# FRESHWATER ASSESSMENT FOR THE PROPOSED OUDRIFT DAM ON PORTIONS 3/RE AND 13/RE OF THE FARM KLIPHEUVEL NO. 143, NEAR MOSSEL BAY

APRIL 2026

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# 1. SPECIALIST DETAILS, EXPERTISE AND DECLARATION

## 1.1. BACKGROUND AND QUALIFICATIONS OF SPECIALIST CONSULTANT

**Organisation:** BlueScience (Pty) Ltd

**Name**: Ms. Toni Belcher

**Profession**: Aquatic Ecologist for BlueScience, SACNASP No 005681

**Expertise**: BlueScience (Pty) Ltd provides water resource management services and includes the following:

- Rivers and wetlands scoping and impact assessments;
- River rehabilitation plans and implementation;
- Wetland rehabilitation plans and implementation;
- Water use authorisation applications (WULA);
- Biomonitoring or rivers (including macro-invertebrates, fish & water quality);
- Water use compliance auditing (internal auditing);
- Water use compliance monitoring and reporting for license holders (including water quality sampling and measurements);
- Ecological Reserve determination of rivers and wetlands;
- River Maintenance and Management Plans (MMP);
- NEMBA – alien vegetation assessment and management plans; and
- Water resources capacity building and training.

Summary of projects undertaken by BlueScience since July 2012:

| Type of project | Number of projects undertaken |
|---|---|
| Dam developments | 78 |
| Other freshwater and freshwater impact assessments | 365 |
| River reach MMP | 6 |
| ESKOM | 34 |
| Renewable energy (WEF and Solar) | 30 |
| Roads (Provincial and National roads) | 48 |
| River monitoring and rehabilitation projects | 58 |
| Water resource study | 12 |
| Water use authorisation applications (not linked to a freshwater assessment study) | 26 |
| Water use authorisation audits and licensing monitoring) | 7 |

## 1.2. DECLARATION OF INDEPENDENCE

I, Antonia Belcher, as the appointed Specialist hereby declare/affirm the correctness of the information provided or to be provided as part of the application, and that I:

- in terms of the general requirement to be independent:
    - other than fair remuneration for work performed in terms of this application, have no business, financial, personal or other interest in the development proposal or application and that there are no circumstances that may compromise my objectivity; or
    - ~~am not independent, but another specialist (the "Review Specialist") that meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);~~
- in terms of the remainder of the general requirements for a specialist, have throughout this EIA process met all of the requirements;
- have disclosed to the applicant, the EAP, the Review EAP (if applicable), the Department and I&APs all material information that has or may have the potential to influence the decision of the Department or the objectivity of any report, plan or document prepared or to be prepared as part of the application; and
- am aware that a false declaration is an offence in terms of Regulation 48 of the EIA Regulations, 2014 (as amended).

| | |
|---|---|
| Signature of the Specialist: |  |
| Name of Company: | BlueScience (Pty) Ltd |
| Date: | 9 March 2026 |

# 2. BACKGROUND

## 2.1. SCOPE OF STUDY

Klipheuwel Trust proposes constructing Oudrift Dam on Portions 3RE and 13RE of the Farm Klipheuvel No. 143 near the settlement Klein-Brakriver in Eden District Municipality in the Western Cape (Figure 1). The proposed dam would be an in-channel dam on a minor tributary of the Moordkuil River The intention of the proposed dam is to increase the storage capacity of water on the property. The dam will be filled from an existing allocation out of the Moordkuil River. The Moordkuil River is a tributary of the Klein Brak River. The potential impacts of the proposed activity on the aquatic ecosystems in the area are assessed, and mitigation measures are recommended to address the potential impacts. There are three options under consideration for the pump station design.

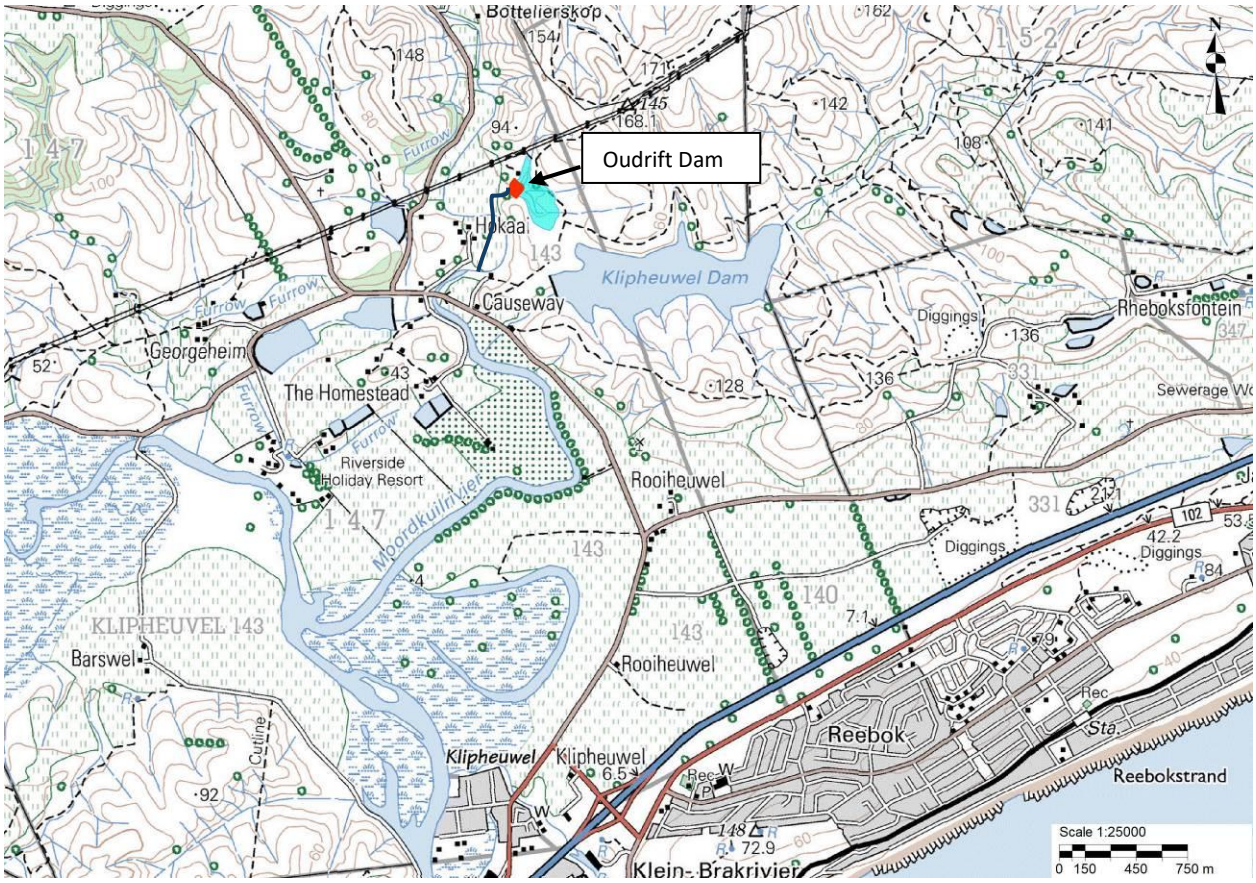


**Figure 1. The location of the existing pump station on the Moordkuil River**

**Table 1. Key water resources information within the study area**

| Descriptor | Name / details | Notes |
|---|---|---|
| Water Management Area (WMA) | Breede Olifants WMA | |
| Catchment Area | Moordkuil River | Tributary of the Klein Brak River |
| Quaternary Catchment | K10F | |
| Present Ecological State (PES) | D (largely modified) | DWS 2024 for the Moordkuil River |
| Ecological Importance and Sensitivity (EI&ES) | Ecological Importance – High<br>Ecological Sensitivity – Very High | |
| Latitude | 34° 2'55.85"S | Location of the proposed dam wall |
| Longitude | 22° 8'12.93"E | |
| Site visit | Ms. Toni Belcher and Mr. D Grobler | 10 May 2020 and 5 March 2026 |

The proposed dam is located within a wider area considered of Low Aquatic Biodiversity Combined Sensitivity (Figure 2). Only the wetland habitat associated with the Moordkuil River and its larger tributaries are mapped as being of very high Aquatic Biodiversity Combined Sensitivity due to the Aquatic CBAs, NFEPA Rivers and Wetlands mapping. The site is not located in a National Surface Water Strategic Water Source Area. The Aquatic CBAs and NFEPA mapped features are discussed in Section 4.7 of this report. The findings of the site verification assessment are largely in agreement with the Screening Tool Aquatic Biodiversity Sensitivity mapping for the site.

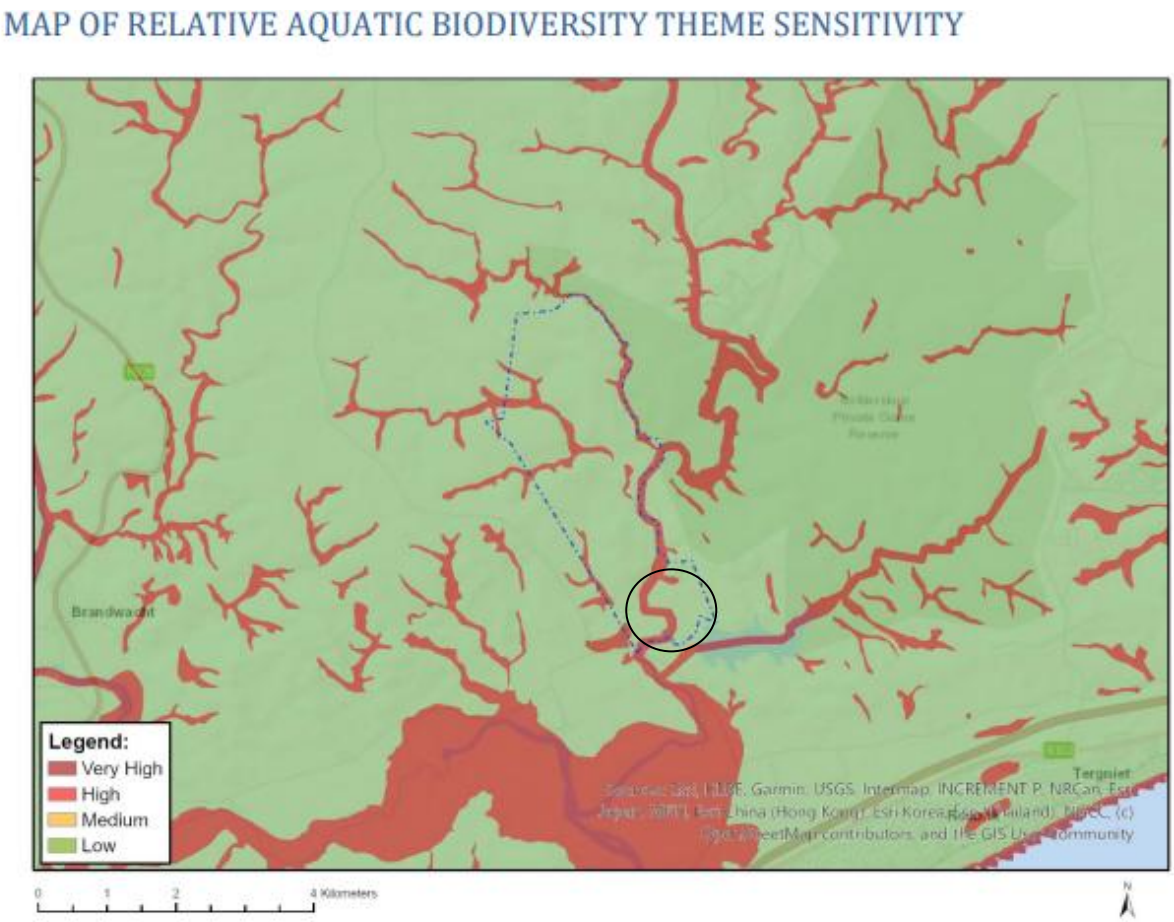


**Figure 2. DFFE Screening map of the area for Aquatic Biodiversity Combined Sensitivity, where the black oval indicates where the proposed work lies within the associated properties**

| Very High sensitivity | High sensitivity | Medium sensitivity | Low sensitivity |
|---|---|---|---|
| X | | | |

**Sensitivity Features:**

| Sensitivity | Feature(s) |
|---|---|
| Low | Low Sensitivity |
| Very High | CBA: Estuary |
| Very High | CBA: River |
| Very High | CBA: Wetland |
| Very High | Estuary |
| Very High | Wetlands_Channelled valley-bottom |
| Very High | Wetlands_Depression |
| Very High | Wetlands_Seep |
| Very High | Estuary_Klein Brak |
| Very High | Rivers |

## 2.2. TERMS OF REFERENCE

The agreed-upon work programme for this assessment was as follows:

Task 1: Freshwater Assessment

1.1 Literature survey and initialisation;

1.2 Freshwater impact assessment field work;

1.3 Freshwater impact assessment report;

1.4 Risk assessment for consideration of water use authorisation; and

1.5 Review and liaison.

## 2.3. ASSUMPTIONS AND LIMITATIONS OF THE ASSESSMENT

Input into this report was informed by a combination of desktop assessments of existing freshwater ecosystem information for the study area and catchment, as well as by a more detailed assessment of the freshwater features within the study area. The site was visited in May 2020, during winter. The timing of the site visit was suitable for the assessment of aquatic features. For the updating of this assessment, the site was revisited on 5 March 2026. Longer-term monitoring results are also available for the river from the River Ecostatus Monitoring Programme that could be utilised.

