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**Water Use License Application:**  
**Rosemoor Bulk Sewage and Stormwater Upgrade**  
**WU47142**

DRAFT WULA SUMMARY REPORT

**Prepared For:** George Municipality  
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**SACNASP:** Pr. Sci. Nat. (Water Resources) – 114084  
**Date:** 1 April 2026



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## 1 BACKGROUND & PURPOSE

Confluent Environmental was appointed to submit a Water Use License Application (WULA) for the proposed upgrading of an existing bulk sewer pipeline (from end of service SANTAR pipes to PVC-u Class 34 pipes) and existing stormwater outlets in Rosemoor, George, Western Cape. Rosemoor is a residential suburb located within the town of George and falls within the catchment area of the Meul River.

The development will take place within the regulated area of a watercourse and triggers several water uses that require a Water Use License (WUL) in terms of the National Water Act (NWA).

## 2 LOCATION OF WATER USES

The existing sewage pipeline and stormwater outlets are located within the upper reaches of the Meul River, which falls within quaternary catchment K30C (Figure 1). The main rivers draining this catchment are the Swart and Kaaimans, both of which originate in the Outeniqua Mountains. The Meul is a smaller river system that flows for a relatively short distance before flowing into the sea. The project area falls within the South-Eastern Coastal Belt (20) Level 1 ecoregion (20.02 Level 2 Ecoregion), which is characterized by moderately undulating plains and low mountains with altitude ranging from 0 to 1 300 m above mean sea level. Mean annual precipitation for the catchment area is approximately 800 mm per year and occurs all year-round, with peaks in October to November and March to April. Dominant natural vegetation in the vegetation comprises broadly of fynbos, renosterveld, dune thicket, and afro-montane forest.

Soils in the catchment area are relatively shallow consisting of a diagnostic pedocutanic duplex soil, with a clear textural contrast between the A and B horizon. The B horizon is however heavily enriched with clay, which serves as a barrier to both root growth and water movement. Sub-surface water therefore tends to flow laterally over the top of the B horizon, through the more coarsely textured A horizon. In addition, the area falls within a very high intensity rainfall zone. For these reasons, soils are highly erodible and is undoubtedly a contributing factor to the extent of erosion observed in and around watercourses – particularly where stormwater is discharged.

The Meul River originates from the industrial centre of George and passes through a combination of formal residential areas and informal settlements (with poor access to water and sanitation services). Sewage spills from blocked manholes and failing pump stations frequently result in sewage spills into the Meula River, which has resulted in closure of recreational activities at Ballots Bay (where the Meul River discharges into the sea). The longest section of the bulk sewer pipeline and stormwater outlets run along the northern edge of a seep wetland which abuts the Meul River. A smaller section of the pipeline runs along an eastern tributary of the Meul River which is also associated with a seep wetland (Figure 2). The formation of seep wetlands along the gentle slopes of valleys is consistent with the soil type in George (i.e. a coarsely textured A horizon overlying a relatively impervious clay enriched B horizon). The seep wetland features are sustained primarily by lateral sub-surface flow which is prevented from penetrating the deeper impervious B horizon and expresses near the surface as it travels down the relatively gentle slopes. The gentle slopes allow water to be retained in the soil profile for an extended period of time, leading to seasonally saturated

conditions and the establishment of wetland vegetation. Further downstream (far below project area of interest below the N2 highway), the gradient of these slopes becomes steeper and water is retained in the soil profile for a shorter duration, and wetland habitat is replaced by woody vegetation typical of a riverine riparian zone.

