. 		
Non- viable design and selection of technology	Negative Medium	<ul style="list-style-type: none"> ▪ The best reasonable and feasible infrastructure and technology for the 	Positive Low	Poor design and selection of technology will lead to poor

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>proposed developments must be employed.</p> <ul style="list-style-type: none"> Technology that meets approved acceptable technical standards such as SABS must be selected. During the planning and design phase, the development must adhere to the relevant legislation and/or policies. 		operation, and contamination of groundwater and the surrounding land.
CONSTRUCTION PHASE				
Geology and soils	Negative High	<ul style="list-style-type: none"> All soil compacted because of construction activities falling outside of development footprint areas should be ripped and profiled. Proper stormwater management measures must be put in place. Storm water runoff shall be considered and its flow controlled on the construction site. Any deep excavations must not be left open for extended periods No further vegetation clearance is to be allowed near the wetland areas. 	Negative Medium	Site clearing and the removal of vegetation may lead to increased runoff, erosion and sedimentation.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Permeable paving: infiltration trenches or swales should be installed if necessary. ▪ Strip and store topsoil separately and reinstate it during the rehabilitation phase to preserve soil structure and seed banks. ▪ Appropriate erosion control measures must be implemented to ensure that no erosion is taking place. At the first sign of erosion the necessary remedial action must be taken; ▪ Disturbed areas, that will not form part of the operational footprint, but which were disturbed as part of the construction activities, should be rehabilitated and re-vegetated using site-appropriate indigenous vegetation and/or seed mixes. 		
Fauna and flora	Negative Very High	<ul style="list-style-type: none"> ▪ Pre-construction planning, including construction and operational phase the applicant must take into account the adjacent Vaal River and the nearby seep 	Positive Medium	Loss of sensitive habitat, particularly relating to the loss of micro-habitat for both faunal and floral species.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>wetlands during the installation of the Phase 2 Sludge Pipeline.</p> <ul style="list-style-type: none"> ▪ Do not clear the vegetation outside of the development footprint area. ▪ Should any animals (e.g. reptiles or mammals) be found during the construction phase, the ECO or relevant specialist should be contacted immediately to ensure the safe removal of the specimen. ▪ No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this. ▪ The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna. ▪ The development footprint of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. 		<p>The construction of permanent structures (New System 1) on site will result in the loss of vegetation due to foundation excavation.</p> <p>Destruction or alteration of critical habitats can lead to the displacement or local extinction of Species of Conservation Concern (SCC).</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Proposed sludge pipelines must make use of existing supportive infrastructure where applicable (e.g, cleared areas) ▪ No littering by construction workers is permitted. Any litter will be collected and removed off-site to a registered waste site. ▪ Stockpiles of vegetation are only to be in areas approved by the ECO and may not exceed 2m in height. ▪ Methods of stacking must take cognizance of the possible creation of a fire hazard. ▪ No burning of stockpiled vegetation is permitted. ▪ None of these species may be introduced and they must all be controlled. ▪ The alien plants on site will be removed during construction. ▪ Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular 		

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>attention must be paid to imported materials).</p> <ul style="list-style-type: none"> Any Species of Conservation Concern, flora, or protected plants observed on site must be demarcated before clearing activities begin. If construction activities are likely to impact on any Species of Conservation Concern or protected plants, these must be relocated, a relevant permit must be obtained prior to any relocation activities. 		
Topography	Negative Medium	<ul style="list-style-type: none"> Excavations to be limited to the construction footprint. All stockpiles must be restricted to designated areas and not to exceed a height of 2 meters. Stockpiles are not to remain during the operational phase. 	Positive Low	Alteration of topography due to excavations and the need to level the site in order to enable construction.
Waste Management	Negative Medium	<ul style="list-style-type: none"> General waste should be placed in watertight containers and disposed of on a regular basis Construction rubble must be disposed of at a registered site 	Positive Low	Waste will be generated on site during the construction phase, if not disposed of correctly it will become a nuisance within the area

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ No Construction rubble may be used for infilling. ▪ Waste skips to be covered with a net to prevent windblown waste. ▪ No waste to be burnt, buried or dumped on site or the surrounding area. ▪ Waste may not be placed on the soil stockpiles or disposed in a haphazard way in the surrounding area resulting in the contamination of the soil and the environment ▪ Disposal certificates must be obtained for all waste disposals. ▪ Records of all waste taken off site and disposed of must be kept as evidence. 		
Hazardous chemicals and waste	Negative Medium	<ul style="list-style-type: none"> ▪ A register of all hazardous substances stored on site must be kept. Relevant Material Safety Data Sheets (MSDS) must be available on site for all potentially hazardous substances. ▪ Proper bunded storage facilities must be provided for the storage of oils, grease fuels, chemicals and any hazardous 	Positive Low	Waste generation during the construction phase will harm the environment, if not controlled adequately.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>materials to be used during the construction phase.</p> <ul style="list-style-type: none"> ▪ Hazardous waste must be separated from general waste, stored separately in appropriate containers and disposed of at a licensed hazardous waste disposal facility. ▪ Cover any wastes that are likely to wash away or contaminate storm water. ▪ The drip trays must be placed underneath vehicles and machinery waiting for maintenance, repair or standing for long periods of time. ▪ All spills of chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) should be cleaned with the use of suitable absorbent materials. ▪ Certificates of hazardous waste disposal are to be kept. ▪ Maintenance or re-fueling of vehicles may not be conducted on site. ▪ No waste (hazardous or general) will be disposed of in excavated trenches. 		