During the field visit, the characterisation and integrity assessments of the freshwater features were undertaken. Mapping of the freshwater features was undertaken using GPS Tracker and mapped in PlanetGIS Professional. The SANBI Biodiversity GIS, Cape Farm Mapper and Freshwater Biodiversity Information System websites were also consulted to identify any constraints in terms of aquatic biodiversity conservation mapping as well as possible aquatic features mapped in the Freshwater Ecosystem Priority Areas maps. This information/data was used to inform the resource protection-related recommendations as well as the instream flow requirement determination.

Limitations and uncertainties often exist within the various techniques adopted to assess the condition of ecosystems. The following techniques and methodologies were utilized to undertake this study:

- Analysis of the freshwater ecosystems was undertaken at a rapid level and did not involve detailed habitat and biota assessments;
- The river health assessment assessments were carried out using South African Department of Water and Sanitation (DWS) developed methodologies. River Health assessments were carried out to provide information on the ecological condition and ecological importance and sensitivity of the river systems impacted.
- The guideline document, “A Practical Field Procedure for the Identification and Delineation of Wetlands and Riparian Areas” document, as published by DWAF (2005) was followed for the delineation of the wetland areas.

The level of aquatic assessment and environmental water requirement determination undertaken was considered to be adequate for this study.

## 2.4 USE OF THIS REPORT

This report reflects the professional judgement of its authors. The full and unedited content of this should be presented to the client. Any summary of these findings should only be produced in consultation with the authors.

## 3. ACTIVITY DESCRIPTION

Klipheuwel Trust wishes to augment the storage augment the existing lawful storage on the Rooiheuwel farming unit (Portion 12 of Farm Hartebeest Kraal No. 122, Portion 2 and 8 of Farm Rheeboksfontein No. 140, Portions 3, 28 and 33 of Farm Klipheuvel No. 143, and Portion 13 of Farm Banff No. 147) near Mossel Bay.

Verified water use for the above-mentioned properties comprises:

Section 21(a): 2 073427 $m^3$/a surface water abstraction

Section 21(b): 326 519 $m^3$ storage of water (260 000 $m^3$ in-channel storage (3 dams) and 66 519 $m^3$ off-channel storage (11 dams))

The proposal is to increase the storage by a further 300 000$m^3$ to ensure sufficient assurance of supply for the next 30 years. Two options were identified for the increase in the storage of water on the properties: enlargement of the Church Dam on Farm Banff No 147; or the proposed new Oudrift Dam on Portions 13/RE and 3/RE of the Farm Klipheuvel No. 143. Other options considered to provide additional storage were eliminated due to technical (especially gravitational) and financial considerations, risk and operational complications were the enlargement of the existing Begraafplaas Dam to add a total of 145 480$m^3$; and the enlargement of various smaller dams to add a total of 63 560$m^3$. Oudrift Dam was found to be the most economically feasible.

The proposed layout for the dam (Figure 3) is that is comprised of an earth embankment with an uncontrolled side spillway section on the right bank. The outlet works with a 250mm diameter pipe that will be located in the lowest river section. A clay core will be constructed in the earth embankment. The non-overspill crest will be at level 25.5 m above sea level, resulting in a freeboard of 2.5m. The estimated length of the embankment is 104 m from the endpoint of the key wall. Three potential borrow areas were identified for embankment materials (28 000$m^3$ of impervious material and 49 000 $m^3$ of transition material) within the proposed dam basin. An additional 300$m^3$ of fragmented quartzitic sandstone boulders for rip-rap for the embankment slope protection is proposed to be removed from the Moordkuil River channel.

A water supply pipeline from the dam to the farm will need to cross the Moordkuil River. It will be weighted down onto the riverbed and excavated in the riparian areas. The twee-spoor road in the Eastern portion of the dam full level mark will also need to be re-routed outside the full level mark but will need to cross the tributary upstream. The stream crossing will involve a culvert/pipes with infill to allow a vehicle to cross.

A V-Notch flow gauging weir is proposed to be constructed on the unnamed tributary upstream of the dam, to measure the environmental flow releases generated from the catchment of the dam that would need to be released downstream of the dam.

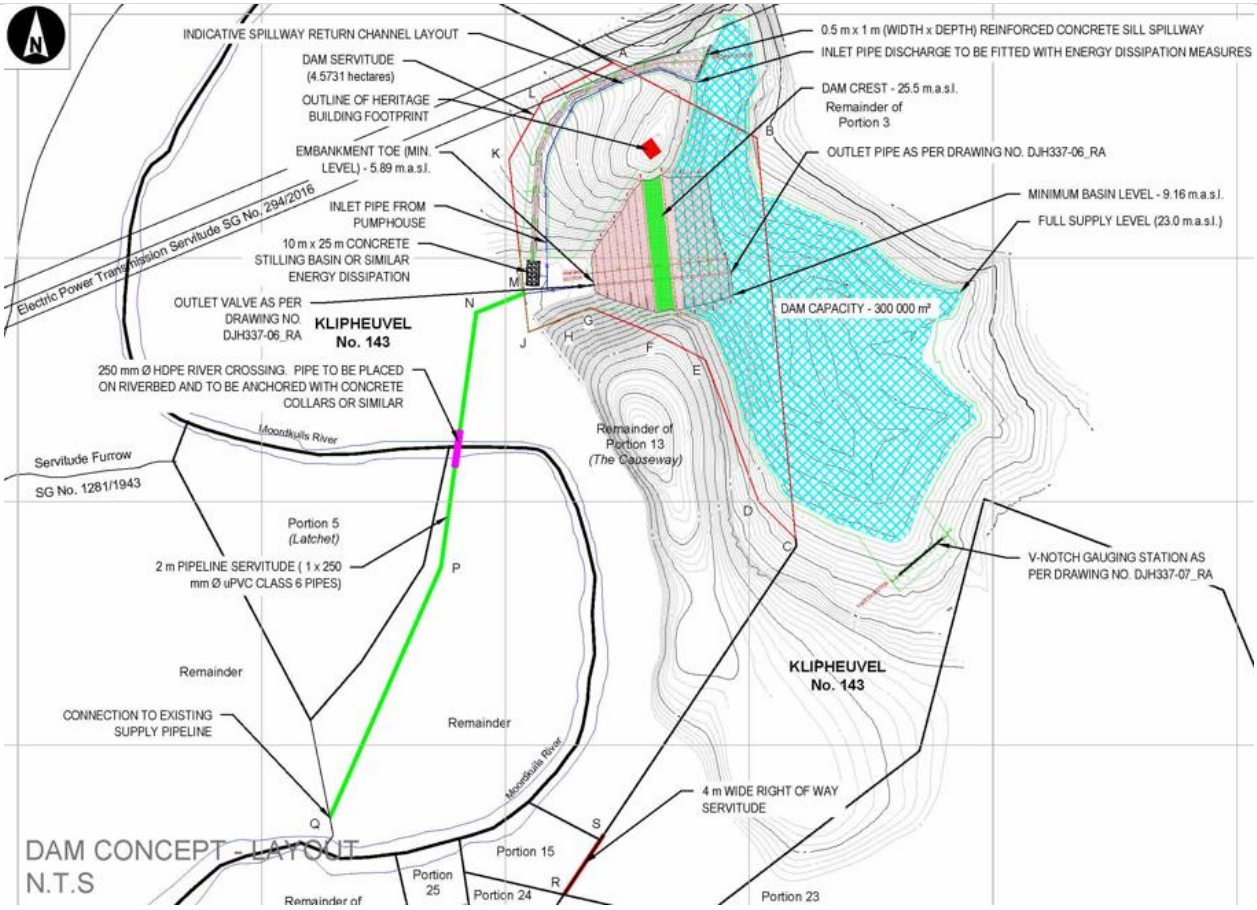


**Figure 3: The concept layout plan for the proposed Oudrift Dam (HagenBrink, 2026).**

# 4. AQUATIC SYSTEMS AND ASSOCIATED CHARACTERISTICS IN THE STUDY AREA

## 4.1 VISUAL CHARACTERISTICS

The general topography of the area slopes steeply from the Outeniekwa Mountains towards the sea, with foothills just south of the mountains followed by a narrow, flat coastal strip. Similarly, the rivers within the study area are short rivers with a relatively steep gradient that are fed by numerous small tributaries. The study site is located on the foothills within the lower Klein Brak River Catchment. The proposed dam site is located on a small tributary that drains into the Moordkuil River from the east. The existing pump station on the Moordkuil River is located approximately 2.5km upstream of the river's confluence with the Brandwacht River. Downstream of the confluence the river becomes the Klein Brak River which flows over the floodplain and into the Klein Brak Estuary. Most of the surrounding landscape has been disturbed by agricultural activities.

## 4.2. CLIMATE

The area normally receives about 450mm of rain per year, with rainfall occurring throughout the year. The lowest rainfall (26mm) occurs in June and the highest (52mm) in March. The average midday temperatures range from 18.8°C in July to 27.6°C in February. The region is the coldest during July when the mercury drops to 7°C on average during the night (Figure 4). Flow in the rivers in the area receives most of its runoff from precipitation that

falls within Outeniekwa Mountains, as well as groundwater contribution to baseflow. The flow pattern thus differs slightly from the rainfall in the area, with higher flows occurring in later winter to spring (Figure 4). A flow record is available for the river near the site at DWS gauging station K1H005 for the period 1978 to the present day.

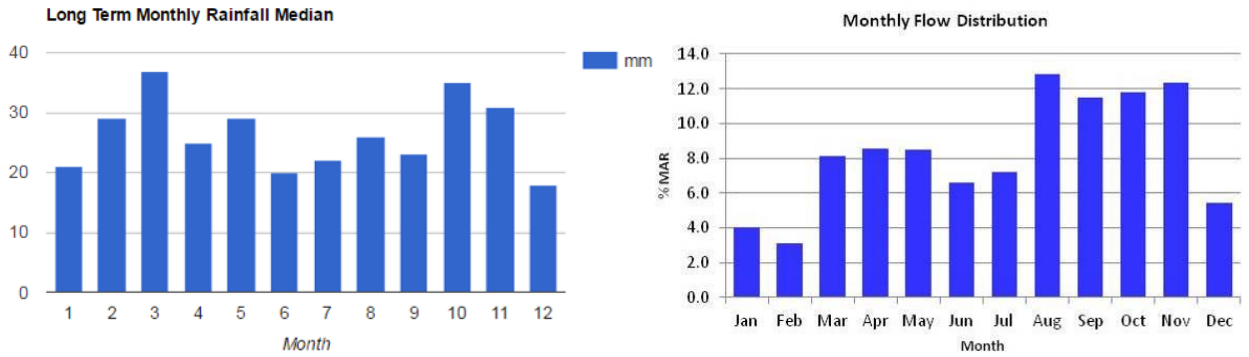


**Figure 4. Average monthly rainfall and the distribution of river flow for the area**

## 4.3. GEOLOGY AND SOIL

The area at the site can broadly be described as being underlain by sedimentary rocks of the Cape Super Group. This complex mix of geology comprises:

- Peninsula, Pakhuis and Cederberg Formations, part of the Tafelberg Group and Cape Supergroup. Normally a light grey quartzitic sandstone with thin siltstone, shale and polymictic conglomerate beds.
- Conglomerate, sandstone, siltstone and mudstone of the Enon and Kirkwood Formations, part of the Uitenhage Group. Variegated (reddish-brown and greenish) silty mudstone and sandstone, conglomerate, subordinate grey shale and sandstone
- The underlying geology within the valley floor comprises largely alluvial valley deposits.