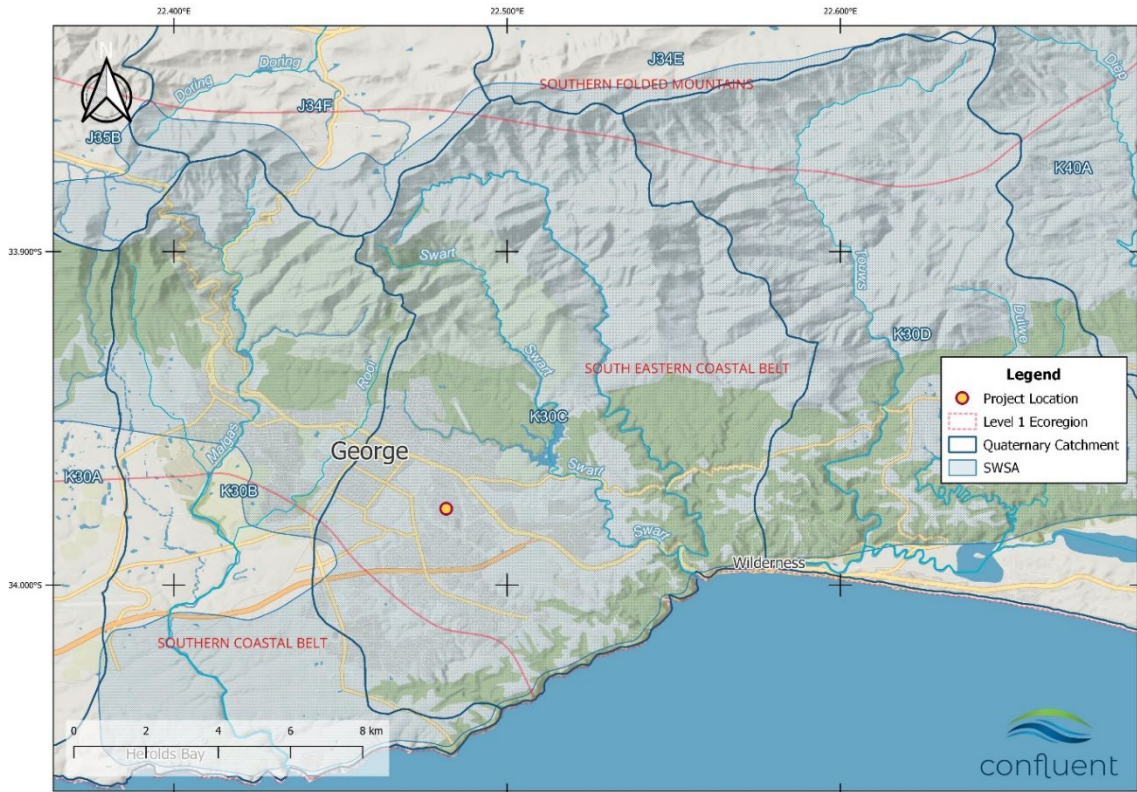


Figure 1: Map indicating the location of the bulk sewer pipeline and stormwater outlets in quaternary catchment K30C.