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Spill kits to be made available at areas of possible spillages of hazardous. Routinely check machinery/plant for oil or fuel leaks each day before construction activities begin and implement remedial action as necessary. 		
Traffic	Negative High	<ul style="list-style-type: none"> Manage the increase in construction traffic in terms of congestion, road surface damage, safety concerns, dust and erosion. Only designated roads should be used for construction vehicles; and Ensure drivers and operators of equipment are familiar with the safety policies and regulations. Traffic calming measures and appropriate signage to be implemented. Avoid transportation of construction material during peak hours 	Positive Medium	The construction phase is likely to generate additional traffic in terms of construction vehicles and heavy vehicles delivering materials to the site.
Stormwater run-off	Negative High	<ul style="list-style-type: none"> . As much as possible water should be retained on site to be reused again for irrigation and habitat creation. 	Positive Medium	Contaminated water would runoff the site and eventually into the nearby watercourse (Vaal River).

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Natural storm water must flow freely, either as sheet flow or where necessary in open grass swales, to allow for infiltration and retention. Natural veld grass must be left undisturbed as far as possible, to allow natural drainage. ▪ Where feasible the use of vegetated swales should be used to accommodate surface runoff, to increase infiltration into the soil. ▪ Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMPr. 		
Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	Negative High	<ul style="list-style-type: none"> ▪ Watercourse must be demarcated to prevent vehicles and workers from encroaching into sensitive areas. ▪ Limit clearing of vegetation and associated soil disturbances to essential areas only. ▪ Operation, storage and maintenance of machinery and construction-related equipment must take place away from the buffer zone and sensitive area. 	Positive Medium	<p>Groundwater contamination might occur through seepage of hazardous materials into the soil or through stormwater runoff.</p> <p>Possible contaminated water entering the river leading to reduced ability to support biodiversity.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Attenuation of stormwater from the development site is important to reduce the speed of runoff into the watercourse area. ▪ Sediment depositions should be regularly removed from the swale, to prevent pollution of the runoff from contaminants contained therein ▪ Cover any waste that are likely to wash away or contaminate storm water ▪ Ensure handling, transport and disposal of hazardous substances are adequately controlled and managed. ▪ Provide containment areas for potential pollutants at construction camps, refueling depots and concrete batching plants. ▪ Cement mixing shall be done only at specifically selected sites. After construction activities end, the cement shall be crushed and removed from the site. This mixing area shall then be ripped and rehabilitated. 		<p>Disturbances of soils leading to increased alien vegetation proliferation, and in turn to altered riparian habitat. Altered runoff patterns, leading to increased erosion and sedimentation of riparian habitat.</p> <p>Waste and contaminated water can be washed into the stream/water course.</p> <p>Impacts on the watercourse in the vicinity of the project site, changing the quantity and fluctuation properties of the watercourse.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Sediment control should be effective and not allow any release of sediment pollution downstream. This should be audited on a weekly basis to demonstrate compliance with upstream conditions. 		
Noise Pollution	Positive Low	<ul style="list-style-type: none"> All plant and construction equipment to be kept in good repair to ensure that point source noise emissions are reduced. Working outside the regular working hours (weekdays 8am – 5pm) must be approved, and adjacent property owners must be notified. Strive for compliance with the relevant South African National Standards (e.g., SANS 10103) and other noise control legislation such as the Occupational Health and Safety Act (Act No. 85 of 1993). 	Negative Low	During the construction phase, there will be an increase in the ambient noise level on-site and on surrounding properties.
Land pollution, degradation	Negative High	<ul style="list-style-type: none"> Rubble and general construction waste on site should be removed at regular intervals. 	Positive Medium	Land Pollution due to the improper handling of waste during the construction phase.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ All waste must be separated according to type and stored in separate drums, adequately marked according to waste sort. ▪ Random littering and discarding of solid waste on the site must be prevented. ▪ Provision of adequate numbers of litter bins throughout the development; and Implementation of an appropriate collection and disposal strategy to ensure regular removal of waste to a permitted waste disposal facility. ▪ Hazardous waste not to be mixed with general waste and be disposed of at permitted site. ▪ Records of all waste being taken off site must be recorded and kept as evidence. ▪ Concrete must only be mixed on mortarboards (where small quantities of onsite mixing are required) or other impermeable surfaces, and not directly on the ground. ▪ The visible remains of concrete, either solid or from washings, shall be 		<p>The remaining concrete mixture can degrade the environment if not properly managed. Cement and liquid concrete are hazardous to the natural environment on account of the high pH of the mixed material, and the chemicals contained therein.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>physically removed immediately and disposed of as waste, (washing of visible signs into the ground is not acceptable).</p> <ul style="list-style-type: none"> All excess aggregates shall also be removed and suitably disposed of. 		
Dust	Negative Medium	<ul style="list-style-type: none"> Machinery or equipment used on the site must not constitute a pollution hazard in respect of air pollution via excessive exhaust fumes. This shall be inspected regularly by the contractor and rectified immediately. display the contact details of the environmental site office and manager at the site entrance. Construction activities should be limited to 07:00 to 17:00 daily. Ensure an adequate water supply on the site for effective dust particulate matter suppression. Always impose and regulate a speed limit of 30 km/h on the site. Ensure that all vehicles are switched off when stationary- no vehicles should be idling for extended periods. 	Positive Low	The construction activities will increase the potential for dust especially from the clearing of vegetation. During the construction phase of the activity, materials will be moved to and from the project site and this could result in dust not only from the materials, but also from the construction vehicles which will be operating on site. The effects of dust will be worsened during high wind conditions