Kleynhans (2021) investigated the geology at the proposed dam site. Peninsula and Pakhuis formations underlie the dam site, with extensive rock outcrops being exposed outside the river section and hill wash alluvial deposits occurring at the base of the lower flank slopes. Areas of rock and boulders occur on both the left and right flanks at the proposed site. These boulder zones are related to the underlying quartzitic sandstone lithology.

Soils within the area tend to have a marked clay accumulation, are strongly structured and have a non-reddish colour. One or more of vertic, melanic and plinthic soils may be present (Figure 5).

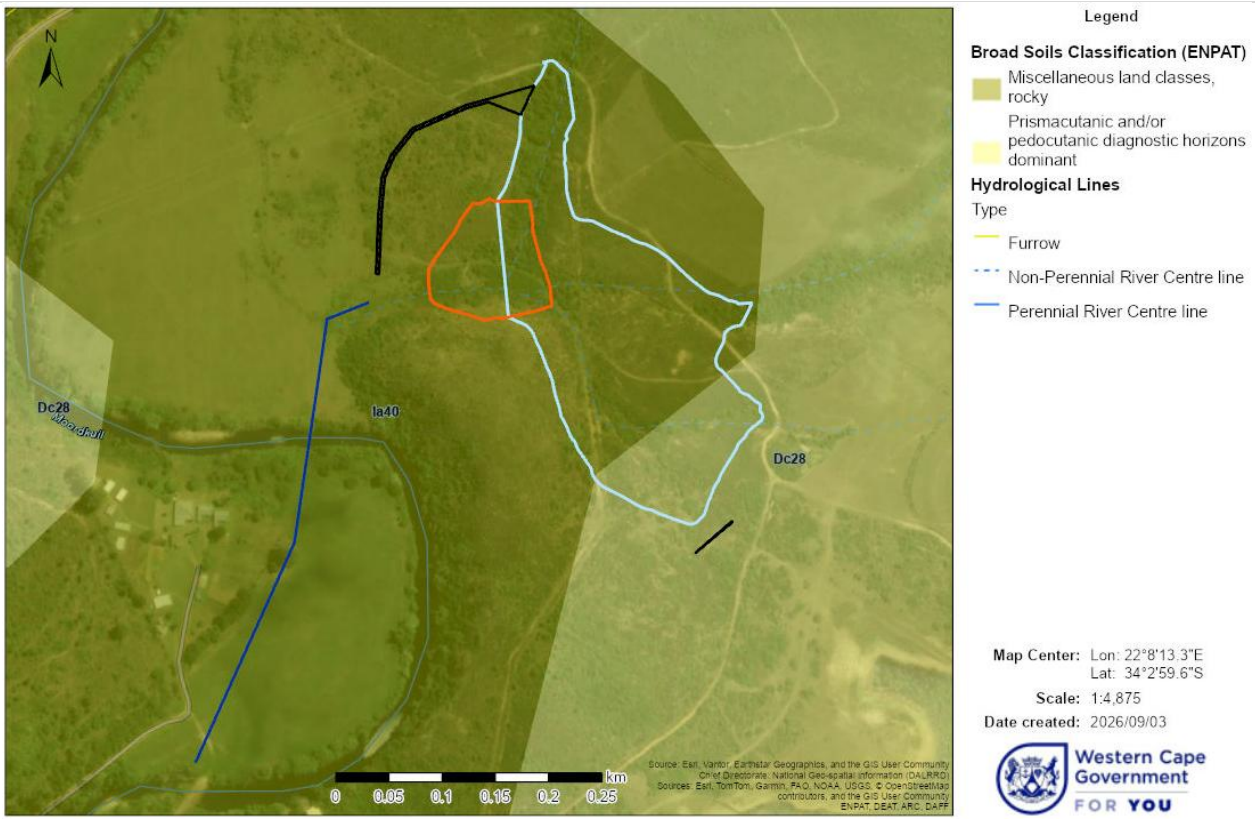


**Figure 5. National soil classes surrounding the Moordkuil River (CapeFarmMapper, 2026)**

## 4.4. FLORA

The naturally occurring vegetation mapped in the 2024 Vegetation Map as occurring at the dam site is transitional between Garden Route Granite Fynbos, a Critically Endangered vegetation type and South Outeniqua Sandstone Fynbos, a vegetation type of Least Concern (Figure 6, top). Groot Brak Dune Strandveld occurs along the Moordkuil River and is considered an Endangered vegetation type. In the composite vegetation map of the Riversdale, Little Karoo, Swartberg and Garden Route regions of the Southern Cape as classified by Jan Vlok in 2007, the dam wall is located within Groot Brak River and Floodplain vegetation and the basin of the dam within Brandwag Fynbos-Renoster-Thicket (Figure 6, bottom). The botanist that undertook the botanical assessment for the proposed project however indicated that the natural vegetation cover at the site was Mossel Bay Shale Renosterveld, a Critically Endangered vegetation type (2022 Revised National List of Ecosystems that are Threatened and in need of Protection).

Much of the terrestrial vegetation within the valley floor has been transformed by agriculture and other activities; however, within the watercourse corridors, such as at the proposed dam site, natural vegetation cover mostly still occurs.

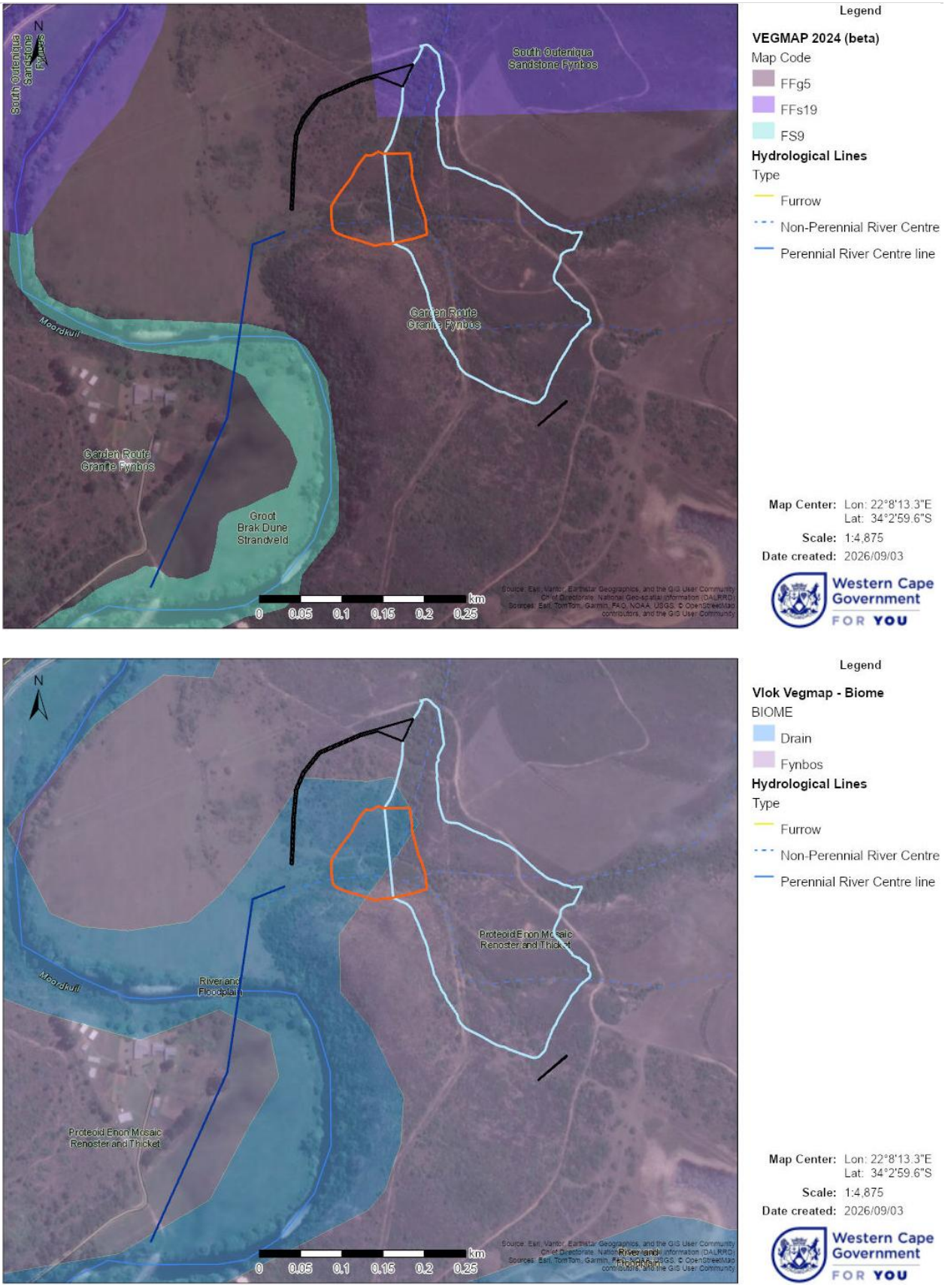


**Figure 6. The natural vegetation which would have occurred in the region of the proposed dam under unmodified conditions, based on the SANBI 2018 VegMap and Vlok Vegmap (Cape Farm Mapper, 2026)**

Vegetation within the riparian zone of the Moordkuil River comprises a mix of indigenous and alien plant species. Indigenous species that were observed were *Vachellia karroo, Virgilia oroboides, Searsia lucida, S. glauca,*

*Diospyros dichrophylla, Euclea racemosa* subsp. *racemosa, Carissa bispinosa* subsp. *bispinosa, Leonotis leonurus, Chasmanthe aethiopica, Carpobrotus edulis, Senecio radicans, Pteridium aquilinum, Cynodon dactylon, Ehrharta erecta* and *Ficinia indica.*

Indigenous vegetation along the marginal zones of the river tends to be dominated by the common reed *Phragmites australis* with sedges and rushes such as *Cyperus textilis, C. polystachyos, Juncus kraussii* and *Persicaria decipiens.* The riparian zone has, however, been modified with much of the indigenous vegetation having been removed with the subsequent encroachment of alien flora such as *Acacia mearnsii*, *Populus × canescens, Arundo donax, Salix babylonica, Cestrum laevigatum, Pennisetum purpureum, Ricinus communis, Solanum mauritianum, Nicotiana rustica* and *Salvinia molesta*.

The thicket within the minor tributary of the Moordkuil River comprises smaller trees and shrubs such as *Vachellia karroo, Osteospermum moniliferum, Searsia spp., Gymnosporia spp., Dodonaea viscosa, Olea europaea, Euclea undulata, Carissa bispinosa, Pittosporum viridiflorum, Sideroxylon inerme, Polygala myrtifolia*. Invasive aliens include black wattle *(Acacia mearnsii),* gums *(Eucalyptus sp.),* rooikrans *(A. cyclops),* silky hakea *(Hakea sericea),* prickly pear *(Opuntia ficus-indica),* olieboom *(Datura stramonium),* and Australian salt bush *(Atriplex semibaccata). Eucalyptus* and *Pinus* trees, as well as other invasive alien plant species have already been removed from the disturbed areas surrounding Klipheuwel Dam

## 4.5. AQUATIC FEATURES

The site is located in the lower Klein Brak River. The river consists of two main tributaries, Brandwacht/Palmiet River to the west and the Moordkuil River to the east. The Moordkuil River originates in the Outeniekwa Mountains and drains the high relief mountain slopes and then the foothills of the mountains.

The river channel is mapped in the Freshwater Ecosystem Priority Area Wetland and in the Mossel Bay fine-scale planning as a valley bottom wetland area (Figure 7). Downstream of the site, the Moordkuil River joins the Brandwacht River to form the Klein Brak River. Here the river opens into a wide floodplain in which the Klein Brak Estuary lies before the river discharges into the sea.