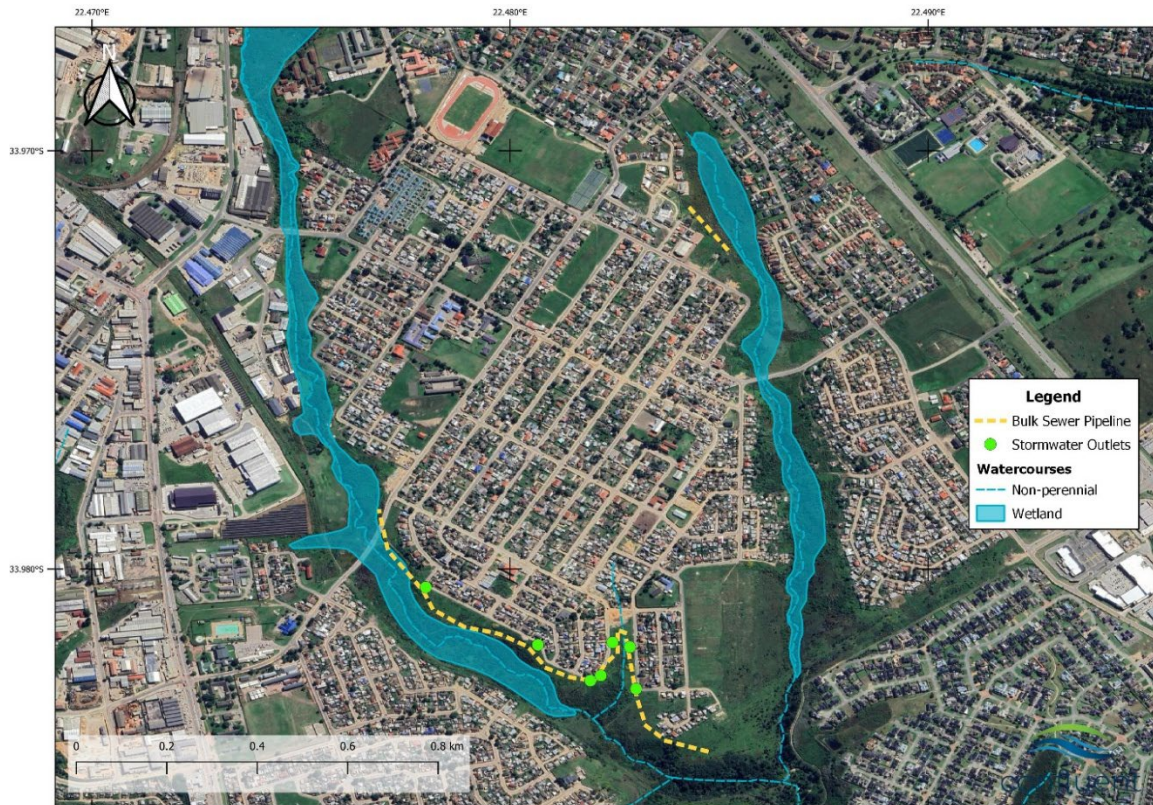


Figure 2: Map showing the delineated extent of seep wetlands along the Meul River and its eastern tributary

The pipeline is mapped to cross a non-perennial watercourse (Figure 2). The site inspection revealed a narrow, incised channel that originates from a stormwater outlet and traverses a gently sloping plain (Figure 2). The outlet discharges onto the gently sloping plain with no defined valley or topography that would favour the formation of a natural drainage line/stream, and it is clear that the channel has been formed due to erosion caused by stormwater discharge. Wetland vegetation has colonised this channel (mainly *Typha capensis*) and as with other stormwater outlets in the area, levels of litter and dumping were high. The pipeline crosses the channel approximately 20 m downstream from the stormwater outlet. The channel is considered a man-made stormwater channel and does not provide habitat for aquatic biodiversity.

Wetland systems have been heavily impacted by urban development and their Present Ecological State (PES) is D (Largely Modified), which is representative of a system which has experienced a large change in ecosystem processes and where loss of natural habitat and biota has occurred.

### 3 PROJECT DESCRIPTION

#### 3.1 Sewage Line Upgrade

The upgrade will involve replacing two sections of an existing bulk sewer pipeline with a larger diameter (250 mm) PVC-U Class 34 pipe (Figure 2).

### 3.2 Stormwater Outlets

The upgrade of stormwater infrastructure will involve building headwall outlets and a 6 m gabion mattress for erosion protection (Figure 4 and Figure 5). These will replace existing outlets which currently have no headwalls and no erosion protection.

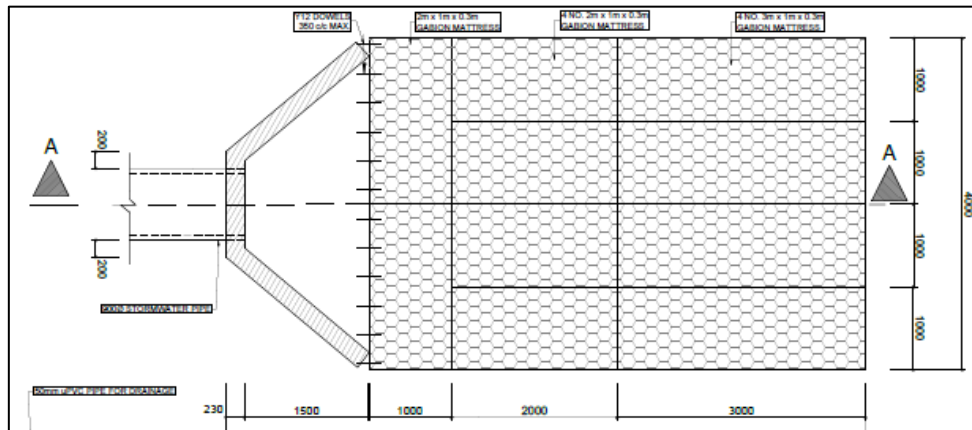


Figure 3: Plan view of proposed stormwater upgrades.