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable. 		
Impact on Archaeological and/or Paleontological Resources	Positive Medium	<ul style="list-style-type: none"> Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the Provincial Heritage Authority of Gauteng. No, person may exhume or collect such remains, whether of recent origin or not, without the endorsement by the Provincial Heritage Authority of Gauteng. The area should be demarcated in order to prevent any further work until an investigation has been completed. Phase 2 Sludge Pipeline route a few old buildings were observed. The property embodies a blend of architectural styles. However, these buildings do not fall within the proposed development 	Negative Medium	Absence of proper surveys can lead to delays, potential damage to valuable heritage resources

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		footprint and should be avoided during the construction phase.		
Employment/job opportunities created	Positive Very High	<ul style="list-style-type: none"> No mitigation required due to the fact that the proposed development will have a positive impact on the local and regional socio-economic conditions by means of job creation. 	Positive Very High	The proposed development will create more employment opportunities during the construction phase.
Crime, Safety and Security	Positive Medium	<ul style="list-style-type: none"> No construction activities are to be allowed after hours during weekdays, or over weekends. Only a limited number of two-night security guards are allowed on the property to ensure the safety of equipment stored on site overnight. The nearest emergency service provider must be identified, and Emergency contact numbers are to be displayed conspicuously at prominent position. The site camp to be fenced off to prohibit unauthorized entry. Signs should be erected to warn of construction activities. All construction staff must have the appropriate PPE. 	Negative Low	There would be an increase in the probability of crime in the area, especially at the site.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Staff handling chemicals or hazardous materials must be trained in the use of the substances and the environmental, health and safety consequences of incidents. 		
Operational Phase				
Geology and soils	Positive Medium	<ul style="list-style-type: none"> Plan excavation activities to have the smallest possible footprint. Limit compaction by not working in wet conditions and limiting vehicular access. No soil may be stored within the wetland/ watercourse and associated buffer. The established pipeline must be inspected on a regular basis and adequately maintained. Frequent routine equipment checks. 	Positive Low	<p>All excavation of the pipeline for repairs or maintenance will once again impact on the soils and geology of the site.</p> <p>Contamination from sludge leaks or spills</p>
Fauna and flora	Positive Medium	<ul style="list-style-type: none"> Maintenance activities shall occur frequently to ensure that there is no invasion by alien vegetation. Compile an alien and invasive species control and monitoring plan. 	Positive Low	Failure to remove alien and invasive plant species after the construction phase, leading to the further spread of these species to the surrounding areas.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Areas bare of vegetation must be revegetated with indigenous ▪ vegetation as soon as possible. ▪ The adjacent natural habitat must be protected in order to provide ▪ displaced fauna the opportunity to disperse into the surrounding area. ▪ Pipelines must be regularly monitored for leaks. 		<p>Increased introduction and proliferation of alien plant species due to a lack of maintenance activities leading to further transformation of natural vegetation and faunal habitat.</p> <p>Improper implementation of rehabilitation plan leading to increased alien invasive plant proliferation and loss of natural vegetation.</p>
Topography	Positive Low	<ul style="list-style-type: none"> ▪ Minimal disturbance of the topography practices shall be implemented. ▪ None. 	Negative Low	<p>Surface disturbance during maintenance.</p> <p>The pipeline will be located underground will not have a direct impact on the topography.</p>
Waste Management	Positive Low	<ul style="list-style-type: none"> ▪ General waste should be placed in watertight containers and disposed of on a regular basis. 	Negative Low	Improper disposal of waste

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	Positive Medium	<ul style="list-style-type: none"> Frequent routine inspection and maintenance of the pipeline. 	Negative Low	Contamination from sludge leaks or spills. However, the sludge that will be transported is classified as non-hazardous, this impact is unlikely.
Noise Pollution	Positive Low	<ul style="list-style-type: none"> Noise control must be enforced to control the level of noise during the use of the facility and its associated infrastructures. 	Negative Low	Disturbing noise from the operation of the facility and its associated infrastructure.
Stormwater run-off	Negative High	<ul style="list-style-type: none"> Permeable paving should be used to reduce runoff and increase infiltration and ground water recharge. Natural storm water must flow freely, either as sheet flow or where necessary in open grass swales, to allow for infiltration and retention. Natural veld grass must be left undisturbed as far as possible, to allow natural drainage. 	Positive Medium	