The watercourse in which the dam is proposed is a small stream that originates in the low hills immediately to the east of the river and drains a catchment of about 0.5 $km^2$. More detail on the aquatic features is the site is discussed in the following section.

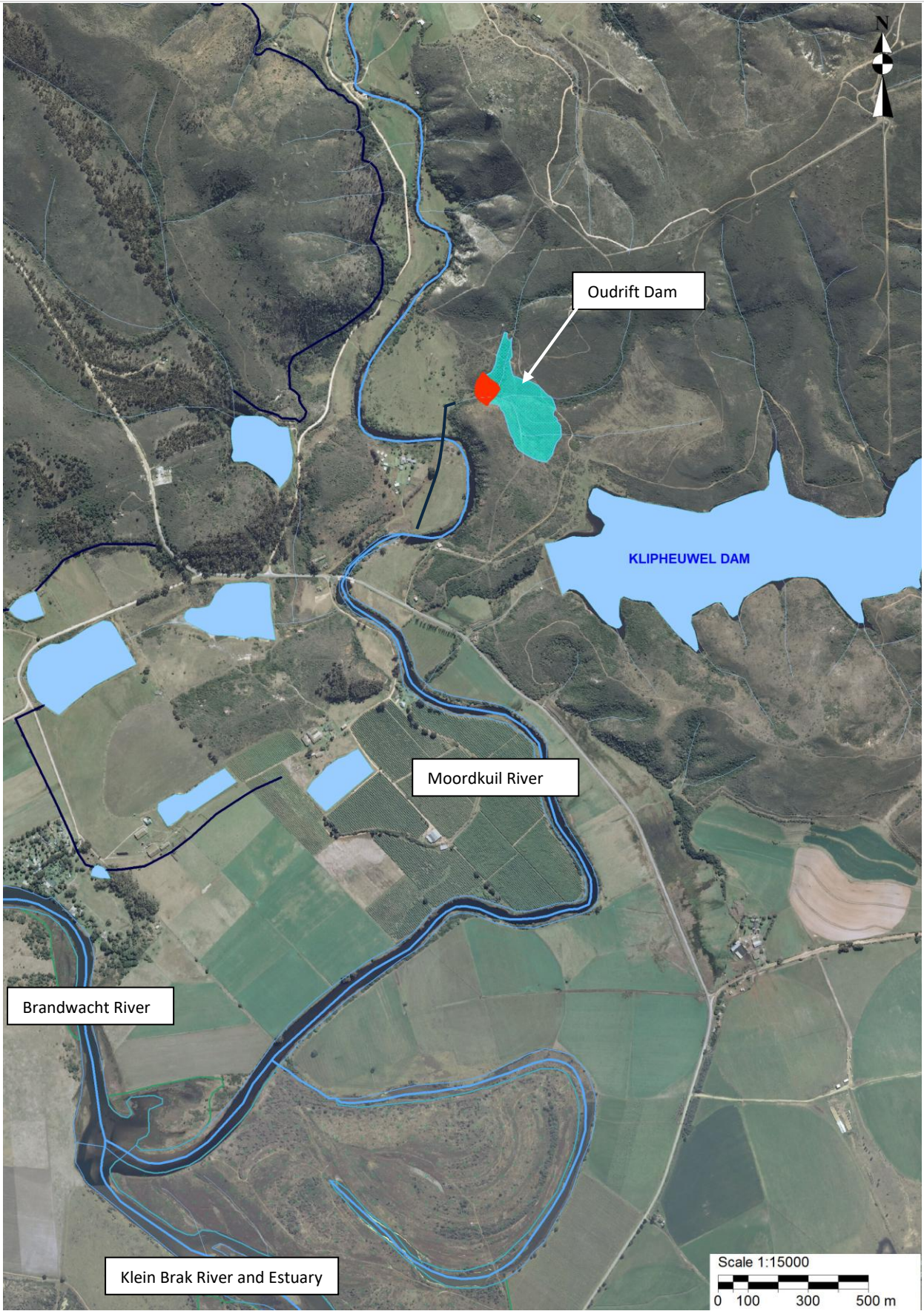


**Figure 7. Orthophotograph of the lower Klein Brak River System and the location of the proposed dam.**

## 4.5. LAND USE

The site lies within the Mossel Bay Municipal area on the Southern Cape coast north of the coastal town of Klein-Brakrivier. The surrounding land use consists of a mix of natural areas and forest/thicket (light and darker green areas in Figure 8, respectively) within the higher-lying areas and agricultural areas (cultivated land and livestock) on the lower-lying slopes and the valley floor. The Botlierskop Private Game Reserve is located immediately upstream of the site, while downstream of the site, the Moordkuil Valley opens out onto the Klein Brak floodplain and estuary. The settlement of Klein Brak is located on the estuary. The large DWS water supply dam, Klipheuwel Dam, is located on another small tributary of the Moordkuil River that joins the river downstream (south) of the site. There are a number of other dams within the lower river system (blue areas in Figure 8). The closest formally protected area is the Doringrivier Wilderness Area in the upper catchment where the river originates.

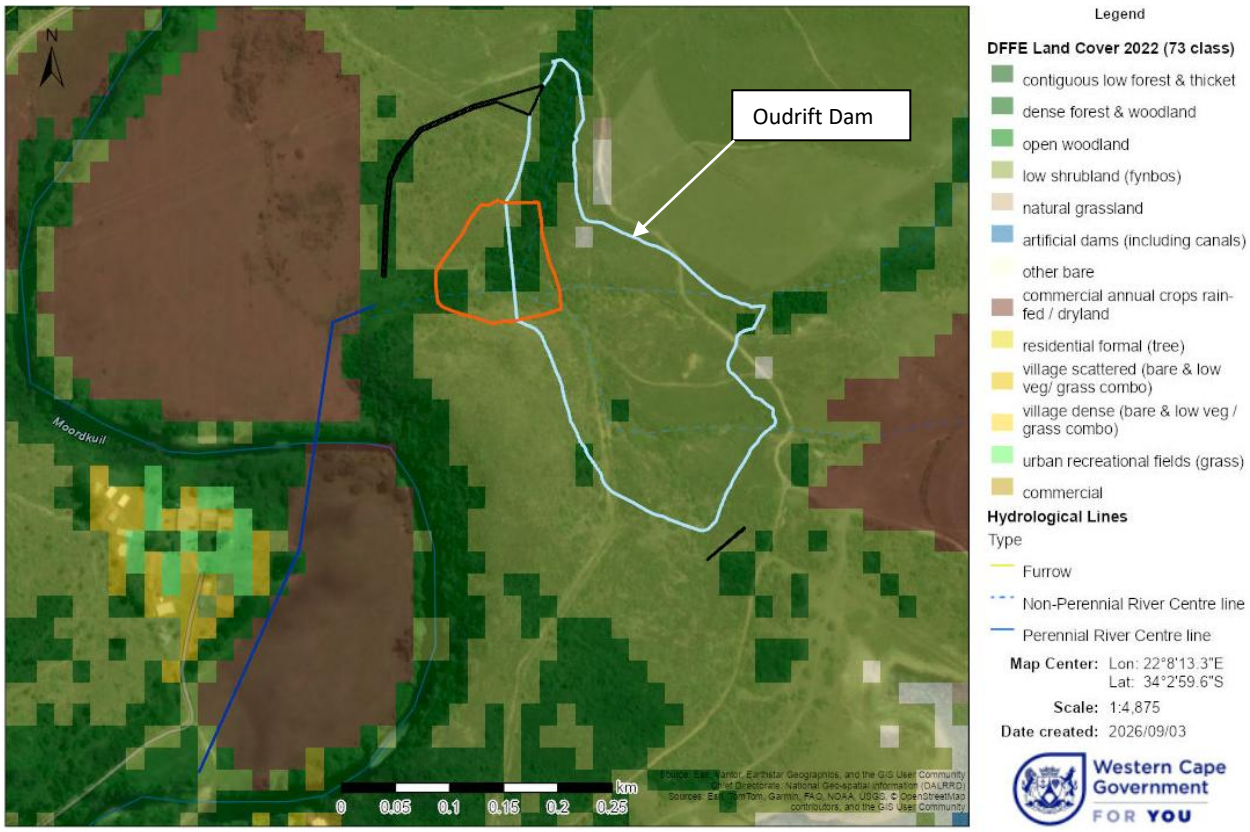


**Figure 8. Land cover (2020) at the site (Cape Farm Mapper, 2026)**

## 4.6. BIODIVERSITY CONSERVATION VALUE

There are two freshwater biodiversity conservation mapping initiatives of relevance to the study area, the National Freshwater Ecosystem Priority Areas (NNFEPA) mapping and the 2017 Western Cape Biodiversity Spatial Plan. NNFEPAs are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. NNFEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for serving ecosystems and associated biodiversity of rivers, wetlands and estuaries. The Moordkuil River upstream of the site is mapped as a Phase 2 NFEPA river (Figure 9). The river is also mapped as a NNFEPA wetland. There are no mapped wetlands at the dam site; however, there is a mapped wetland at the southern extent of the site and the site does lie within a wider

area mapped as a wetland cluster that is associated with the Moordkuil River wetlands. The wetland mapped at the southern extent of the dam basin does not appear in the National Wetland Map 5 (Figure 10).

