

APPENDIX D - SITE VERIFICATION REPORT

1. Introduction

Woodlands Settlement is a rural settlement located within the Koukamma Local Municipality (KKLM) in the Eastern Cape, approximately 15 km southwest of Kareedouw Town along the R102 route. The existing small-bore gravity sewer reticulation and digester system servicing the Woodlands Settlement requires upgrading. The existing wastewater treatment system has a hydraulic and treatment capacity of approximately 250 kL/day and was originally designed to receive septic tank sludge rather than domestic wastewater. The existing system does not include inlet works for screening, degritting or flow measurement, does not provide for the receipt of sewage from honey suckers, and does not have a chlorine contact tank or dedicated sludge management system. Limited capacity to clean the digesters has also resulted in unsanitary conditions. The system has experienced overflows during peak conditions and is currently not operational, with the effluent consequently not complying with the applicable limits of the General Authorisation issued in terms of the National Water Act, 1998 (Act 36 of 1998).

The Koukamma Local Municipality has commissioned SMEC South Africa to undertake the design and implementation of the internal sewer reticulation, bulk sewer reticulation and wastewater treatment works for the Woodlands Settlement.

2. Project Overview

2.1 Location

The existing and proposed WWTW is located on Erf RE/1 (SG Code: C03400160000000100000), which is approximately 327 ha in extent. The expanded WWTW development footprint will comprise approximately 2.2 ha with approximate central coordinates: 34° 0'45.35"S; 24° 9'35.41"E

The proposed pipeline route alternatives will traverse Farm Palmiet River 2/584 (SG Code: C03400000000058400002).

2.2 Proposed Development

The proposed project comprises the decommissioning and replacement/upgrading of the existing wastewater treatment system, together with upgrades to the internal and bulk sewer reticulation infrastructure. The existing digester tank system will be discontinued and the internal reticulation pipes will be replaced with 160 mm diameter Class 34 uPVC pipes. A 160mm diameter pipe, operating at 80% capacity, is sufficient for the development. To accommodate more than the anticipated 20% stormwater ingress, the pipe size will increase to a 200mm diameter class 34 uPVC pipe for the final 900 meters, connecting to the WWTW. Manholes should be placed every 80m, at pipe bends and at all pipe connections.

The new sewer system will operate as a gravity sewer, with the network directing wastewater towards the lower points of the settlement. The proposed bulk sewer main has been routed to avoid future development areas where required. The preferred pipeline route and WWTW layout have been revised to avoid sensitive aquatic areas as far as practicable. The preferred layout is identified as Site Layout 3 with Pipeline Route 3. This layout is located outside the delineated wetland as far as practicable, with only a short section of the pipeline traversing the wetland south of the pipeline route.

2.3 Design Capacity

The proposed WWTW has been designed to treat domestic sewage at an Average Dry Weather Flow (ADWF) of 500 kl/day (0.5 MI/day). The WWTW will also accommodate sewage received from honey suckers. Future hydraulic load calculations undertaken by SMEC, taking into account planned Spatial Development Framework (SDF) housing in the area, indicate a projected ADWF of 462.37 kl/day.

The proposed 0.5 MI/day treatment capacity is therefore intended to accommodate the anticipated future average daily wastewater flows from the Woodlands Settlement.

2.4 Head of Works and Treatment Process

The proposed head of works will comprise:

- A tanker dumping area;
- One 10 mm coarse mechanical screen; and
- Two degritting channels.
- Biological Nutrient Removal (BNR) process comprising anaerobic, anoxic and aerobic treatment zones, followed by clarification through settling of activated sludge.
- Treated effluent will gravitate to two chlorine contact tanks.
- Following treatment and disinfection, the effluent will be discharged to a perennial stream located south of the WWTW site, from where it will eventually reach the Groot River.

2.5 Sludge Management

The proposed development includes two sludge drying beds and a dried sludge storage area (Site layout 3). The sludge is intended to be treated to sludge classification A1A for potential beneficiation by surrounding community members and/or off-site disposal at a registered waste disposal facility.

2.6 Stormwater Management

A stormwater dam is incorporated into the proposed layout. Excess flow from the inlet works will overflow and gravitate towards the stormwater dam.