Table 12: Potential Impacts during Pre-Construction, Construction and Operational Phases (Panfontein Sludge Pipeline)

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
PRE- CONSTRUCTION PHASE				
Non-compliance with the Environmental Management Plan, Permits and Environmental Authorisation. / Relevant Site Documentation	Negative Very High	<ul style="list-style-type: none"> ▪ All relevant authorisations (e.g. Environmental Authorisation, Water Use Licence/General Authorisation) must be obtained before construction commences. ▪ The applicant must comply with the conditions of the issued Environmental Authorisation. ▪ A water use licence in terms of the National Water Act, 1998 (Act 36 of 1998) to be obtained before the Phase 2 Sludge pipeline is installed. A Rehabilitation plan to be included as part of the water use licence application. ▪ The Environmental Management Plan must be made binding in all contracts concerning the proposed project. ▪ Method statements (or SOPs) must be developed and approved by the applicant, ECO, Engineer and Contractor. 	Positive Medium	Failure to comply with legislation & policies will lead to fines and conflicts with local, provincial and national stakeholders

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
Inappropriate design and selection of technology	Negative Medium	<ul style="list-style-type: none"> The best reasonable and feasible infrastructure and technology for the proposed developments must be employed. Technology that meets approved acceptable technical standards such as SABS must be selected. During the planning and design phase, the development must adhere to the relevant legislation and/or policies. 	Positive Low	Poor design and selection of technology will lead to poor operation, and contamination of groundwater and the surrounding land.
CONSTRUCTION PHASE				
Geology and soils	Negative High	<ul style="list-style-type: none"> All soil compacted because of construction activities falling outside of development footprint areas should be ripped and profiled. Proper stormwater management measures must be put in place. Storm water runoff shall be considered and its flow controlled on the construction site. Any deep excavations must not be left open for extended periods No further vegetation clearance is to be allowed near the wetland areas. 	Negative Medium	Site clearing and the removal of vegetation may lead to increased runoff, erosion and sedimentation.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Permeable paving: infiltration trenches or swales should be installed if necessary. ▪ Strip and store topsoil separately and reinstate it during the rehabilitation phase to preserve soil structure and seed banks. ▪ Appropriate erosion control measures must be implemented to ensure that no erosion is taking place. At the first sign of erosion the necessary remedial action must be taken; ▪ Disturbed areas, that will not form part of the operational footprint, but which were disturbed as part of the construction activities, should be rehabilitated and re-vegetated using site-appropriate indigenous vegetation and/or seed mixes. 		
Fauna and flora	Negative Very High	<ul style="list-style-type: none"> ▪ Pre-construction planning, including construction and operational phase the applicant must take into account the adjacent Vaal River during the 	Positive Medium	Loss of sensitive habitat, particularly relating to the loss of micro-habitat for both faunal and floral species.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>installation of the Phase 2 Sludge Pipeline.</p> <ul style="list-style-type: none"> ▪ The construction area must be demarcated and fenced off. All construction activities should be kept outside of Wetlands/Riparian Habitat. ▪ Watercourses must be demarcated to prevent workers from encroaching into sensitive areas. ▪ Do not clear the vegetation outside of the footprint area. ▪ Should any animals (e.g. reptiles or mammals) be found during the construction phase, the ECO or relevant specialist should be contacted immediately to ensure the safe removal of the specimen. ▪ No trapping, killing, or poisoning of any wildlife is to be allowed. Signs must be put up to enforce this. ▪ The duration of the construction should be minimized to as short term as possible, to reduce the period of disturbance on fauna. 		<p>The construction of permanent structures (New System 1) on site will result in the loss of vegetation due to foundation excavation.</p> <p>Destruction or alteration of critical habitats can lead to the displacement or local extinction of Species of Conservation concern (SCC).</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ The footprint area of the construction should be kept to a minimum. The footprint area must be clearly demarcated to avoid unnecessary disturbances to adjacent areas. ▪ Proposed sludge pipelines must make use of existing supportive infrastructure where applicable (e.g, cleared areas) ▪ No littering by construction workers is permitted. Any litter will be collected and removed off-site to a registered waste site. ▪ Stockpiles of vegetation are only to be in areas approved by the ECO and may not exceed 2m in height. ▪ Methods of stacking must take cognizance of the possible creation of a fire hazard. ▪ No burning of stockpiled vegetation is permitted. ▪ None of these species may be introduced and they must all be controlled. 		