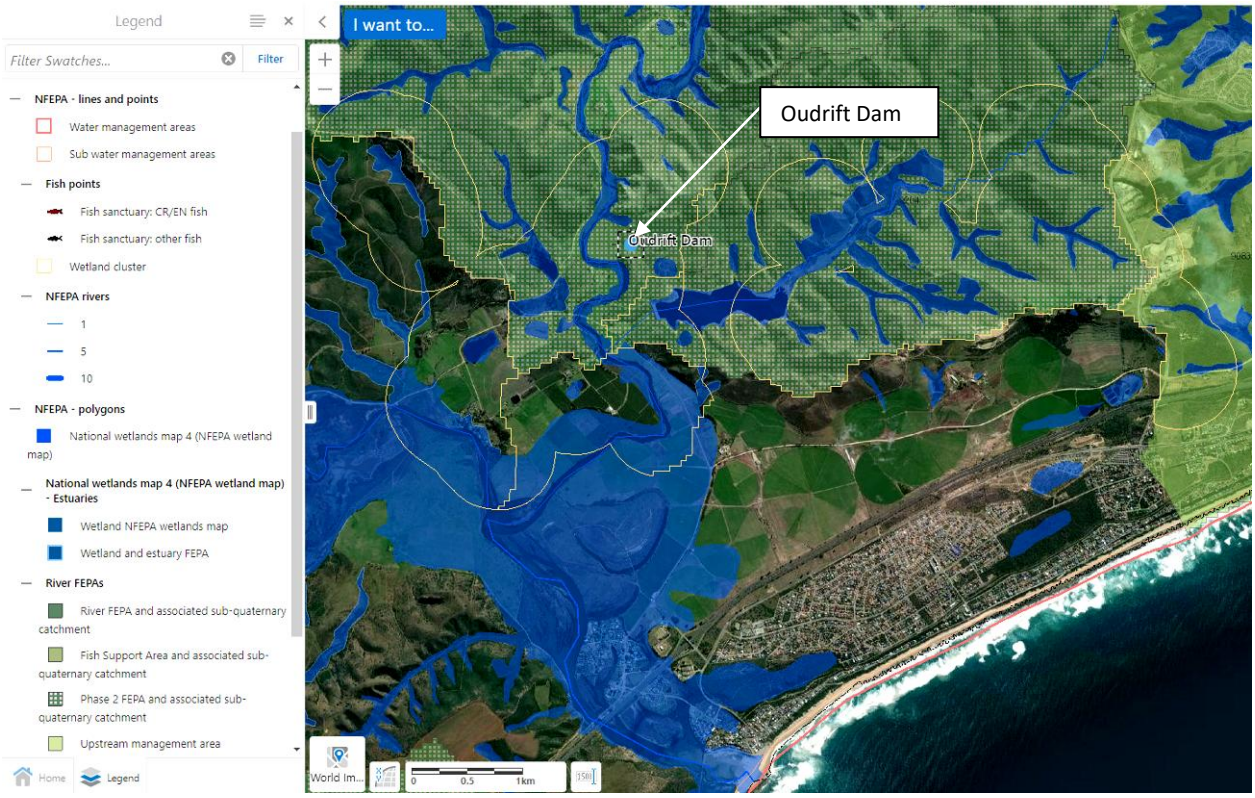


**Figure 9. Freshwater Ecosystem Priority Areas mapping for the area (SANBI BiodiversityGIS, 2022)**

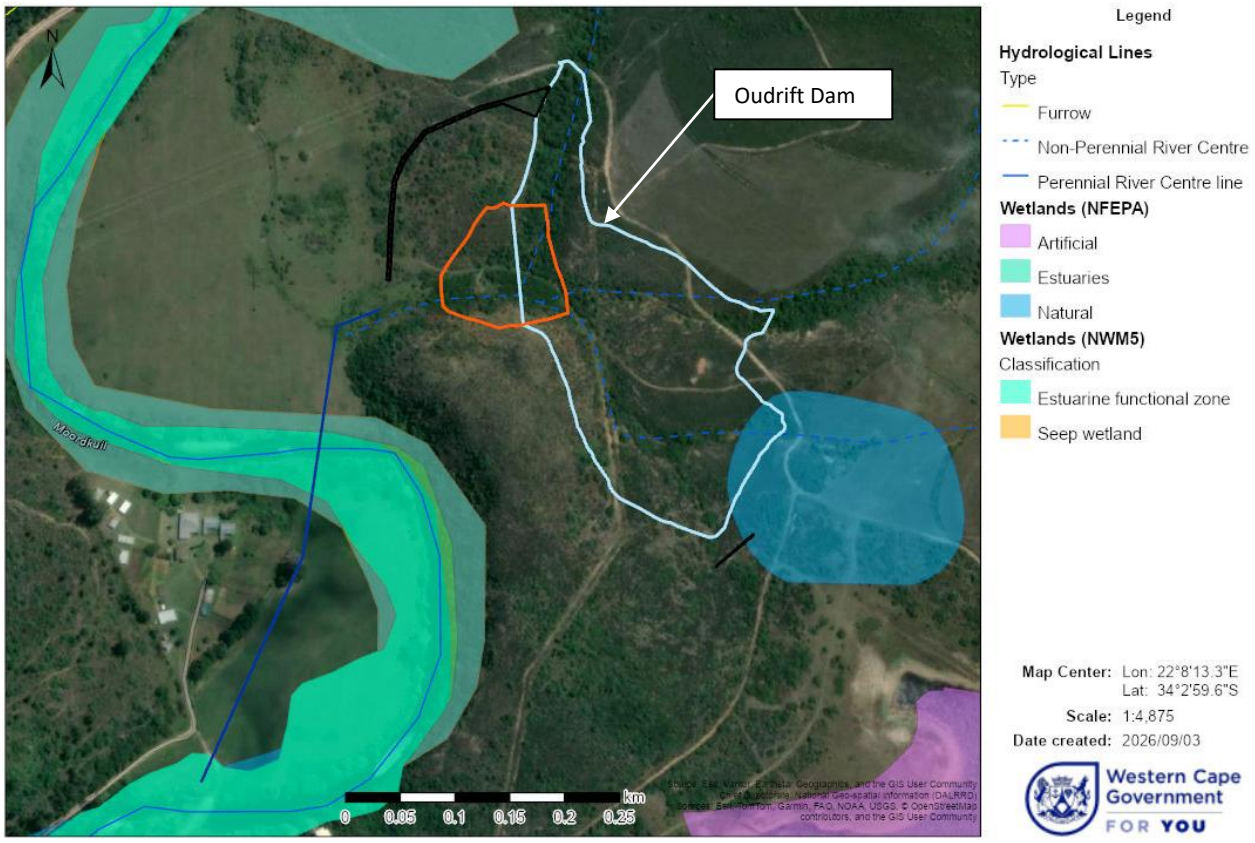


**Figure 10. National Wetland Map 5 for the area (CapeFarmMapper, 2026)**

The 2023 Western Cape Biodiversity Spatial Plan map aims to guide sustainable development by providing a synthesis of biodiversity information to decision-makers. The map indicates areas of land as well as aquatic features which must be safeguarded in their natural state if biodiversity is to persist and ecosystems are to continue functioning.

The river and much of the surrounding terrestrial vegetation are mapped as River and Terrestrial Critical Biodiversity Areas (CBAs)(Figure 11). The NFEPA Wetland mapped at the southern extent of the dam basin is not included in the mapped aquatic CBAs, nor is the wider river corridor mapped in the wetland mapping. CBAs are areas in a natural condition that are required to meet biodiversity targets, for species, ecosystems or ecological processes and infrastructure. These areas should be maintained in a natural or near-natural state, with no further loss of natural habitat. Degraded areas should be rehabilitated. Only low-impact, biodiversity-sensitive land uses are deemed to be appropriate within CBAs. Ground-truthing of the mapped wetland at the southern extent of the dam basin confirmed that, in agreement with the National Wetland Map 5 and 2023 WCBSP, no wetland occurs in this area.


**Figure 11. 2023 Western Cape Biodiversity Spatial Plan mapping for the area (CapeFarmMapper, 2026)**

## 5. ASSESSMENT OF THE MOORDKUIL RIVER AND MINOR TRIBUTARY

The Oudrift Dam site is located in a small tributary of the lower Moordkuil River that drains a small catchment of approx. 0.5 km$^2$ in the low hills to the east of the river. Three smaller non-perennial streams drain into the tributary, which then exists through a small valley to drain over the wider Moordkuil Valley floor. The vegetation cover within the tributary is still largely intact, comprising a thicket of indigenous trees and shrubs within the lower reaches of the watercourses (see section 4.4). The area indicated to comprise a NFEPA wetland in the southern extent of the proposed dam basin did not contain any wetland characteristic.

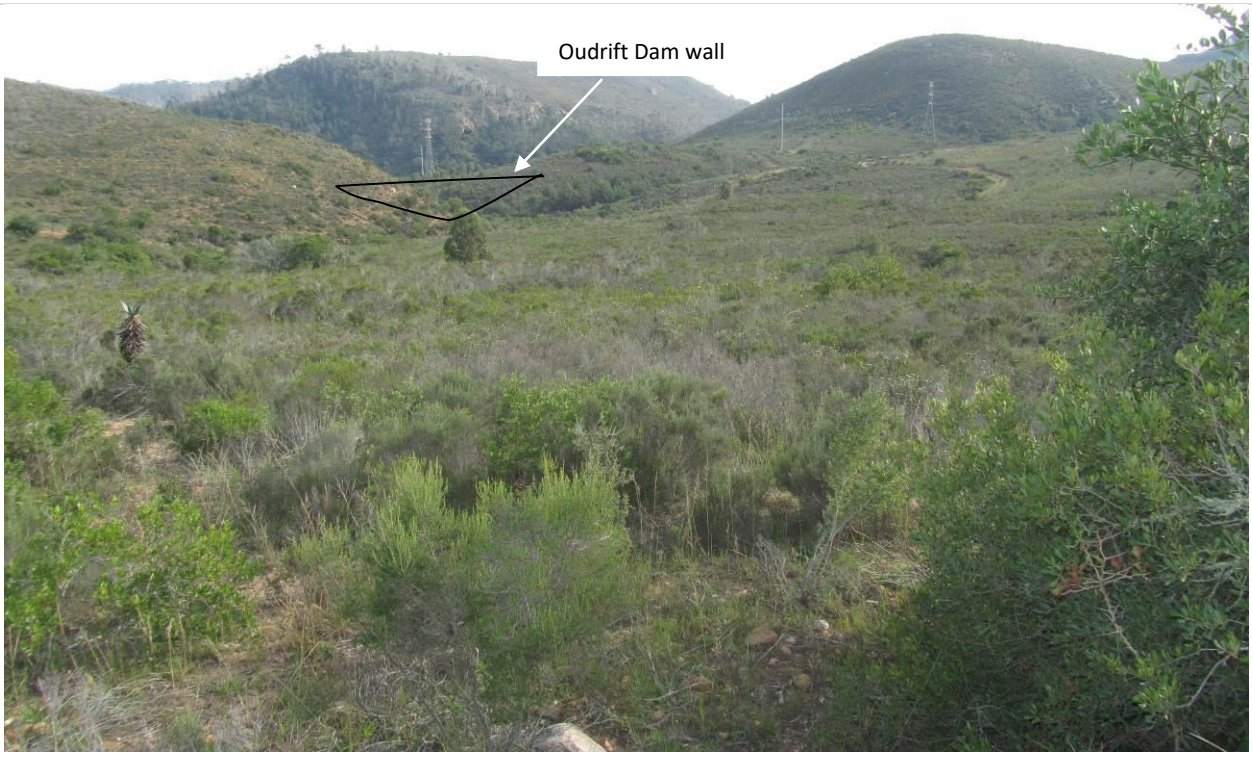


**Figure 12. View of the catchment of the small tributary that is proposed to be inundated by the Oudrift Dam. The image was taken in the southern extent, near the area mapped as NFEPA wetland, looking north-westwards towards where the dam wall is proposed (approximate location is indicated on the photograph)**

The Moordkuil River at the site of the abstraction from the river for the dam consists of a single channel with a narrow band of riparian vegetation, which comprises a mix of alien and indigenous vegetation.

**Figure 13. A view of the Moordkuil River and riparian zones at the existing abstraction pumps and near the proposed pipeline river crossing.**

Downstream of the site a low water crossing through the river results in an inundated area or pool at the site. While the NFEPA and Mossel Bay wetland mapping show wetland habitat associated with the river, the river at the site is narrow with a steep bank at the pump station. As a result, there is little wetland habitat at the site and only an assessment of the riverine habitat has been undertaken for this assessment. A small patch of wetland habitat

has developed along the road, associated with the leaking furrow that is not considered significant and was thus not assessed.

## 5.1. PAST MODIFICATION

Figure 14 below is an aerial image of the wider study area, taken in 1939. The extent of cultivation of the lower-lying areas was at that time already similar to that of today. The riparian zones of the Moordkuil River have also already mostly been removed due to agricultural practices extending up to the top of bank of the river. The Klipheuwel Dam and Church Dam had, however not yet been constructed. The catchment of the minor tributary does not appear to have been disturbed, only the lower reach in the Moordkuil Valley floor as is currently the case.

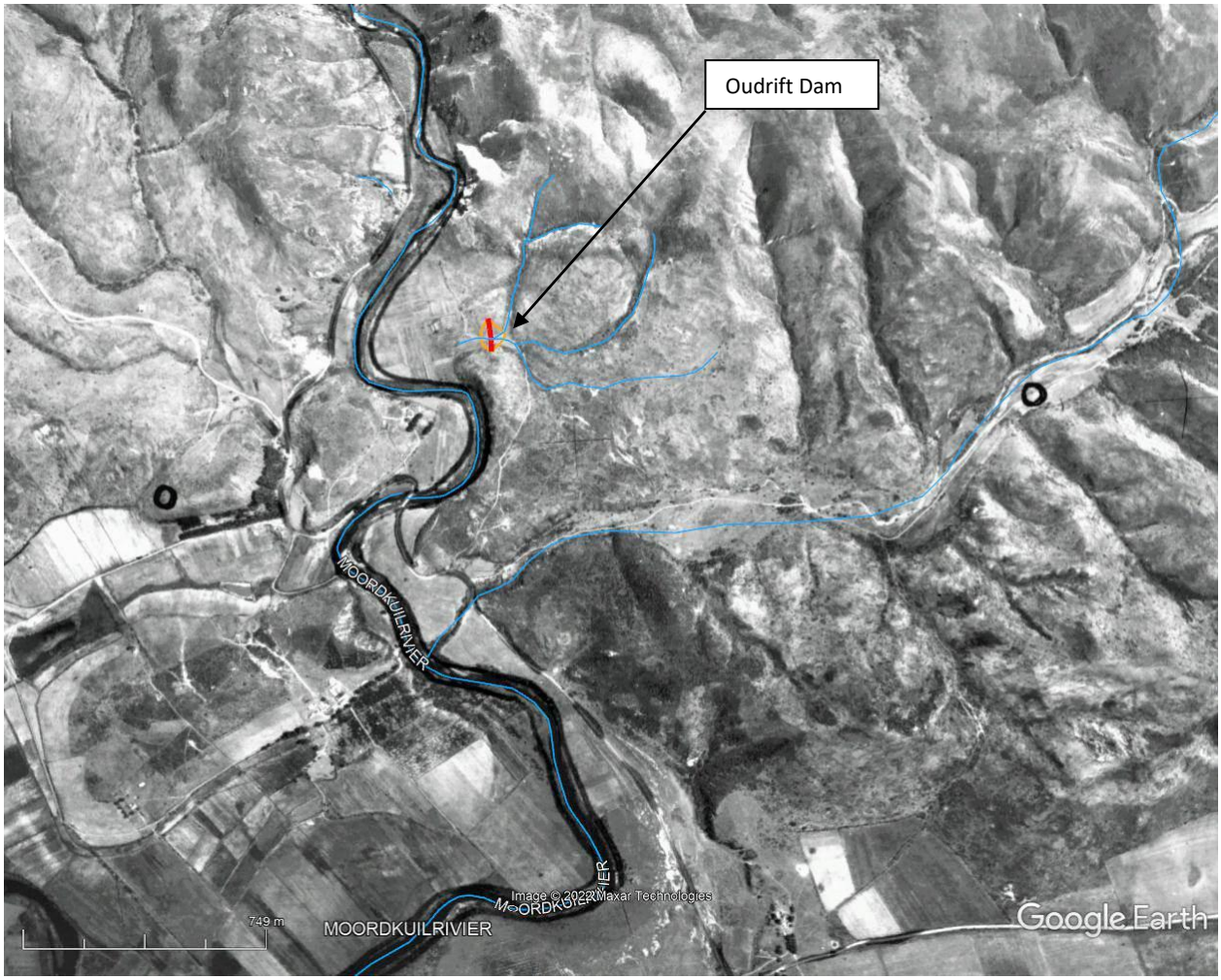


**Figure 14. Aerial image of the wider study area taken in 1939 and overlaid in Google Earth with the mapped present-day watercourses with the location of the proposed Oudrift Dam indicated**