3. Environmental Sensitivities

A screening tool has been developed by the Department of Forestry, Fisheries and Environmental Affairs (DFFE). The Screening Tool identifies related exclusions and/ or specific requirements including specialist studies applicable to the proposed site and/ or development, based on the national sector classification and the environmental sensitivity of the site. A screening report was generated for the proposed project; the sensitivities identified and verified are provided in **Error! Reference source not found..**

Specialist Studies

The following specialist studies have been carried out:

- Geological and groundwater assessment (DHS Groundwater) (Appendix D1)
- Aquatic Assessment (Confluent Environmental Pty (Ltd)) (Appendix D2)
- Terrestrial Biodiversity Assessment and Flora Assessment (Jamie Pote) (Appendix D3)
- Fauna Assessment (Jonathan Colville and Callan Cohen) (Appendix D4)

- Agriculture desktop assessment (SoilzSa) (Appendix D5)
- Heritage, archaeology, palaeontology screening assessment (CTS Heritage) (Appendix D6)
- Heritage, archaeology, palaeontology impact assessment (CTS Heritage) (Appendix D7)

3.1 Topography and Drainage

The project area is situated on a generally undulating plain/low-hill landform. Elevations across the area range from approximately 229 mamsl at the northernmost point to approximately 202 mamsl along the southern boundary. Surface water drainage generally follows the natural topographic gradient from northeast to southwest towards drainage features associated with the Groot River system.

The proposed bulk sewer pipeline is located on the western portion of the settlement and extends towards the WWTW. The pipeline route is in proximity to delineated wetland and floodline areas. The preferred Pipeline Route 3 provides the shortest crossing of the wetland and a suitable gradient. The design provides for the pipeline to be raised where watercourse crossings occur.

3.2 Geology, Soils and Groundwater

The underlying geology comprises the Table Mountain Group of the Cape Supergroup, characterised predominantly by quartzitic sandstone with interbedded shale and siltstone. The Peninsula, Cederberg, Goudini and Skurweberg Formations occur across the project area, with the Baviaanskloof Formation occurring south of the WWTW within the drainage area associated with the treated effluent discharge.

The WWTW site and pipeline routes were not identified as being underlain by dolomite, sinkhole or doline areas, and no shallow groundwater table was identified. The available groundwater assessment indicates a static groundwater level of approximately 20.16 m below ground level, although this is based on low-resolution interpolation and is not intended to define groundwater depths at a small scale.

Groundwater occurs predominantly within fractured aquifers, with reported yields of approximately 0.5–2.0 L/s. The aquifer vulnerability is rated as moderate, and the aquifer system is classified as a Minor to Major Aquifer System. The groundwater assessment identifies a high level of groundwater protection required in terms of both groundwater flow regime and groundwater quality management.

No groundwater users were identified within 1 km of the WWTW during the hydrocensus, and no groundwater users were identified within the defined Geohydrological Response Unit (GRU). The GRU covers approximately 826 ha and is bounded by surrounding topographic highs and lows. Available DWS groundwater databases similarly did not identify groundwater users within the GRU.

Notwithstanding the absence of identified groundwater users in the immediate area, the groundwater assessment identifies the protection of the aquifer, surrounding ecosystems and baseflow as important considerations. Potential sources of groundwater contamination associated with the WWTW therefore require appropriate containment, monitoring and operational management.

3.3 Aquatic Environment

In terms of the National DFFE screening tool report, the project area falls within an area of Very High aquatic biodiversity sensitivity, with the DFFE Screening Tool identifying an Ecological Support Area 1 (ESA 1) and the Tsitsikamma Strategic Water Source Area for surface water.

The nearest perennial river is the Groot River, located approximately 900 m south of the WWTW. Several non-perennial drainage features occur within the broader project area. Wetlands are present west and south of the

WWTW, including an unchannelled valley-bottom wetland that will be crossed by the proposed pipeline. The delineated wetland is in a moderately modified condition (Present Ecological State Category C), while the associated wetland vegetation is in a near-natural condition (Category B).

The lower section of the watercourse into which treated effluent is proposed to be discharged comprises a drainage line with perennial flowing water and a well-developed riparian zone. The riparian area is assessed as Category B (largely natural), with some minor alien vegetation impacts.