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ The alien plants on site will be removed during construction. ▪ Care must be taken to avoid the introduction of alien plant species to the site and surrounding areas. (Particular attention must be paid to imported materials). ▪ Any Species of Conservation Concern, flora, or protected plants observed on site must be demarcated before clearing activities begin. ▪ If construction activities are likely to impact on any Species of Conservation Concern or protected plants, these must be relocated, a relevant permit must be obtained prior to any relocation activities. 		
Topography	Negative Medium	<ul style="list-style-type: none"> ▪ Excavations to be limited to the construction. ▪ All stockpiles must be restricted to designated areas and not to exceed a height of 2 meters. ▪ Stockpiles are not to remain during the operational phase. 	Positive Low	Alteration of topography due to excavations and the need to level the site in order to enable construction.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
Waste Management	Negative Medium	<ul style="list-style-type: none"> ▪ General waste should be placed in watertight containers and disposed of on a regular basis ▪ Construction rubble must be disposed of at a registered site ▪ No Construction rubble may be used for infilling. ▪ Waste skips to be covered with a net to prevent windblown waste. ▪ No waste to be burnt, buried or dumped on site or the surrounding area. ▪ Waste may not be placed on the soil stockpiles or disposed in a haphazard way in the surrounding area resulting in the contamination of the soil and the environment ▪ Disposal certificates must be obtained for all waste disposals. ▪ Records of all waste taken off site and disposed of must be kept as evidence. 	Positive Low	Waste will be generated on site during the construction phase, if not disposed of correctly it will become a nuisance within the area
Hazardous chemicals and waste	Negative Medium	<ul style="list-style-type: none"> ▪ A register of all hazardous substances stored on site must be kept. Relevant Material Safety Data Sheets (MSDS) 	Positive Low	Waste generation during the construction phase will harm the

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>must be available on site for all potentially hazardous substances.</p> <ul style="list-style-type: none"> ▪ Proper bunded storage facilities must be provided for the storage of oils, grease fuels, chemicals and any hazardous materials to be used during the construction phase. ▪ Hazardous waste must be separated from general waste, stored separately in appropriate containers and disposed of at a licensed hazardous waste disposal facility. ▪ Cover any wastes that are likely to wash away or contaminate storm water. ▪ The drip trays must be placed underneath vehicles and machinery waiting for maintenance, repair or standing for long periods of time. ▪ All spills of chemicals or hydrocarbons (oil, grease, diesel, petrol, etc.) should be cleaned with the use of suitable absorbent materials. ▪ Certificates of hazardous waste disposal are to be kept. 		<p>environment, if not controlled adequately.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Maintenance or re-fueling of vehicles may not be conducted on site. ▪ No waste (hazardous or general) will be disposed of in excavated trenches. ▪ Spill kits to be made available at areas of possible spillages of hazardous. ▪ Routinely check machinery/plant for oil or fuel leaks each day before construction activities begin and implement remedial action as necessary. 		
Traffic	Negative High	<ul style="list-style-type: none"> ▪ Manage the increase in construction traffic in terms of congestion, road surface damage, safety concerns, dust and erosion. ▪ Only designated roads should be used for construction vehicles; and ▪ Ensure drivers and operators of equipment are familiar with the safety policies and regulations. ▪ Traffic calming measures and appropriate signage to be implemented. ▪ Avoid transportation of construction material during peak hours 	Positive Medium	The construction phase is likely to generate additional traffic in terms of construction vehicles and heavy vehicles delivering materials to the site.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
Stormwater run-off	Negative High	<ul style="list-style-type: none"> ▪ Permeable paving should be used to reduce runoff and increase infiltration and ground water recharge. ▪ As much as possible water should be retained on site to be reused again for irrigation and habitat creation. ▪ Natural storm water must flow freely, either as sheet flow or where necessary in open grass swales, to allow for infiltration and retention. Natural veld grass must be left undisturbed as far as possible, to allow natural drainage. ▪ Where feasible the use of vegetated swales should be used to accommodate surface runoff, to increase infiltration into the soil. ▪ Effective stormwater management should be a priority during the construction phase. This should be monitored as part of the EMPr. 	Positive Medium	Contaminated water would runoff the site and eventually into the nearby watercourse (Vaal River).
Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	Negative High	<ul style="list-style-type: none"> ▪ Watercourse must be demarcated to prevent vehicles and workers from encroaching into sensitive areas. 	Positive Medium	Groundwater contamination might occur through seepage of hazardous materials into the soil or through stormwater runoff.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Limit clearing of vegetation and associated soil disturbances to essential areas only. ▪ Operation, storage and maintenance of machinery and construction-related equipment must take place away from the buffer zone and sensitive area. ▪ Attenuation of stormwater from the development site is important to reduce the speed of runoff into the watercourse area. ▪ Sediment depositions should be regularly removed from the swale, to prevent pollution of the runoff from contaminants contained therein ▪ Cover any waste that are likely to wash away or contaminate storm water ▪ Ensure handling, transport and disposal of hazardous substances are adequately controlled and managed. ▪ Provide containment areas for potential pollutants at construction camps, refueling depots and concrete batching plants. 		<p>Possible contaminated water entering the river leading to reduced ability to support biodiversity.</p> <p>Disturbances of soils leading to increased alien vegetation proliferation, and in turn to altered riparian habitat. Altered runoff patterns, leading to increased erosion and sedimentation of riparian habitat.</p> <p>Waste and contaminated water can be washed into the stream/water course.</p> <p>Impacts on the watercourse in the vicinity of the project site, changing the quantity and fluctuation properties of the watercourse.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Cement mixing shall be done only at specifically selected sites. After construction activities end, the cement shall be crushed and removed from the site. This mixing area shall then be ripped and rehabilitated. ▪ Sediment control should be effective and not allow any release of sediment pollution downstream. This should be audited on a weekly basis to demonstrate compliance with upstream conditions. 		
Noise Pollution	Positive Low	<ul style="list-style-type: none"> ▪ All plant and construction equipment to be kept in good repair to ensure that point source noise emissions are reduced. ▪ Working outside the regular working hours (weekdays 8am – 5pm) must be approved, and adjacent property owners must be notified. ▪ Strive for compliance with the relevant South African National Standards (e.g., SANS 10103) and other noise control legislation such as the Occupational 	Negative Low	During the construction phase, there will be an increase in the ambient noise level on-site and on surrounding properties.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		Health and Safety Act (Act No. 85 of 1993).		
Land pollution, degradation	Negative High	<ul style="list-style-type: none"> ▪ Rubble and general construction waste on site should be removed at regular intervals. ▪ All waste must be separated according to type and stored in separate drums, adequately marked according to waste sort. ▪ Random littering and discarding of solid waste on the site must be prevented. ▪ Provision of adequate numbers of litter bins throughout the development; and Implementation of an appropriate collection and disposal strategy to ensure regular removal of waste to a permitted waste disposal facility. ▪ Hazardous waste not to be mixed with general waste and be disposed of at permitted site. ▪ Records of all waste being taken off site must be recorded and kept as evidence. ▪ Concrete must only be mixed on mortarboards (where small quantities of 	Positive Medium	<p>Land Pollution due to the improper handling of waste during the construction phase.</p> <p>The remaining concrete mixture can degrade the environment if not properly managed. Cement and liquid concrete are hazardous to the natural environment on account of the high pH of the mixed material, and the chemicals contained therein.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<p>onsite mixing are required) or other impermeable surfaces, and not directly on the ground.</p> <ul style="list-style-type: none"> The visible remains of concrete, either solid or from washings, shall be physically removed immediately and disposed of as waste, (washing of visible signs into the ground is not acceptable). All excess aggregates shall also be removed and suitably disposed of. 		
Dust	Negative Medium	<ul style="list-style-type: none"> Machinery or equipment used on the site must not constitute a pollution hazard in respect of air pollution via excessive exhaust fumes. This shall be inspected regularly by the contractor and rectified immediately. display the contact details of the environmental site office and manager at the site entrance. Construction activities should be limited to 07:00 to 17:00 daily. Ensure an adequate water supply on the site for effective dust particulate matter suppression. 	Positive Low	The construction activities will increase the potential for dust especially from the clearing of vegetation. During the construction phase of the activity, materials will be moved to and from the project site and this could result in dust not only from the materials, but also from the construction vehicles which will be operating on site. The effects of dust will be worsened during high wind conditions