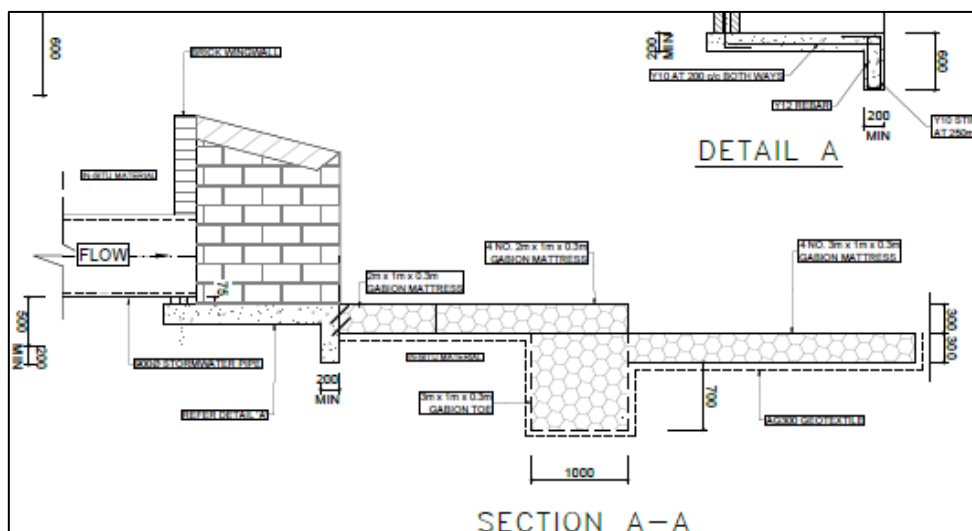


Figure 4: Section view of proposed stormwater upgrades.

## 4 WATER USES

Based on the project layout and proposed plans, the following water uses have been identified and will form the subject of the WUL application:

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

Further details are provided in Table 1.

Table 1: List of water uses that will be included in the WULA

| ID                                     | Water Use | Description       | Lat       | Long       |
|--|-----------|-------------------|-----------|------------|
| SO1                                    | 21 i      | Stormwater Outlet | 22.477986 | -33.980434 |
| SO2                                    | 21 i      | Stormwater Outlet | 22.480667 | -33.981809 |
| SO3                                    | 21 i      | Stormwater Outlet | 22.481923 | -33.982669 |
| SO4                                    | 21 i      | Stormwater Outlet | 22.482173 | -33.982547 |
| SO5                                    | 21 i      | Stormwater Outlet | 22.482453 | -33.981753 |
| SO6                                    | 21 i      | Stormwater Outlet | 22.48287  | -33.981862 |
| SO7                                    | 21 i      | Stormwater Outlet | 22.483016 | -33.982864 |
| North Sewage Line (Construction)       | 21 c & i  | Bulk Sewage Line  | 22.484788 | -33.97191  |
| South Sewage Line (Construction)       | 21 c & i  | Bulk Sewage Line  | 22.48042  | -33.981856 |
| South Sewage Line Watercourse Crossing | 21 c & i  | Bulk Sewage Line  | 22.482668 | -33.981485 |
| North Sewage Line (Operation)          | 21 c & i  | Bulk Sewage Line  | 22.484788 | -33.97191  |
| South Sewage Line (Operation)          | 21 c & i  | Bulk Sewage Line  | 22.48042  | -33.981856 |

## 5 IMPACTS & MITIGATION

As highlighted in Figure 2, the pipeline and stormwater outlets are located immediately adjacent to or intersect with delineated wetland habitat. There is therefore potential for construction activities to impact the wetland and mitigation measures must be implemented in order to avoid and/or minimize these impacts.