The project area also falls within Fish Freshwater Ecosystem Priority Areas (Fish FEPAs). Potential fish species associated with the relevant systems include the Eastern Cape redbfin (*Pseudobarbus afer*), slender redbfin (*Pseudobarbus tenuis*) and Cape galaxias (*Galaxias zebratus*). The aquatic assessment identifies water quality, flow regime and habitat structure as important considerations in relation to the proposed discharge of treated wastewater. The site is also identified as an Aquatic Ecological Support Area 1 in terms of the Eastern Cape Biodiversity Conservation Plan, 2019. The management objective for this area is to maintain ecological functioning and biodiversity objectives.

3.4 Existing Water Quality

Water quality sampling undertaken as part of the aquatic assessment identified elevated chlorine and *E. coli* concentrations, exceeding the applicable DWS General Authorisation limits. The assessment attributes the existing poor water quality to the non-functional WWTW and inadequate sanitation conditions within the settlement.

The proposed WWTW upgrade is therefore intended not only to provide treatment capacity for future sewage generation, but also to address existing wastewater-related pollution.

The aquatic assessment identifies the existing sewage-related water quality impacts as a significant factor affecting the present ecological condition of the receiving watercourse. Continued operational failure of the WWTW, including failure arising from power interruptions or equipment malfunction, could result in recurrence of these impacts.

Accordingly, effective operation and maintenance of the upgraded WWTW, routine monitoring of treated effluent and groundwater, appropriate sludge testing, and effective emergency response procedures are important components of the environmental management requirements.

3.5 Terrestrial Biodiversity and Vegetation

The DFFE Screening Tool identifies terrestrial biodiversity sensitivities within the broader project area. The proposed WWTW and pipeline occur primarily within Tsitsikamma Sandstone Fynbos (*Least concern*), while approximately 200 m of the bulk pipeline route is mapped within Eastern Coastal Shale Band Vegetation, which has an *endangered* conservation status.

The proposed WWTW and pipeline do not overlap with a designated Protected Area or Important Bird Area. A section of the WWTW access road overlaps with an area designated under the National Protected Areas Expansion Strategy (NPAES). The site is located within the broader Garden Route Biosphere Reserve and within the proposed Garden Route National Park expansion area.

In terms of the Eastern Cape Biodiversity Conservation Plan (2019), the WWTW site and bulk pipeline route fall within a terrestrial Critical Biodiversity Area 1 (CBA1), with portions of the pipeline also mapped as areas with no natural area remaining (NNR).

The terrestrial assessment found that the project area is substantially transformed and invaded, with remnant and secondary patches of fynbos vegetation occurring amongst areas dominated by alien invasive species. Site intactness was rated as very low, with more than 75% of the original vegetation considered to have been removed or lost. Overall degradation was rated as high, and the terrestrial sensitivity of both the WWTW site and pipeline route was assessed as low.

The approximately 200 m section of pipeline mapped within the endangered Eastern Coastal Shale Band Vegetation is located adjacent to the existing settlement and outside the delineated wetland. The terrestrial assessment indicates that the proposed routing is not expected to result in significant additional fragmentation of terrestrial biodiversity, particularly given the existing disturbance and transformation of the area.

3.6 Indigenous Flora and Alien Invasive Vegetation

The site contains remnant and secondary fynbos vegetation, interspersed with extensive areas of alien invasive vegetation. Species recorded include black wattle, blackwood, lantana, pine, bramble, bugweed and other invasive or weed species.

Several indigenous species of conservation concern were recorded during the botanical assessment, including *Erica sparsa*, *Erica glandulosa* and *Erica discolor*, as well as *Watsonia pillansii*. These species are protected in terms of the applicable provincial conservation legislation and their removal may require the relevant permit from DEDEAT.

No Endangered or Critically Endangered flora species were confirmed to be present within the affected area. No large yellowwood trees were recorded during the site assessment. A final botanical walkdown prior to construction was recommended to identify any newly established sensitive species or yellowwood seedlings.

The high level of existing alien invasion and disturbance means that rehabilitation and alien invasive plant management will be important during and following construction. Construction activities also have the potential to introduce or spread invasive species if appropriate controls are not implemented.

3.7 Terrestrial Fauna

The DFFE Screening Tool identifies a High animal species sensitivity for the broader area, including potential habitat for several bird, insect and mammal Species of Conservation Concern (SCC).