Figure 15 provides an aerial view of the wider study area in 2000. The cultivated areas in the valley floor of the Moordkuil River had not expanded significantly; however, the large DWS Klipheuwel Dam, as well as some of the larger farm dams such as Church Dam had also been constructed. The catchment of the proposed Oudrift Dam was still largely undisturbed.

**Figure 15. An aerial image of the wider study area taken in 2000, with the location of the proposed Oudrift Dam indicated**

## 5.2. RIVER CLASSIFICATION

To assess the condition and ecological importance and sensitivity of the watercourses, it is necessary to understand how the watercourses might have appeared under unimpacted conditions. This is achieved through classifying rivers according to their ecological characteristics, in order that they can be compared to ecologically similar rivers.

River typing or classification involves the hierarchical grouping of rivers into ecologically similar units so that inter- and intra-river variation in factors that influence water chemistry, channel type, substratum composition and hydrology are best accounted for. Any comparative assessment of river condition should only be done between rivers that share similar physical and biological characteristics under natural conditions. Thus, the classification of rivers provides the basis for assessing river condition to allow comparison between similar river types. The primary classification of rivers is a division into Ecoregions. Rivers within an ecoregion are further divided into sub-regions.

**Ecoregions** are groups of rivers within South Africa which share similar physiography, climate, geology, soils and potential natural vegetation. For the purposes of this study, the ecoregional classification presented in DWAF (1999), which divides the country's rivers into ecoregions, was used. The Moordkuil River falls into the Southern Coastal Belt Ecoregion (Table 2).

**Sub-regions** (or geomorphological zones) are groups of rivers, or segments of rivers, within an ecoregion, which share similar geomorphological features, of which gradient is the most important. The use of geomorphological features is based on the assumption that these are a major factor in the determination of the distribution of the biota.

**Table 2. Characteristics of the Southern Coastal Belt Ecoregion (dominant types in bold).**

| Main Attributes | Southern Coastal Belt |
|---|---|
| Terrain Morphology | Plains; Low Relief;<br>Plains Moderate Relief;<br>Open Hills; Lowlands; Mountains; Moderate to High Relief;<br>**Closed Hills; Mountains; Moderate and High Relief** |
| Vegetation types | **South and South West Coast Renosterveld;** Central Mountain Renosterveld; Limestone fynbos; Mountain Fynbos; Laterite Fynbos;<br>Dune Thicket; Patches Afromontane Forest |
| Altitude | 0-700m a.m.s.l |
| MAP | 300 to 600mm |
| Rainfall seasonality | Winter to all year |
| Mean annual temp. | 10 to 20°C |
| Median annual runoff | 10 to >250mm for quaternary catchment |

## 5.3. SITE CHARACTERISATION

The geomorphological and physical characteristics of the Moordkuil River and its tributary within the study area are described in Table 3 based on the Site Characterisation assessments for the watercourses.

**Table 3. Geomorphological and Physical features of the Moordkuil River**

| Watercourse | Moordkuil | Minor tributary |
|---|---|---|
| Geomorphological Zone | Lowland River | Foothill stream |
| Lateral mobility | Semi-confined | Largely confined by topography |
| Channel dimension | Approx. 30m wide | <2m wide |
| Channel pattern | Single thread: low sinuosity | Single thread: low sinuosity |
| Channel type | Alluvial with cobbles/gravel | Gravel/sand |
| Channel modification | Moderately modified by surrounding agricultural land-use | Largely natural |
| Hydrological type | Perennial (present-day as a result of WWTW and storm water discharges to the river) | Non-perennial |
| Ecoregion | Southern Coastal Belt Ecoregion | Southern Coastal Belt Ecoregion |
| DWA catchment | K10F | K10F |
| Vegetation type | Groot Brak Dune Strandveld | Brandwag Fynbos-Renoster-Thicket |
| Rainfall region | Rainfall throughout the year but mostly in Winter | Rainfall throughout the year but mostly in Winter |

## 5.4. HABITAT INTEGRITY

The evaluation of Index of Habitat Integrity (IHI) provides a measure of the degree to which a river has been modified from its natural state. The methodology (DWAF, 1999) involves a qualitative assessment of the number and severity of anthropogenic perturbations on a river and the damage they potentially inflict upon the system. These disturbances include both abiotic and biotic factors, which are regarded as the primary causes of the degradation of a river. The severity of each impact is ranked using a six-point scale with 0 (no impact) to 25 (critical impact).

The IHI assessment is based on an evaluation of the impacts of two components of the river, the riparian zone and the instream habitat. The total scores for the instream and riparian zone components are then used to place the habitat integrity of both in a specific habitat category (Table 5). The criteria used to undertake the assessment and the assessment results are provided in Table 4.

**Table 4. Results for the Habitat Integrity assessment**

| Criteria | Moordkuil | Minor tributary | Criteria | Moordkuil | Minor tributary |
|---|---|---|---|---|---|
| Water Abstraction | 8 | 0 | Vegetation Removal | 11 | 6 |
| Flow Modification | 6 | 5 | Exotic Vegetation | 10 | 6 |
| Bed Modification | 8 | 4 | Bank Erosion | 7 | 7 |
| Channel Modification | 7 | 4 | Channel Modification | 8 | 5 |
| Water Quality | 7 | 5 | Water Abstraction | 7 | 0 |
| Inundation | 9 | 0 | Inundation | 8 | 0 |
| Exotic Macrophytes | 6 | 3 | Flow Modification | 6 | 5 |
| Exotic Fauna | 4 | 3 | Water Quality | 8 | 5 |
| Rubbish Dumping | 4 | 2 | | | |
| Instream Habitat Integrity Score | 73 | 88 | Riparian Zone Habitat Integrity Score | 61 | 83 |
| **Integrity Class** | **C** | **B** | **Integrity Class** | **C/D** | **B** |

**Table 5. Habitat Integrity categories (From DWAF, 1999)**

| Category | Description | Score (% of Total) |
|---|---|---|
| A | Unmodified, natural. | 90-100 |
| B | Largely natural with few modifications. A small change in natural habitats and biota may have taken place but the ecosystem functions are essentially unchanged. | 80-90 |
| C | Moderately modified. A loss and change of natural habitat and biota have occurred but the basic ecosystem functions are still predominantly unchanged. | 60-79 |
| D | Largely modified. Large loss of natural habitat, biota and basic ecosystem function occurred. | 40-59 |
| E | The loss of natural habitat, biota and basic ecosystem functions is extensive. | 20-39 |
| F | Modifications have reached a critical level with an almost complete loss of natural habitat and biota. Basic ecosystem functions may have been destroyed and changes are irreversible. | 0 |

The habitat integrity of the Moordkuil River at the site is moderately to largely modified primarily due to the direct impacts of the surrounding land use. The riparian habitat is slightly more impacted due to the removal of indigenous riparian vegetation and the subsequent growth of invasive alien plants.

The smaller tributary is still in a largely natural condition.

## 5.5. ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

EIS considers a number of biotic and habitat determinants surmised to indicate either importance or sensitivity. The determinants are rated according to a four-point scale (Table 6). The median of the resultant score is calculated to derive the EIS category (Table 7). The results for the streams and rivers assessed are given in Table 8.

**Table 6. Scale used to assess biotic and habitat determinants to indicate either importance or sensitivity**

| Scale | Definition |
|---|---|
| 1 | One species/taxon judged as rare or endangered at a local scale. |
| 2 | More than one species/taxon judged to be rare or endangered on a local scale. |
| 3 | One or more species/taxon judged to be rare or endangered on a Provincial/regional scale. |
| 4 | One or more species/taxon judged as rare or endangered on a National scale |

**Table 7. Ecological importance and sensitivity categories (DWAF, 1999)**

| EISC | General description | Range of median |
|---|---|---|
| Very high | Quaternaries/delineations considered unique on a national and international level based on unique biodiversity. These rivers are usually very sensitive to flow modifications and have no or only a small capacity for use. | >3-4 |
| High | Quaternaries/delineations considered unique on a national scale based on their biodiversity. These rivers may be sensitive to flow modifications but in some cases may have substantial capacity for use. | >2-≤3 |
| Moderate | Quaternaries/delineations considered unique on a provincial or local scale due to biodiversity. These rivers are not usually very sensitive to flow modifications and often have substantial capacity for use. | >1-≤2 |
| Low/ marginal | Quaternaries/delineations not unique on any scale. These rivers are generally not very sensitive to flow modifications and usually have substantial capacity for use. | ≤1 |

**Table 8. Results of the EIS assessment**

| Biotic Determinants | Moordkuil | Minor tributary |
|---|---|---|
| Rare and endangered biota | 3 | 1 |
| Unique biota | 3 | 1.5 |
| Intolerant biota | 3 | 1.5 |
| Species/taxon richness | 2.5 | 1 |
| Aquatic Habitat Determinants | | |
| Diversity of aquatic habitat types or features | 2.5 | 1 |
| Refuge value of habitat type | 2 | 1.5 |
| Sensitivity of habitat to flow changes | 2 | 1.5 |
| Sensitivity of flow related water quality changes | 2 | 1.5 |
| Migration route/corridor for instream & riparian biota | 3 | 1 |
| National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs | 2 | 1.5 |
| **EIS CATEGORY** | **High** | **Moderate/Low** |

The Moordkuil River is considered to be of high importance and sensitivity. This is largely due to the populations of indigenous Cape galaxias *Galaxias zebratus*, Cape kurper *Sandelia capensis* and Eastern Cape redfin *Pseudobarbus afer* as well as the unique and sensitive macroinvertebrate communities that the river supports. The smaller tributary is of moderate to low ecological importance and sensitivity.

## 5.6. RECOMMENDED ECOLOGICAL CATEGORY

According to the draft water resource classes and resource quality objectives recommended for the Breede Gouritz Water Management Area (Government Gazette No 42053 of 2018), the recommended or target ecological category for the Moordkuil River in Quaternary Catchment K10E, upstream of the site, is D (Largely modified). The Klein Brak Estuary downstream of the site, in Quaternary Catchment K10F is C (Moderately modified). It is recommended that the tributary should be at least managed in a moderately modified ecological condition.