### 5.1 Construction Phase

#### 5.1.1 Impact 1: Pollution of Wetland caused by Construction Activities

General construction impacts associated with vehicles, workers and storage of construction equipment and include the following:

- Pollution of watercourses through leakage of fuels, oils, and other pollutants from vehicles and construction machinery, or from washing of equipment and vehicles;
- The presence of construction workers on site will require the need for appropriate ablution facilities. Poor management of these facilities could potentially lead to sewage spills or leaks which could contaminate watercourses;
- Storage of construction materials or the temporary lay-down of equipment within an area that drains in the direction of the watercourse;
- Dumping of excavated material into the watercourse;
- Poor management of waste generated during construction activities; and
- Mixing of concrete or cement in or in close proximity to watercourses.

##### 5.1.1.1 Mitigation

- Excavators and all other machinery and vehicles must be checked for oil and fuel leaks daily. No machinery or vehicles with leaks are permitted to work in the wetland;

- Refuelling and fuel storage areas, and areas used for the servicing or parking of vehicles and machinery, must be located on impervious bases and should have bunds around them (sized to contain 110 % of the tank capacity) to contain any possible spills;
- Chemical toilets should be provided on-site at 1 toilet per 10 persons;
- Waste from chemical toilets must be disposed of regularly (at least once a week) in a responsible manner by a registered waste contractor;
- Cement/concrete used in the construction must not be mixed on bare ground or within the delineated extent of the wetlands. An impermeable/bunded area must be established in such a way that cement slurry, runoff and cement water will be contained and will not flow into the surrounding environment or contaminate the soil;
- Workers must be properly instructed in the proper care of the environment, especially with respect to poaching, disturbance of nesting and roosting areas, disposal of human waste, garbage etc.;
- Construction areas to be inspected on a regular basis (at least weekly) by an appropriately qualified ECO for signs of disturbance, sedimentation and pollution during the construction phase. If signs of disturbance, sedimentation or pollution are noted, immediate action should be taken to remedy the situation and, if necessary, a freshwater ecologist should be consulted for advice on the most suitable remediation measures.

|   | Bulk Sewage Pipeline Upgrade                 | No Go            |
|---|--|------------------|
| Nature of impact:   | Management of construction site and workers  | Not Applicable   |
| Extent and duration of impact:  | Site-Specific & Short Term                   |                  |
| Consequence of impact or risk:  | Disturbance and pollution of wetland habitat |                  |
| Probability of occurrence:  | Highly Probable                              |                  |
| Degree to which the impact may cause irreplaceable loss of resources: | Marginal Loss                                |                  |
| Degree to which the impact can be reversed:                           | Fully Reversible                             |                  |
| Indirect impacts:   | None   |                  |
| Cumulative impact prior to mitigation:                                | Medium                                       |                  |
| <b>Significance rating of impact prior to mitigation:</b>             | <b>Medium Negative</b>                       | <b>No Impact</b> |
| Degree to which the impact can be avoided:                            | High   | Not Applicable   |
| Degree to which the impact can be managed:                            | High   |                  |
| Degree to which the impact can be mitigated:                          | High   |                  |
| Proposed mitigation:  | See Section 5.1.1.1                          |                  |
| Residual impacts:   | Very Low                                     |                  |
| Cumulative impact post mitigation:                                    | Negligible                                   |                  |
| <b>Significance rating of impact after mitigation</b>                 | <b>Low Negative</b>                          | <b>No Impact</b> |

### 5.1.2 Impact 2: Mobilisation of Sediment Caused by the Excavation of Trench

Installation of a new bulk sewer pipeline will require the excavation of a trench along the edge of and through a small section of the wetland which will expose bare soil to environmental elements and could lead to erosion of the embankment during heavy rainfall events. This can result in increased instream turbidity and sedimentation of aquatic habitat (including wetland habitat). Given the current PES of the affected wetland these impacts are not expected to be particularly severe if the appropriate mitigation measures are implemented. There is no impact associated with the No-Go option.