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> Always impose and regulate a speed limit of 30 km/h on the site. Ensure that all vehicles are switched off when stationary- no vehicles should be idling for extended periods. Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where practicable. 		
Impact on Archaeological and/or Paleontological Resources	Positive Very High	<ul style="list-style-type: none"> Contractors and workers shall be advised of the penalties associated with the unlawful removal of cultural, historical, archaeological or paleontological artefacts, as set out in the Provincial Heritage Authority of Gauteng. No, person may exhume or collect such remains, whether of recent origin or not, without the endorsement by the Provincial Heritage Authority of Gauteng. The area should be demarcated in order to prevent any further work until an investigation has been completed. 	Positive Medium	Absence of proper surveys can lead to delays, potential damage to valuable heritage resources

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> The area should be demarcated in order to prevent any further work until an investigation has been completed. 		
Employment/job opportunities created	Positive Very High	<ul style="list-style-type: none"> No mitigation required due to the fact that the proposed development will have a positive impact on the local and regional socio-economic conditions by means of job creation. 	Positive Very High	The proposed development will create more employment opportunities during the construction phase.
Crime, Safety and Security	Positive Medium	<ul style="list-style-type: none"> No construction activities are to be allowed after hours during weekdays, or over weekends. Only a limited number of two-night watchmen are to be allowed on the property to ensure the safety of equipment stored on site overnight. The nearest emergency service provider must be identified, and Emergency contact numbers are to be displayed conspicuously at prominent position. The site camp to be fenced off to prohibit unauthorized entry. Signs should be erected to warn of construction activities. 	Negative Low	There would be an increase in the probability of crime in the area, especially at the site.