Resource quality objectives have only been set for the Klein Brak Estuary which requires 77% of the mean annual runoff for environmental flow requirements (EWR). The monthly flow distribution of the EWR in the RQOs for the estuary is as follows (expressed as a percentage of the natural Mean Monthly Runoff (MMR) and Mean Annual Runoff (MAR)):

| Months | Oct | Nov | Dec | Jan | Feb | Mar | Apr | May | Jun | Jul | Aug | Sep | Annual |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| MMR/MAR (% Nat) | 77.4 | 77.4 | 75.1 | 71.7 | 70.2 | 75.8 | 77.9 | 78.5 | 78.0 | 78.1 | 79.5 | 78.8 | 77.0 |

## 5.7. ENVIRONMENTAL WATER REQUIREMENTS

This section provides a consideration of the environmental water requirement (EWR) or instream flow requirements associated with the proposed Oudrift Dam, where the dam is to be filled from an existing allocation out of the Moordkuil River. The catchment information at the site is provided in Table 9.

**Table 9: Catchment area and Mean Annual Runoff for the K10F quaternary catchment and the Oudrift Dam**

| Catchment | Catchment Area ($km^2$) | Mean Annual Precipitation (mm) | MAR ($10^6m^3$) |
|---|---|---|---|
| K10F (Cumulative for Moordkuil Catchment)) | 239[1] | 590[1] | 21.78[1] |
| Klein Brak Estuary (Cumulative for Moordkuil and Brandwag Catchments) | 372[1] | 545[1] | 50.67[2] |
| Oudrift Dam | 0.5 | 444[3] | 0.008[4] |

[1] WR2012
[2] DWS, 2014
[3] SA Atlas of Climatology and Agrohydrology (R.E. Schulze, 2009)
[4] Water Use License Application: Technical Report, Kleynhans, R. 2021

Given the small catchment and low runoff from the catchment of the Oudrift Dam, it is recommended that there is no EWR requirement for the dam. There is also only 250m of watercourse downstream of the dam that is already in a degraded condition that would be impacted by the impedance of flow. The water use on the property, including the monthly volumes of water stored and utilized from the dam, should be metered and recorded. The increase in storage on the properties provides an opportunity to reduce the abstraction of water from the Moordkuil River during the lower flowing periods (December to February and June/July), that the water can be taken during higher flow conditions. This practice should be implemented.

The ecological Reserve determination for the Klein Brak Reserve (DWS, 2014) states that:

*The estuary is on a **negative trajectory of change** and if the current (low) base flow regime, as well as certain non-flow related impacts on the system, continues as at present, the estuary is likely to move into a Category C/D, even a Category D. These issues therefore need to be addressed in order to maintain the REC (Category C) in future.*

*The following Ecological Specifications (EcoSpecs), and associated Thresholds of Potential Concern (TPCs) are representative of a **Category C for the Klein Brak Estuary**:*

| Component | EcoSpecs | Thresholds of Potential Concern |
|---|---|---|
| Hydrology | Maintain a flow regime to create the required habitat for birds, fish, macrophytes, microalgae and water quality | River inflow:<br>▪ Monthly river inflow < 0.4 $m^3/s$ persists for more than 30% of the time.<br>▪ Monthly river inflow < 0.15 $m^3/s$ persists for more than 15% of the time.<br>▪ Monthly river inflow drops to 0 $m^3/s$ |

The present mean annual runoff (MAR) into the Klein Brak Estuary was determined to be approximately 37.66 million $m^3$, 74% of the natural MAR of the estuary of 50.67 million $m^3$. As there are numerous relatively small farm dams as well as run-of-river abstractions that capture the medium to low flow/runoff from the catchment, the primary reduction in river inflow to the estuary relates mainly to low flows. A summary of the change in the Present State low flow conditions from the Reference Condition was calculated to be as follows:

| Percentile | Monthly flow ($m^3/s$) | | % Remaining |
|---|---|---|---|
| | Natural | Present | |
| 30% | 0.4 | 0.1 | 32.3 |
| 20% | 0.3 | 0.1 | 32.2 |
| 10% | 0.2 | 0.1 | 31.9 |
| % Similarity in low flows | | | 32.2 |

This indicates that there is a particular need to increase the lower flows to the estuary in the size class of up to $0.4m^3/s$. Below is a graph obtained from the DWS NIWIS showing the recent (2020 to 2025) measured flow in the lower Moordkuil River at Banff which is about 2 km from the municipal offtake point. From the graph, it can be seen that there are regular occurrences of high-flow events occurring in the river, the low/base flow in the river is often below the indicated normal range.

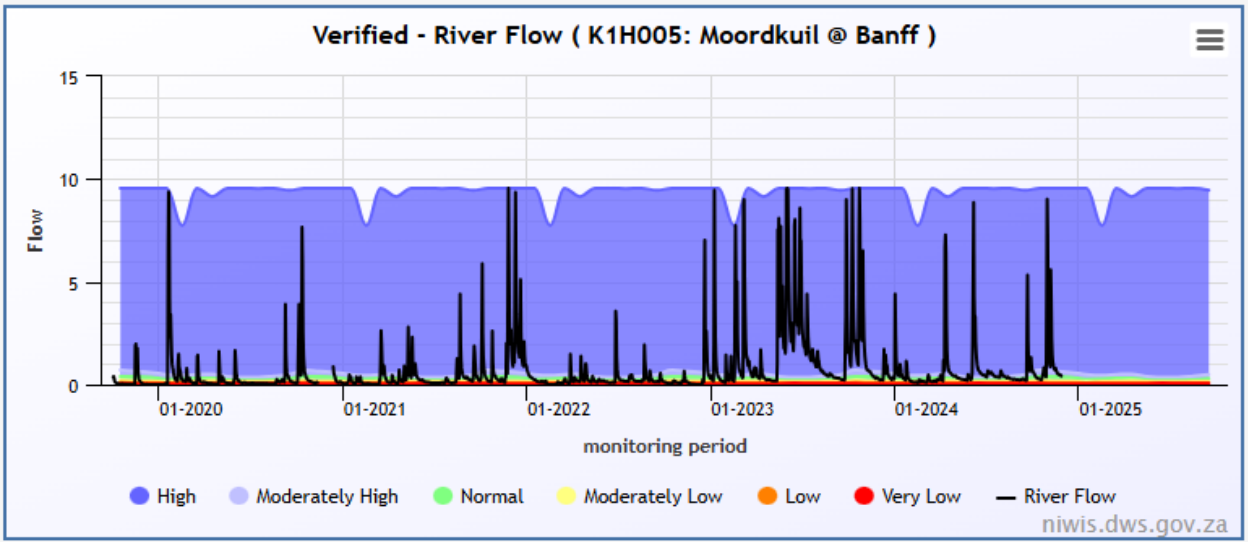


**Figure 16. Measured and verified river flow in the lower Moordkuil River at Banff for the period October 2019 to November 2024).**

It is thus recommended that water abstracted from the Moordkuil River to fill the dam preferably be taken from the Moordkuil River when the measured flow in the river at the DWS gauging weir K1H005 is above $0.4m^3/s$. The volume can be translated to a water level that can be read off a calibrated water level plate at the DWS gauging station. This abstraction practice would be in line with the RQOs set for the estuary.

With regards to the EWR for the proposed dam, it is rather recommended that a bypass pipe or channel be catered for at the dam that will allow for the runoff from the catchment to drain past the dam unimpeded and still maintain the lower reach of the watercourse within the Moordkuil Valley floor. The structure should be designed such that it needs very little intervention or management and should have sufficient capacity to convey the natural runoff for the dam's catchment.

## 6. LEGISLATIVE AND REGULATORY REQUIREMENTS

The proposed project needs to take cognisance of the legislative requirements, policies, strategies, guidelines and principles of the relevant regulatory documents of the Mossel Bay Municipality and the Garden Route District

Municipality, as well as the National Water Act (NWA) and the National Environmental Management Act (NEMA) as two pieces of legislation that specifically aim to limit the impact of activities on aquatic ecosystems.

## 6.1. NEMA AND ENVIRONMENTAL IMPACT ASSESSMENT REGULATIONS

National Environmental Management Act (NEMA) (No. 107 of 1998, as amended) is the overarching piece of legislation for environmental management in South Africa and includes provisions that must be considered to give effect to the general objectives of integrated environmental management. These provisions are contained in Section 24 (4)(a)(b) of the Act and will be considered during the Environmental Impact Assessment (EIA) process. Activities listed in terms of Chapter 5 of NEMA in Government Notice No. R. 983, 984 and 985, dated 4 December 2014, as amended, trigger a mandatory Basic Assessment, or even a full scoping EIA process, before development.

## 6.2. NATIONAL WATER ACT, 1998 (ACT NO. 36 OF 1998)

The purpose of the National Water Act, 1998 (NWA) is to provide a framework for the equitable allocation and sustainable management of water resources. Both surface and groundwater sources are redefined by the Act as national resources which cannot be owned by any individual, and rights which are not automatically coupled to land rights, but for which prospective users must apply for authorisation and register as users. The NWA also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources.

The Act aims to regulate the use of water and activities (as defined in Part 4, Section 21 of the NWA), which may impact on water resources through the categorisation of 'listed water uses' encompassing water abstraction and flow attenuation within catchments as well as the potential contamination of water resources, where the DWS is the administering body in this regard. Defined water use activities require the approval of DWS in the form of a General Authorisation or Water Use Licence authorisation. There are restrictions on the extent and scale of listed activities for which General Authorisations apply.

Section 22(3) of the National Water Act allows for a responsible authority (DWS) to dispense with the requirement for a Water Use Licence if it is satisfied that the purpose of the Act will be met by the grant of a licence, permit or authorisation under any other law.

The potential water uses associated with the proposed activities relate to:

21(b) – storage of water;

21(c) – impeding or diverting flow in a watercourse; and

21(i) – changing the bed, banks or characteristics of a watercourse.

### 6.2.1. GENERAL AUTHORISATION IN TERMS OF SECTION 39 OF THE NWA

The proposed works within and adjacent to the rivers, streams and wetland areas are deemed to be changing the characteristics of the associated freshwater ecosystems as well as impeding flow in the watercourses and therefore require authorisation. The authorisation of water use activities for Sections 21 (c) - change to the bed,

banks and characteristics of a watercourse and 21 (i)- impeding and diverting the flow, will need to be applied for. According to the preamble to Part 6 of the NWA, "*This Part established a procedure to enable a responsible authority, after public consultation, to permit the use of water by publishing general authorisations in the Gazette…*" *"The use of water under a general authorisation does not require a licence until the general authorisation is revoked, in which case licensing will be necessary…"*

The General Authorisations for Section 21 (c) and (i) water uses (impeding or diverting flow or changing the bed, banks or characteristics of a watercourse) as defined under the NWA have been revised (Government Notice R509 of 2016). Determining if a water use licence is required for these water uses is now associated with the risk of degrading the ecological status of a watercourse. A low risk of impact could be authorised in terms of a General Authorisations (GA).

A risk assessment (for Section 21(c) and (i) water uses only) has been undertaken to inform the water use authorisation process and is included for information purposes in this freshwater impact assessment report. An integrated water use licence application has been submitted to DWS for the proposed dam and a Water Use Licence (Licence No 02/K10F/BC/13298), DATED 29 November 2023, was issued for the construction of, and storage of water in Oudrift Dam.

### 6.2.2. REGULATIONS REQUIRING THAT A WATER USER BE REGISTERED, GN R.1352 (1999)

Regulations requiring the registration of water users were promulgated by the Minister of DWA in terms of provision made in section 26(1)(c), read together with Section 69 of the National Water Act, 1998. Section 26(1)(c) of the Act allows for registration of all water uses including existing lawful water use in terms of section 34(2). Section 29(1)(b)(vi) also states that in the case of a general authorisation, the responsible authority may attach a condition requiring the registration of such water use. The Regulations (Art. 3) oblige any water user as defined under section 21 of the Act to register such use with the responsible authority and effectively to apply for a Registration Certificate as contemplated under Art.7(1) of the Regulations.

## 7. FRESHWATER ASSESSMENT OF IMPACTS

The main potential impact on the proposed Oudrift Dam is associated with the physical impact of the dam within its basin. The footprint of the Oudrift Dam will inundate the riverine habitat of a minor unnamed tributary of the Moordkuil River. The instream habitat due to the seasonal to episodic flow in the stream has very limited instream aquatic vegetation but does include thicket indigenous trees and shrubs that are associated with the watercourses.

The downstream reach of the watercourse, below the proposed dam (approx. 200m before it joins the Moordkuil River), which would also potentially be impacted by the construction and operation of the dam as well as the proposed pipeline that will need to cross the river in this downstream reach, has also been significantly encroached on by the surrounding cultivation areas. The present ecological condition of the tributary is considered to be largely natural in its upper reaches but degrades to being significantly modified in its lower reaches. The tributary has an ecological importance and sensitivity of moderate to low. Approximately 750 m of cumulative watercourse length within the tributary would be inundated or modified by the proposed dam.