Ground-truthing undertaken during the fauna assessment found that the project area is heavily disturbed and transformed and retains only limited natural vegetation and faunal habitat. Suitable habitat for the SCC identified through the Screening Tool was not found across the project area.

Based on the existing level of disturbance and habitat transformation, the importance of the project area for the identified SCC was assessed as low to very low. The proposed WWTW and sewer infrastructure are therefore primarily located within an already disturbed environment.

3.8 Agricultural Potential

The DFFE Screening Tool identifies the agricultural theme as Very High sensitivity. However, the proposed WWTW footprint is approximately 2.2 ha, is already associated with wastewater infrastructure and is located adjacent to the Woodlands settlement and an existing small landfill site.

The site has not been used for agricultural purposes, and the small extent and existing land use limits the agricultural production potential of the site. The agricultural assessment found the agricultural potential of the site to be low and that the proposed development will not result in a loss of future agricultural production potential.

Treated effluent and/or appropriately managed sludge generated from the WWTW can provide a potential beneficial resource for surrounding agricultural users, subject to the applicable regulatory requirements and appropriate treatment and management.

3.9 Surrounding Land Use

The proposed development is situated within and adjacent to the existing Woodlands Settlement. The surrounding 500 m area comprises a combination of residential development, natural and disturbed areas, agricultural land,

plantation areas, the existing wastewater treatment facility, landfill/waste-related land uses and aquatic features including rivers, streams and wetlands.

The proposed works will upgrade existing wastewater infrastructure and provide sewer infrastructure to service the settlement.

The surrounding land uses are relevant to the proposed development primarily in relation to the protection of nearby residential areas and natural resources from potential wastewater-related impacts. The upgraded WWTW is intended to address the existing inadequate wastewater treatment and sanitation conditions and provide appropriate treatment capacity for the settlement.

The presence of surrounding natural areas, agricultural land and aquatic features requires that construction activities remain within the approved development footprint and that appropriate controls are implemented to prevent pollution, uncontrolled runoff, vegetation disturbance and impacts to surrounding land uses.

3.10 Cultural and Heritage Resources

The Heritage Impact Assessment (HIA) recorded a municipal graveyard north of the school and church, which was graded IIIA due to its social and spiritual value. Two 20th-century homesteads were also identified and graded IIIB. These heritage resources occur to the east of the Woodlands Settlement and are not in close proximity to the WWTW site or proposed pipeline route, being located more than 350 m from the development area, and are therefore unlikely to be impacted. A ruin within the WWTW area was also noted but was assessed as Not Conservation Worthy, given its condition and the extent to which its surroundings have been altered. The identified sites are indicated on the final site layout plan in Appendix A4.

No archaeological material, such as stone artefacts or ceramics, was observed during the field assessment, and previous studies similarly indicate low archaeological sensitivity in the area. As the pipeline will largely follow existing roads and will be buried, and the identified heritage resources are located outside the development footprint, the potential impact on archaeological heritage is considered low.

The field assessment confirmed that the development footprint has been extensively disturbed. No in situ bedrock outcrops or fossil material were identified during the survey, and no fossiliferous horizons were detected. Given the lack of exposed geology and the absence of fossil finds during the survey, the potential for encountering significant palaeontological material during construction is regarded as low. Any fossil occurrences, if present, are expected to be isolated and of limited scientific importance, and the potential impact on palaeontological heritage resources associated with excavation and trenching is considered minimal.

The HIA recorded a low density and occurrence of archaeological and palaeontological material, with no significant heritage resources identified within the development footprint. Archaeological and palaeontological resources in the study area were assessed as having low sensitivity. With the recommended mitigation measures implemented, impacts to heritage resources are considered minimal and unlikely.

The following heritage management measures are included in the EMPr (Appendix F):

* Should any buried archaeological resources, human remains or burials be uncovered during development activities, work must cease in the vicinity of the finds, and the Eastern Cape Provincial Heritage Resources Authority (ECPHRA) must be contacted immediately to determine the appropriate way forward.

* A Chance Fossil Finds Protocol (CFFP) is incorporated into the EMPr to guide on-site personnel during all ground-disturbing activities.