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> All construction staff must have the appropriate PPE. Staff handling chemicals or hazardous materials must be trained in the use of the substances and the environmental, health and safety consequences of incidents. 		
Operational Phase				
Geology and soils	Positive Medium	<ul style="list-style-type: none"> Plan excavation activities to have the smallest possible footprint. Limit compaction by not working in wet conditions and limiting vehicular access. No soil may be stored within the wetland/ watercourse and associated buffer. The established pipeline must be inspected on a regular basis and adequately maintained. Frequent routine equipment checks. 	Positive Low	<p>All excavation of the pipeline for repairs or maintenance will once again impact on the soils and geology of the site.</p> <p>Contamination from sludge leaks or spills</p>
Fauna and flora	Positive Medium	<ul style="list-style-type: none"> Maintenance activities shall occur frequently to ensure that there is no invasion by alien vegetation. 	Positive Low	Failure to remove alien and invasive plant species after the construction phase, leading to the further spread

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
		<ul style="list-style-type: none"> ▪ Compile an alien and invasive species control and monitoring plan. ▪ Areas bare of vegetation must be revegetated with indigenous vegetation as soon as possible. ▪ The adjacent natural habitat must be protected in order to provide displaced fauna the opportunity to disperse into the surrounding area. ▪ Pipelines must be regularly monitored for leaks. 		<p>of these species to the surrounding areas.</p> <p>Increased introduction and proliferation of alien plant species due to a lack of maintenance activities leading to further transformation of natural vegetation and faunal habitat.</p> <p>Improper implementation of rehabilitation plan leading to increased alien invasive plant proliferation and loss of natural vegetation.</p>
Topography	Positive Low	<ul style="list-style-type: none"> ▪ Minimal disturbance of the topography practices shall be implemented. ▪ None. 	Negative Low	<p>Surface disturbance during maintenance.</p> <p>The pipeline will be located underground will not have a direct impact on the topography.</p>

Potential impacts:	Significance rating of impacts (positive or negative):	Proposed mitigation (Management Actions:	Significance rating of impacts after mitigation:	Risk of the impact and mitigation not being implemented.
Waste Management	Positive Low	<ul style="list-style-type: none"> General waste should be placed in watertight containers and disposed of on a regular basis. 	Negative Low	Improper disposal of waste
Geohydrological, hydrological & Geological (Groundwater and surface water disturbance function)	Positive Medium	<ul style="list-style-type: none"> Frequent routine inspection and maintenance of the pipeline. 	Negative Low	Contamination from sludge leaks or spills. However, the sludge that will be transported is classified as non-hazardous, this impact is unlikely.
Noise Pollution	Positive Low	<ul style="list-style-type: none"> Noise control must be enforced to control the level of noise during the use of the facility and its associated infrastructures. 	Negative Low	Disturbing noise from the operation of the facility and its associated infrastructure.
Stormwater run-off	Negative High	<ul style="list-style-type: none"> Permeable paving should be used to reduce runoff and increase infiltration and ground water recharge. Natural storm water must flow freely, either as sheet flow or where necessary in open grass swales, to allow for infiltration and retention. Natural veld grass must be left undisturbed as far as possible, to allow natural drainage. 	Positive Medium	

11 CUMULATIVE IMPACTS

Cumulative impacts are the result of the combined impact of a proposed activity on a shared resource when added to the impacts of other past, present, or anticipated future activities. This section offers a detailed description and analysis of the potential combined effects of the proposed activity during both the construction and operational phases. It considers the impact of the development on the natural environment and the socio-economic conditions.

- **Proposed New System 1 in Vereeniging**

The cumulative impacts associated with the proposed construction of New System 1 at the Rand Water Vereeniging Water Treatment Works arise primarily from the site's location within an already operational and semi-demolished infrastructure. Although the redevelopment replaces an old decommissioned system, cumulative impacts include the increase in resistant surfaces, and potential compounded impacts on local air and water quality from existing infrastructure. The site is also in close proximity to a heritage structure (an old water treatment building), and while no significant archaeological material was identified, cumulative heritage sensitivity is elevated by the presence of older water treatment infrastructure. The redevelopment also adds pressure to the already limited buffer space between industrial infrastructure and ecological features, increasing the overall environmental burden in the area.

- **Phase 2 Sludge Pipeline**

It is anticipated that the Phase 2 Sludge pipeline will not result in cumulative impacts. The pipeline will be constructed within an already disturbed area due to the existing Phase 1 Pipeline. Rehabilitation measures will be implemented immediately after construction phase, which it will include the replacement of topsoil, and re-vegetation with indigenous species to restore ecological function. As the pipeline will be fully buried, operational activities will have no interaction with surrounding environment except when maintenance is due which it is expected to occur once in a while. Therefore, no long-term environmental degradation is expected except impacts that will occur during the construction phase.

- **Panfontein Sludge Pipeline**

Though the extent of the Panfontein pipeline is shorter in length, this servitude contributes to cumulative impacts primarily due to its location within a degraded wetland system and proximity to sludge ponds. The surrounding landscape has already experienced long-term disturbance from previous pipeline installations and agricultural activities. Introducing a new pipeline, even within a low-sensitivity zone, adds to the cumulative loss of wetland function, particularly hydrological and nutrient filtration. Additionally, it reinforces the trend of wetland encroachment and reduces the opportunity for future ecological restoration. The cumulative impacts, while considered low in magnitude due to the site's existing degraded state, still necessitate active mitigation to prevent further decline and spread of invasive plant species across the disturbed corridor.