#### 5.1.2.1 Mitigation

- Construction activities must be timed to coincide with low rainfall probability (dry season) to avoid erosion of exposed banks;
- A silt fence must be placed downslope of the trench, along the length of the pipeline alignment;
- No laydown areas, stockpiling of construction materials or excavated topsoil is permitted within delineated wetland areas;
- Construction must be sequenced so that installation of the pipeline can take place with the minimum possible delay. Disturbance/excavation of areas where the pipeline is to be installed must be undertaken only when final placement can follow immediately following the initial disturbance;
- A construction schedule must be developed and clearly defined so as to avoid multiple sites being exposed and unattended to at any moment in time. The completion date for each phase of development must be indicated and all clearing, excavation, and stabilisation operations must be completed before moving onto the next phase;
- Following backfilling of the trench, exposed unvegetated slopes must be stabilised with appropriate geotextiles (e.g. SoilSaver®) or vegetated with appropriate indigenous vegetation. Banks must be regraded to match existing slopes/contours; and
- Wooden stakes must be used to anchor erosion control mats as there is a high probability that metal stakes will be stolen.

|   | Bulk Sewage Pipeline Upgrade                 | No Go            |
|---|--|------------------|
| Nature of impact:   | Excavation of embankment                     | Not applicable   |
| Extent and duration of impact:  | Site-Specific & Short Term                   |                  |
| Consequence of impact or risk:  | Erosion and sedimentation of wetland habitat |                  |
| Probability of occurrence:  | Highly Probable                              |                  |
| Degree to which the impact may cause irreplaceable loss of resources: | Marginal Loss                                |                  |
| Degree to which the impact can be reversed:                           | Fully Reversible                             |                  |
| Indirect impacts:   | None   |                  |
| Cumulative impact prior to mitigation:                                | Medium                                       |                  |
| <b>Significance rating of impact prior to mitigation:</b>             | <b>Medium Negative</b>                       | <b>No Impact</b> |
| Degree to which the impact can be avoided:                            | High   | Not applicable   |
| Degree to which the impact can be managed:                            | High   |                  |

|   | Bulk Sewage Pipeline Upgrade | No Go            |
|---|------------------------------|------------------|
| Degree to which the impact can be mitigated:          | High                         |                  |
| Proposed mitigation:                                  | See Section 8.1.2.1          |                  |
| Residual impacts:                                     | Very Low                     |                  |
| Cumulative impact post mitigation:                    | Negligible                   |                  |
| <b>Significance rating of impact after mitigation</b> | <b>Low Negative</b>          | <b>No Impact</b> |

### 5.1.3 Impact 3: Disturbance of Wetland Habitat caused by the Excavation of the Trench (Sewage Upgrade)

The pipeline is aligned through a small section of delineated wetland habitat. Construction of the pipeline through this habitat will result in physical disturbance of this habitat. There is no impact associated with the No-Go option.

#### 5.1.3.1 Mitigation

- Construction within wetland seep areas must be confined to clearly demarcated areas so as to prevent unnecessary disturbance of wetland habitat outside of these areas;
- Where crossing through delineated wetland habitat is unavoidable, use less disruptive methods if these are feasible. For example, horizontal directional drilling (HDD) can be used to install the pipeline beneath the wetland, avoiding surface disturbance;
- Restrict construction activities to designated corridors and limit vehicle and equipment movement to reduce soil compaction and habitat damage;
- Revegetation of disturbed wetland areas must be actively encouraged. The pipeline route is currently well covered by indigenous wetland vegetation which could be used to revegetate the trench post-construction. It is recommended that when trenching, a top layer of vegetation in association with 20-30 cm of soil should be removed and set aside for replanting or covering the backfilled in trench;
- During excavation of the trench, topsoil and subsoil must be separated and, when backfilled, must be replaced in sequence (i.e. subsoil followed by topsoil); and
- Once construction has been completed, the trench must be backfilled and the original topography, soil structure, and hydrology must be restored as much as possible to ensure water can flow freely and the vegetation can re-establish.