4. Environmental Constraints and sensitivity verification

Environmental constraints relevant to the proposed WWTW and associated sewer infrastructure include:

- Delineated wetland associated with the bulk sewer pipeline;
- Aquatic features associated with the receiving effluent; the perennial receiving watercourse and downstream aquatic environment;
- Groundwater resource and requirement for groundwater quality protection;
- Approximately 200 m of the bulk pipeline occurring within mapped endangered Eastern Coastal Shale Band Vegetation; remnant indigenous vegetation occurring amongst extensive areas of alien invasive vegetation; the presence of protected indigenous plant species requiring consideration prior to vegetation clearance;
- The potential for the introduction and spread of invasive species during construction;
- Potential contamination arising from wastewater, sludge and infrastructure failure;
- Stormwater and flood-related risks; and
- The need to maintain effective operation of the upgraded WWTW to prevent recurrence of existing wastewater-related pollution.

The WWTW footprint and the majority of the pipeline route occur within an already disturbed and highly transformed environment. The preferred Site Layout 3 (Figure 1; Appendix A3) and Pipeline Route 3 (Figure 2; Appendix A4) have been selected to avoid sensitive aquatic areas as far as practicable. The proposed discharge of treated effluent to the receiving watercourse requires specific management and monitoring measures during operations.

The groundwater assessment identified a moderately vulnerable aquifer system requiring a high level of groundwater protection, although no groundwater users were identified within the defined Geohydrological Response Unit. Appropriate containment of wastewater and sludge, prevention of uncontrolled discharges, and monitoring of groundwater and effluent are therefore important to maintaining the protection of the groundwater and receiving aquatic environment.

The environmental sensitivities associated with the proposed development have been identified and considered in the preferred layout and design of the WWTW operational components and gravity bulk pipeline. The key environmental risks are associated with aquatic features, wastewater and effluent management, groundwater protection, vegetation clearance and the management of construction activities within the existing disturbed environment. Measures to manage anticipated impacts are provided in the EMPr (Appendix F). The verification of sensitivities identified in the DFFE Screening tool report are provided in **Table 1** below.