12 ENVIRONMENTAL IMPACT STATEMENT

▪ Proposed New System 1 in Vereeniging

The New System 1 infrastructure is proposed within the existing Rand Water Vereeniging Treatment Works and includes the demolition of an old system and construction of a modern 225 MLD sedimentation tank with enhanced automation. Environmental impacts are largely locally based but include potential risks such as, stormwater runoff, and accidental spills during construction. No threatened species were recorded, and habitat value is moderately low due to historic disturbance. However, heritage sensitivity is elevated due to the site's age and cultural value. With appropriate mitigation (e.g., buffer zones, silt traps, and chance-find protocols), the negative impacts can be minimised, and positive impacts such as improved water reliability and energy efficiency will be realised.

▪ Phase 2 Sludge Pipeline

The 7 km Phase 2 sludge pipeline traverses through mixed-use and industrial developments, intersecting several watercourses and ecologically transformed grasslands. The main environmental risks include trenching impacts on identified seep wetlands and the Vaal River compaction of soils, disruption of hydrological connectivity, and increased erosion potential. Although the pipeline follows an existing servitude, the ecological corridor's functionality remains vulnerable. Biodiversity sensitivity is moderate due to riparian connectivity to the Vaal River. The alignment intersects moderately sensitive habitats and passes within 500 meters of a watercourse, triggering water use and wetland buffer regulations. The biodiversity assessment found that the area has no species of conservation concern recorded. The impacts are considered moderate in magnitude and spatially limited but require mitigation measures including erosion controls, buffer enforcement, and rehabilitation using indigenous plant species. If mitigation measures outlined in the EMPr are followed, the residual impacts are expected to be of medium to low significance.

▪ Panfontein Sludge Pipeline

The 1.5 km Panfontein sludge line is located in a highly disturbed area, previously impacted by sludge handling infrastructure and agriculture. The ecological sensitivity of this site is low, with limited biodiversity value. The dominant impacts are physical, including land compaction, minor vegetation clearance, and possible sedimentation from disturbed soils. Although wetlands at the site are of low functional value, they still contribute to local hydrological balance. Mitigation will focus on erosion prevention and post-construction rehabilitation. This development poses minimal risk, and if managed properly, it may present an opportunity to stabilise and control degradation in the surrounding area.

13 CONCLUSION

The proposed Rand Water infrastructure upgrade is deemed both necessary and environmentally feasible. Although the development activities present certain environmental risks, these have been thoroughly identified, assessed, and addressed through the Environmental Impact Assessment process and the findings of the specialist studies. With the successful implementation of the Environmental Management Programme (EMPr), it is recommended that the proposed activities be authorised. Environmental Authorisation should be granted for a period of ten (10) years to

accommodate for the acquisition of other applicable licences and permits, planning phase and commencement of construction activities. It is further anticipated that construction activities will require another ten (10) years to complete.

The proposed developments will significantly enhance water service delivery, improve operational resilience, and ensure compliance with environmental legislation, contributing meaningfully to South Africa's broader infrastructure development and sustainability goals. Considering the project's alignment with national and provincial policy frameworks, its socio-economic value, and the manageable nature of its environmental impacts, the project is recommended for Environmental Authorisation.

With sustained compliance monitoring, transparent stakeholder engagement, and adherence to the recommended mitigation measures, the proposed development is expected to deliver long-term benefits for both the public and the environment.

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15 APPENDICES

Appendix A: Pre-application meeting minutes

Appendix B: Site plan (s)

Appendix C : Site photographs

Appendix D : Public Participation Information

- Appendix D1(a): Site Notices
- Appendix D1 (b): Proof of site Notice Erection
- Appendix D2: Proof of Newspaper Advertisement
- Appendix D3: Project Announcement Notification letters
- Appendix D3(a): Notification Letters to I&APs
- Appendix D3(b): Notification Letters to Organ of State
- Appendix D4: Background Information Document (BID)
- Appendix D4(a): Proof of Bid Distribution
- Appendix D4(b): BID comment Forms
- Appendix D5: Database
- Appendix D6: Comment and Response Report
- Appendix D7: Public Participation Report

Appendix E: Site Sensitivity Verification Report

- Appendix E1: Screening Tools

Appendix F: Specialist reports

- Appendix F1: Socio- Economic Assessment Study
- Appendix F2: Agricultural Compliance Statement
- Appendix F3: Wetland Assessment Study
- Appendix F4: Heritage Impact Assessment Study
- Appendix F5: Terrestrial Biodiversity Assessment Study
- Appendix F6: Geohydrological Assessment Study
- Appendix F7: Stormwater Management Plan
- Appendix F8: Palaeontological Desktop Study
- Appendix F9: Geotechnical Assessment Study
- Appendix F10: Hydrological Assessment Study
- Appendix F11: Flood line Assessment Study

Appendix G: EMPr

Appendix H: EAP Curriculum Vitae and Qualifications