|   | Bulk Sewage Pipeline Upgrade             | No Go          |
|---|--|----------------|
| Nature of impact:   | Excavation of delineated wetland habitat | Not applicable |
| Extent and duration of impact:  | Site-Specific & Short Term               |                |
| Consequence of impact or risk:  | Disturbance of wetland habitat           |                |
| Probability of occurrence:  | Highly Probable                          |                |
| Degree to which the impact may cause irreplaceable loss of resources: | Marginal Loss                            |                |
| Degree to which the impact can be reversed:                           | Completely Reversible                    |                |
| Indirect impacts:   | None                                     |                |
| Cumulative impact prior to mitigation:                                | Low                                      | No Impact      |
| <b>Significance rating of impact prior to mitigation:</b>             | <b>High Negative</b>                     |                |

|   | Bulk Sewage Pipeline Upgrade | No Go            |
|---|------------------------------|------------------|
| Degree to which the impact can be avoided:            | Can be partly mitigated      | Not applicable   |
| Degree to which the impact can be managed:            | High                         |                  |
| Degree to which the impact can be mitigated:          | High                         |                  |
| Proposed mitigation:                                  | See Section 5.1.3.1          |                  |
| Residual impacts:                                     | Medium                       |                  |
| Cumulative impact post mitigation:                    | Low                          |                  |
| <b>Significance rating of impact after mitigation</b> | <b>Medium Negative</b>       | <b>No Impact</b> |

#### 5.1.4 Impact 4: Disturbance of Aquatic Habitat caused by the Excavation of the Bed & Banks (Stormwater Outlets)

Additional impacts associated with the construction phase involve the loss of additional habitat and biota as a result of disturbances (e.g. from construction vehicles and machinery) that occur outside of the areas designated for the installation of stormwater outlets. Given the current PES of the watercourses these impacts are not expected to be particularly severe if the appropriate mitigation measures are implemented. There is no impact associated with the No-Go option.

##### 5.1.4.1 Mitigation

- Areas where instream construction activities will take place must be confined to clearly demarcated areas so as to prevent unnecessary disturbance of instream and riparian habitat outside of these areas; and
- A single point of access must be used to access each site.

|   | Stormwater Upgrades            | No Go            |
|---|--------------------------------|------------------|
| Nature of impact:   | Excavation of banks            | Not applicable   |
| Extent and duration of impact:  | Site-Specific & Short Term     |                  |
| Consequence of impact or risk:  | Disturbance of wetland habitat |                  |
| Probability of occurrence:  | Highly Probable                |                  |
| Degree to which the impact may cause irreplaceable loss of resources: | Marginal Loss                  |                  |
| Degree to which the impact can be reversed:                           | Fully Reversible               |                  |
| Indirect impacts:   | None                           |                  |
| Cumulative impact prior to mitigation:                                | Medium                         |                  |
| <b>Significance rating of impact prior to mitigation:</b>             | <b>Medium Negative</b>         | <b>No Impact</b> |
| Degree to which the impact can be avoided:                            | High                           | Not applicable   |
| Degree to which the impact can be managed:                            | High                           |                  |
| Degree to which the impact can be mitigated:                          | High                           |                  |
| Proposed mitigation:  | See Section 5.1.3.1            |                  |
| Residual impacts:   | Very Low                       |                  |
| Cumulative impact post mitigation:                                    | Negligible                     |                  |
| <b>Significance rating of impact after mitigation</b>                 | <b>Low Negative</b>            | <b>No Impact</b> |

## 5.2 Operational Phase

### 5.2.1 Impact 5: Sewage Spills from Upgraded Bulk Sewer Pipeline.

While blockages and spills may still occur, increasing the diameter of the pipeline is likely to reduce the frequency of these events occurring. The No-Go scenario (smaller diameter pipe) will not result in any improvement.

#### 5.2.1.1 Mitigation

- The pipeline must be inspected on a routine basis to ensure that is free of any blockages and debris and is operating according to design specifications;