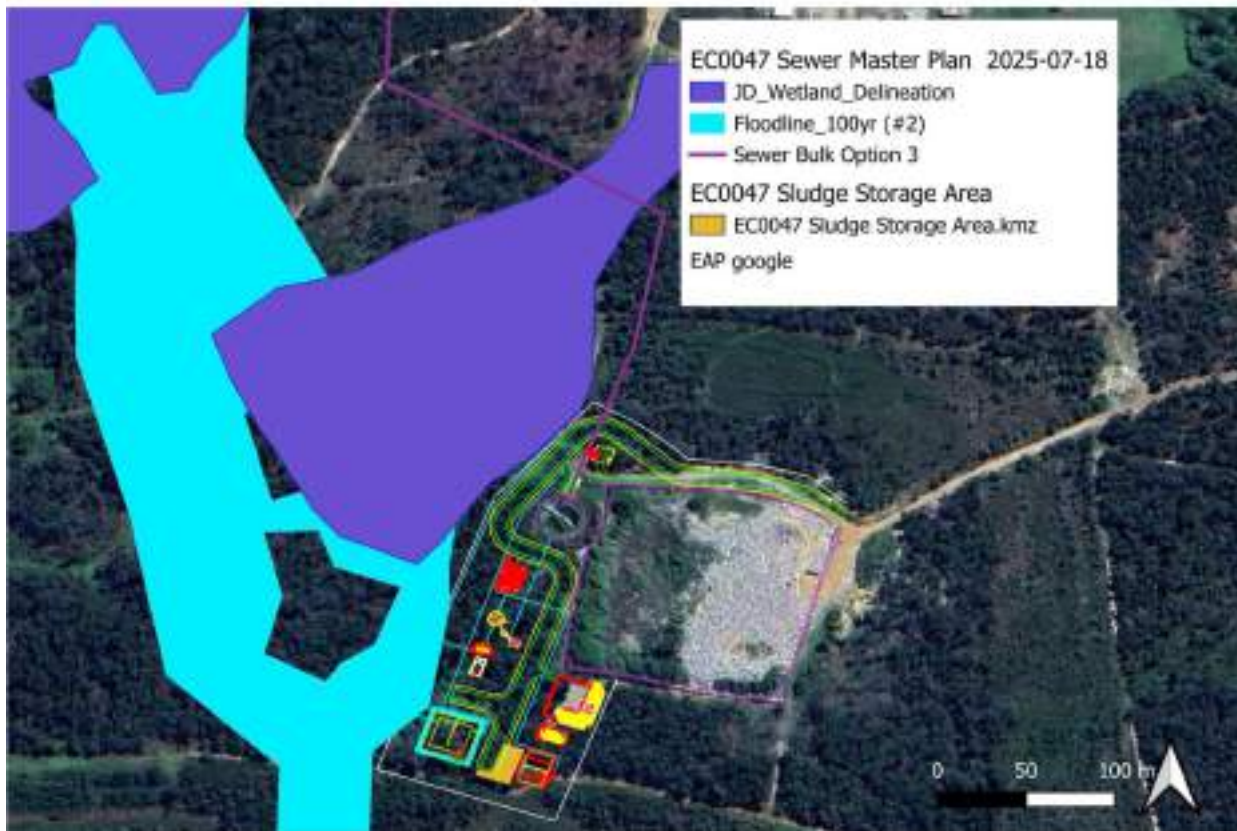


Figure 1: Preferred site layout

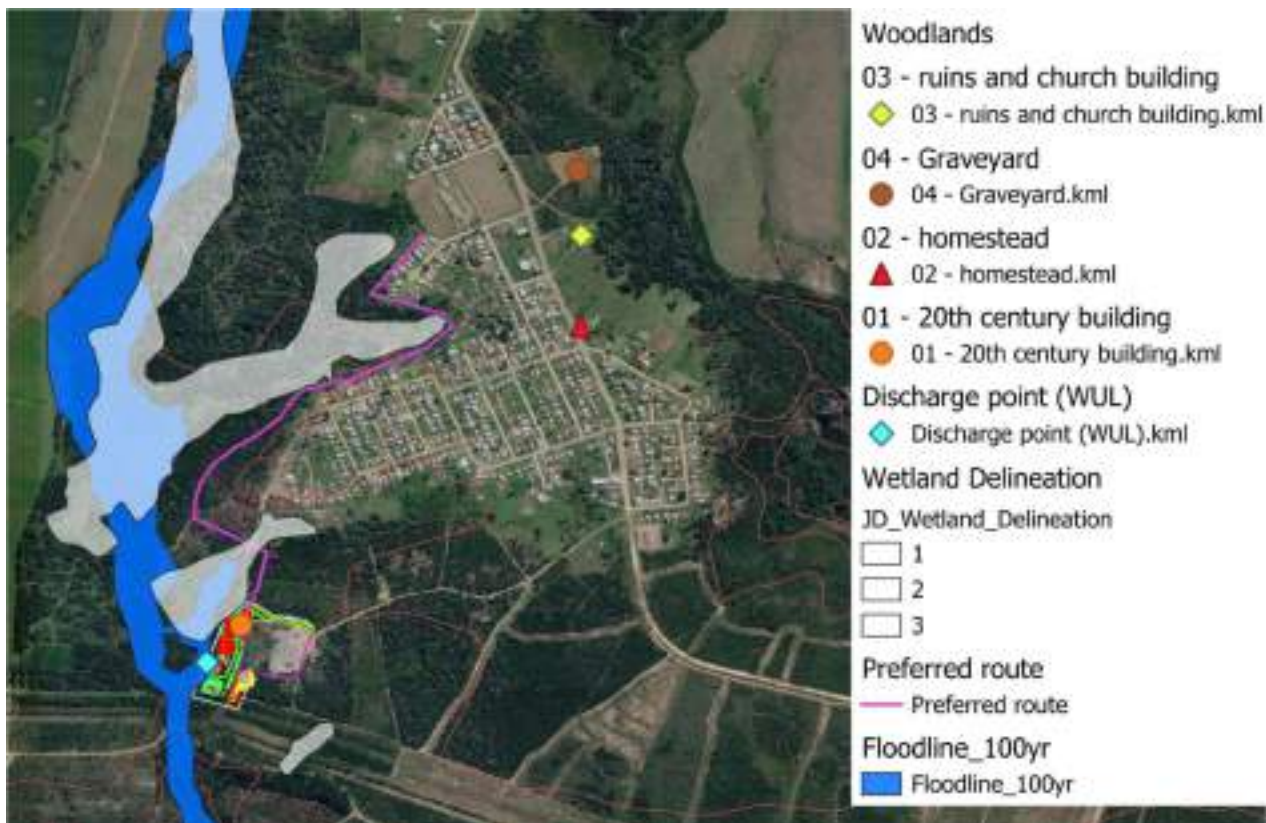


Figure 2: Preferred site layout and pipeline route

Table 1: Verification of environmental sensitivities

Theme and / or protocol	Environmental sensitivity as per screening tool report	Verification of environmental sensitivity	Description
Landscape/Visual Impact Assessment	NA	NA	WWTW is not located close to visual receptors with exception of bulk line and internal reticulation. Visual impacts are addressed as part of the Basic Assessment. Refer to section D.
Agricultural theme	High Sensitivity	Low	The site is already used as a WWTW site and is approximately 2.2 ha in extent, limiting its suitability for agricultural production. No existing agricultural infrastructure occurs on the site and the land has not been used for agricultural purposes. An Agricultural Compliance Statement was prepared and concluded that the proposed development will not result in a loss of future agricultural production potential. The agricultural potential of the affected area is therefore considered low.
Animal Species	High Sensitivity	Low	The site is highly disturbed and provides limited suitable habitat for Species of Conservation Concern identified by the Screening Tool. Ground-truthing confirmed that the importance of the site for these species is low to very low. Some incidental foraging and occurrence of common fauna associated with adjacent wet areas and disturbed areas may occur.
Aquatic Biodiversity Hydrology Assessment	Very High	Very High	The project area occurs within a Strategic Water Source Area and an Aquatic Ecological Support Area 1 and is associated with a Fish FEPA and sensitive aquatic and groundwater systems. The receiving watercourse and wetland areas require protection from wastewater-related pollution and construction impacts. The existing non-functional WWTW is already contributing to poor water quality, making effective treatment and operational management an important component of the proposed upgrade.

Theme and / or protocol	Environmental sensitivity as per screening tool report	Verification of environmental sensitivity	Description