|   | Bulk Sewage Pipeline Upgrade  | No Go   |
|---|---|---|
| Nature of impact:   | Reduced blockages and associated sewage spills due to increased pipe diameter | Continued blockages and associated sewage spills due to |
| Extent and duration of impact:  | Site-Specific & Long Term   | Site-Specific & Long Term                               |
| Consequence of impact or risk:  | Reduced pollution of wetland habitat  | No reduction in pollution of wetland habitat            |
| Probability of occurrence:  | Probable  | Probable  |
| Degree to which the impact may cause irreplaceable loss of resources: | Marginal Loss   | Marginal Loss   |
| Degree to which the impact can be reversed:                           | Fully Reversible  | Fully Reversible  |
| Indirect impacts:   | None  | None  |
| Cumulative impact prior to mitigation:                                | Low   | Medium  |
| <b>Significance rating of impact prior to mitigation:</b>             | <b>Low Positive</b>   | <b>Moderate Negative</b>                                |
| Degree to which the impact can be avoided:                            | High  | High  |
| Degree to which the impact can be managed:                            | High  | High  |
| Degree to which the impact can be mitigated:                          | High  | High  |
| Proposed mitigation:  | See Section 5.2.1.1   | None – No Go  |
| Residual impacts:   | Low   | Moderate  |
| Cumulative impact post mitigation:                                    | Low   | Moderate  |
| <b>Significance rating of impact after mitigation</b>                 | <b>Low Positive</b>   | <b>Moderate Negative</b>                                |

### 5.2.2 Impact 6: Modification to Wetland Habitat Caused by Discharge of Stormwater Runoff.

The most serious impacts related to stormwater discharge relates to the input of high volumes of water at high velocity, which has already caused erosion of wetland seep habitat. Considering that all outlets currently discharge stormwater into the Meul River and associated wetland habitat, the intensity of impact has been assessed relative to the current scenario. In this respect the addition of energy dissipation structures designed to reduce the velocity of the water discharged which will help to prevent erosion problems and represents a positive impact. The No-Go scenario will result in continued erosion of wetland seep habitat and deposition of high quantities of sediment into the river.

#### 5.2.2.1 Mitigation

- The stormwater outlet structures must be inspected on a routine basis to ensure that is free of any blockages and debris and is operating according to design specifications;

- The bed and banks of the river must be routinely inspected (especially following heavy rainfall events) to ensure that the outlet structure is not causing unnecessary erosion of the bed and banks of the river. Any erosion observed must immediately be attended to through appointment of a suitably qualified aquatic specialist;
- All gabion structures must be inspected on a routine basis to ensure that the baskets are intact and that rocks have not displaced. Any faults must be immediately repaired; and
- Gabion structures must be lined with geotextiles to prevent the migration of fines that would otherwise undermine these structures.

|   | <b>Stormwater Upgrades</b>                   | <b>No Go</b>                                 |
|---|--|--|
| Nature of impact:   | Discharge of stormwater into wetland habitat | Discharge of stormwater into wetland habitat |
| Extent and duration of impact:  | Site-Specific & Long Term                    | Site-Specific & Long Term                    |
| Consequence of impact or risk:  | Reduced erosion of wetland habitat           | Erosion of wetland habitat                   |
| Probability of occurrence:  | Highly Probable                              | Definite                                     |
| Degree to which the impact may cause irreplaceable loss of resources: | Marginal Loss                                | Marginal Loss                                |
| Degree to which the impact can be reversed:                           | Fully Reversible                             | Fully Reversible                             |
| Indirect impacts:   | None   | None   |
| Cumulative impact prior to mitigation:                                | Low  | Medium                                       |
| <b>Significance rating of impact prior to mitigation:</b>             | <b>Low Positive</b>                          | <b>High Negative</b>                         |
| Degree to which the impact can be avoided:                            | High   | High   |
| Degree to which the impact can be managed:                            | High   | High   |
| Degree to which the impact can be mitigated:                          | High   | High   |
| Proposed mitigation:  | See Section 5.2.1.1                          | None – No Go                                 |
| Residual impacts:   | Low  | Moderate                                     |
| Cumulative impact post mitigation:                                    | Low  | Negligible                                   |
| <b>Significance rating of impact after mitigation</b>                 | <b>Low Positive</b>                          | <b>High Negative</b>                         |

## 6 REPORTS AND OTHER TECHNICAL DOCUMENTS

*Table 5: Additional technical reports relevant to application*

| <b>Technical documents</b>  | <b>Compiled by</b>                             | <b>Date compiled</b> |
|---|--|----------------------|
| Appendix 1 - Freshwater Assessment Report   | Confluent Environmental                        | March 2026           |
| Appendix 2 - Implementation of Stormwater Master Plan Projects: Upgrading of Street and Stormwater, Sewer & Water: Rosemoor: Area A | Lyners Consulting Engineers & Project Managers | September 2025       |