Archaeological and Cultural Heritage	Low sensitivity	Low	The HIA identified a low density and occurrence of archaeological and palaeontological material. No significant archaeological resources were identified within the development footprint. Identified heritage resources occur outside the development footprint and are unlikely to be affected. The STR identifies very high palaeontological sensitivity. The field assessment found no fossil material, fossiliferous horizons or exposed bedrock within the development footprint. The footprint is extensively disturbed and the potential for encountering significant palaeontological material is considered low. A Chance Fossil Finds Protocol has been incorporated into the EMPr.
Paleontological	Very High	Low	
Plant Species Assessment	Medium sensitivity	Low	Secondary and degraded vegetation and alien invasive vegetation dominate the affected area. No Endangered or Critically Endangered plant species were confirmed within the affected area. Protected indigenous species listed under the applicable provincial conservation legislation were recorded and may require permits should vegetation clearance affect these species.
Terrestrial Biodiversity Impact	Very High Sensitivity	Low	The terrestrial assessment found that the project area is substantially transformed and invaded, with remnant and secondary patches of fynbos vegetation occurring amongst areas dominated by alien invasive species. Site intactness was rated as very low, with more than 75% of the original vegetation considered to have been removed or lost. Overall degradation was rated as high, and the terrestrial sensitivity of both the WWTW site and pipeline route was assessed as low. The approximately 200 m section of pipeline mapped within the endangered Eastern Coastal Shale Band Vegetation is located adjacent to the existing settlement and

Theme and / or protocol	Environmental sensitivity as per screening tool report	Verification of environmental sensitivity	Description
			outside the delineated wetland. The terrestrial assessment indicates that the proposed routing is not expected to result in significant additional fragmentation of terrestrial biodiversity, particularly given the existing disturbance and transformation of the area.
Socio-Economic	NA	NA	Socio-economic impacts are addressed through the Basic Assessment process. No specific specialist assessment was considered necessary.
Civil Aviation Assessment	Medium sensitivity	NA	A Civil Aviation Assessment / Compliance Statement was not considered necessary as the proposed development is not expected to affect civil aviation or an aerodrome.
Defence theme	Low sensitivity	NA	A Defence Theme Compliance Statement was not considered necessary as the proposed development is not expected to affect the Defence Theme.