Short-term water quality impacts may occur during the construction of the dam which is of low significance and can easily be mitigated.

Longer-term flow impacts in the lower tributary are likely to occur as a result of the impedance of flow at the dam. Given the very low runoff generated by the catchment of the dam, these impacts are likely to be of a low significance. The dam has a potential positive flow impact on the lower Moordkuil River and estuary if the water abstracted to fill the dam primarily takes place largely during the higher flow period and in so doing reduces the current need to abstract when the flow in the river falls below 0.4$m^3$/s.

With regards to the proposed pipeline, the only aquatic ecosystem impact would be associated with the pipeline crossing through the Moordkuil River and its associated riparian zone. It is proposed that the pipe be weighted down with concrete collars or similar onto the riverbed at the crossing, but will be trenched or excavated in the riparian areas. The pipe is a 250 mm dia. PVC pipe, within a 2m wide servitude. This would be likely to result on only a limited and short term disturbance of the riparian zones that are already in a moderately to largely modified ecological condition. Longer term impacts would relate to any maintenance work should the pipeline need to be replaced for example if damaged during a high flow event. The disturbance of the riparian zone would also facilitate further invasion of the riparian zone with alien vegetation.

Similarly, the re-routed access road through the smaller tributary to above the full supply level of the dam, would result in limited disturbance of the watercourse and associated vegetation. The tributary is still in a largely natural ecological condition and has much sparser associated vegetation with little invasive alien plants that would be more susceptible to erosion at the new road crossing.

Significance of impacts without mitigation: **Medium to low negative** impact for the construction and operation phases.

Recommended mitigation: The loss of aquatic habitat within the tributary as a result of the construction of the dam should be mitigated by improving the ecological condition of the Moordkuil River at the pipeline crossing and water abstraction point for a distance of 5m to 10 m upstream and 50 m downstream of these points. Rehabilitation would through by removing invasive alien plants within the watercourse corridor and revegetating with indigenous vegetation. Ongoing control of invasive alien vegetation will be required within the areas disturbed by the construction activities.

Both the pipeline crossing of the Moordkuil River and the realigned road through the tributary should be rehabilitated after construction through reshaping of the surface to resemble the surrounding landscape and revegetating with suitable local indigenous vegetation. These areas in particular should be monitored and mitigated over the longer term for invasion with alien plants and for erosion.

The structure associated with the realigned access road that is placed in the tributary should not impede the flow in the watercourse nor concentrate of change the direction or the base level in the stream.

Considering the number of dams and infrastructure within the properties, it is recommended that a Maintenance Management Plan be approved for the property that allows for longer-term maintenance activities within the various watercourses.

To mitigate the potential water quality impacts, the construction of the dam should preferably take place in the drier months of the year (December to March and June/July). Good housekeeping measures should be in place within the construction site to ensure that any potential water quality contaminants are contained and managed on site.

In terms of the potential flow-related impacts associated with the dam, it is recommended that a bypass channel or pipeline be included in the design of the dam that will allow any runoff from the catchment to bypass the dam.

Water abstracted from the Moordkuil River to fill the Oudrift Dam should preferably primarily take place largely during the higher flow period (August to November) and when the measured flow in the river at the DWS gauging weir K1H005 is above 0.4m$^3$/s.

The water use on the property, including the monthly volumes of water stored and utilised from the dam should be metered and recorded.

Significance of impacts with mitigation: **Low negative** impact for the construction and operation phases.

Impact table for proposed Oudrift Dam:

| Construction Phase | |
|---|---|
| Potential impact and risk | Aquatic ecology |
| Nature | Loss/disturbance of aquatic habitat and water quality impacts at the proposed dam site |
| Extent and duration | Low Extent and High duration |
| Intensity/Severity | Medium to low |
| Consequence | Medium to low |
| Probability | Medium to high |
| Confidence | High |
| Irreplaceability | Medium to low |
| Reversibility | Low |
| Indirect impacts | Flow and water quality modification |
| Cumulative impacts before mitigation | Medium to low negative |
| Significance of impact before mitigation | Medium to low negative |
| Degree impact can be avoided | Low |
| Degree impact can be managed | Medium to high |
| Degree impact can be mitigated | Medium to high |
| Mitigation | • The loss of aquatic habitat within the tributary as a result of the construction of the dam should be mitigated by improving the ecological condition of the Moordkuil River at the abstraction point by removing invasive alien plants within the watercourse corridor and revegetating with indigenous vegetation.<br>• Both the pipeline crossing of the Moordkuil River and the realigned road through the tributary should be rehabilitated after construction through reshaping of the surface to resemble the surrounding landscape and revegetating with suitable local indigenous vegetation.<br>• The structure associated with the realigned access road that is placed in the tributary should not impede the flow in the watercourse nor concentrate of change the direction or the base level in the stream.<br>• To mitigate the potential water quality impacts, the construction of the dam should preferably take place in the drier months of the year (December to July). Good housekeeping measures should be in place within the construction site to ensure that any potential water quality contaminants are contained and managed on site. |
| Residual impacts | Modification of aquatic habitat |
| Cumulative impacts after mitigation | Low negative |
| Significance of impact after mitigation | Low negative |

| Operation Phase | |
|---|---|
| Potential impact and risk | Aquatic ecology |
| Nature | Modification of aquatic habitat as well as flow impacts |
| Extent and duration | Low Extent and high duration |
| Intensity/Severity | Medium |
| Consequence | Medium to Low |
| Probability | Medium |
| Confidence | High |
| Irreplaceability | Medium to low |
| Reversibility | Medium to low |
| Indirect impacts | Growth of alien invasive plants in riparian zones and wetlands and erosion of channel |

| | |
|---|---|
| Cumulative impacts before mitigation | Medium to Low negative due to existing poor ecological condition of watercourse and wetland |
| Significance of impact before mitigation | Medium Low negative |
| Degree impact can be avoided | Medium to low |
| Degree impact can be managed | Medium |
| Degree impact can be mitigated | Medium |
| Mitigation | • Control of invasive alien vegetation and erosion within watercourses<br>• Maintenance works in aquatic habitats and buffer areas in accordance with approved MMP/EMP<br>• In terms of the potential flow-related impacts associated with the dam, it is recommended that a bypass channel or pipeline be included in the design of the dam that will allow any runoff from the catchment to bypass the dam.<br>• Water abstracted from the Moordkuil River to fill the Oudrift Dam should preferably primarily take place largely during the higher flow period (August to November) and when the measured flow in the river at the DWS gauging weir K1H005 is above 0.4m³/s.<br>• The water use on the property, including the monthly volumes of water stored and utilized from the dam should be metered and recorded.<br>• Considering the number of dams and infrastructure within the properties, it is recommended that a Maintenance Management Plan be approved for the property that allows for longer term maintenance activities within the various watercourses. |
| Residual impacts | Modified aquatic habitat |
| Cumulative impacts after mitigation | Low negative e |
| Significance of impact after mitigation | Low negative |

The proposed alternative of enlargement of the Church Dam would result in more significant impacts in terms of loss/modification of aquatic habitat, water quality and flow impacts as the Church Dam is an instream dam in a larger tributary of the Moordkuil River with associated valley bottom wetland habitat in the watercourse upstream of the dam that would be inundated. The wetland habitat is mapped as aquatic CBA, NFEPA wetland and included in the National Wetland Map.

The No-Go Alternative would not result in the immediate impacts associated with the construction and operation of the Oudrift Dam but would also prevent the landowner from altering his abstraction practice to abstraction in the higher flow periods instead of a dependence on abstraction during the low flow period when the water is needed for irrigation.

## 8. RISK ASSESSMENT

A risk assessment was carried out for the proposed activities to inform the water use authorisation process as discussed in Section 6.2 and is summarised in Table 10. The full risk assessment matrix can be seen in Appendix A.

The risk rating of the proposed activities is considered to be moderate to low, provided the mitigation measures are implemented. An integrated water use licence application will need to be submitted for the proposed water use activities

**Table 10. Risk assessment for the proposed dam**

| | |
|---|---|
| **PROJECT:** | **PROPOSED OUDRIFT DAM AND ASSOCIATED INFRASTRUCTURE ON REM OF PTN 13 OF FARM KLIPHEUVEL NO 143, MOSSEL BAY** |
| **Name of assessor:** | Toni Belcher |
| **Date of assessment:** | 9/03/2026 |

**RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities (version 2.0): SUMMARY**

**[ASSUMING THAT ALL PROPOSED IMPACT CONTROL MEASURES ARE EFFECTIVELY IMPLEMENTED]**

| Phase | Activity | Impact | Potentially affected watercourses | Risk Rating |
|---|---|---|---|---|
| CONSTRUCTION | Construction of Oudrift Dam | Habitat, flow and water quality modification and disturbance during construction | Moordkuil Minor Tributary | M |
| | | Water quality and flow impacts as a result of construction activities | Moordkuil River | L |
| | Construction of associated infrastructure | Habitat, flow and water quality modification and disturbance during | Moordkuil River | L |
| | | Habitat, flow and water quality modification and disturbance during construction | Moordkuil Minor Tributary | L |
| OPERATIONAL | Maintenance of water supply scheme and associated infrastructure | Habitat disturbance and water quality impacts during maintenance | Moordkuil River | L |
| | | Habitat disturbance and water quality impacts during maintenance | Moordkuil Minor Tributary | L |
| | Operation of water supply scheme | Habitat modification, flow and water quality impacts due to operation of scheme | Moordkuil River | L |
| | | Habitat modification, flow and water quality impacts due to operation of scheme | Moordkuil Minor Tributary | M |

## 9. CONCLUSIONS AND RECOMMENDATIONS

The tributary of the Moordkuil River in which the Oudrift Dam is proposed is in a largely natural condition and of moderate to low ecological importance and sensitivity. The larger Moordkuil River from which the water is to be abstracted (an existing water use allocation) is in a moderately to largely modified state as a result of surrounding land-use activities. The river does, however, have conservation value and is considered of high ecological importance and senstivity. The river at the site is mapped as a critical biodiversity area and an NFEPA wetland. The findings of the site verification assessment are largely in agreement with the Screening Tool Aquatic Biodiversity Sensitivity mapping for the site.

The largest impact would be the loss of aquatic habitat within the proposed dam footprint. Additional impacts would result from a change to the flow and quality within the watercourse downstream of the dam site. There are only 200m of watercourse downstream of the dam that is already in a degraded condition that would be impacted by the impedance of flow. A low negative impact is expected for the construction and operation phases if adequately mitigated.

The loss of aquatic habitat within the tributary as a result of the construction of the dam should be mitigated by improving the ecological condition of the Moordkuil River at the pipeline crossing and water abstraction point for a distance of 5m to 10 m upstream and 50 m downstream of these points. Rehabilitation would through by

removing invasive alien plants within the watercourse corridor and revegetating with indigenous vegetation. Ongoing control of invasive alien vegetation will be required within the areas disturbed by the construction activities.

With regards to the proposed pipeline, the only aquatic ecosystem impact would be associated with the pipeline crossing through the Moordkuil River and its associated riparian zone. This would be likely to result on only a limited and short term disturbance of the riparian zones. Limited longer term impacts would relate to any maintenance work. The disturbance of the riparian zone would also facilitate further invasion of the riparian zone with alien vegetation. Similarly, the re-routed access road would result in limited disturbance of the watercourse and associated vegetation. The tributary is still in a largely natural ecological condition and has much sparser associated vegetation with little invasive alien plants that would be more susceptible to erosion at the new road crossing.

Both the pipeline crossing of the Moordkuil River and the realigned road through the tributary should be rehabilitated after construction through reshaping of the surface to resemble the surrounding landscape and revegetating with suitable local indigenous vegetation. These areas in particular should be monitored and mitigated over the longer term for invasion with alien plants and for erosion. The structure associated with the realigned access road that is placed in the tributary should not impede the flow in the watercourse nor concentrate of change the direction or the base level in the stream.

To mitigate the potential water quality impacts, the construction of the dam should preferably take place in the drier months of the year (December to July). Good housekeeping measures should be in place within the construction site to ensure that any potential water quality contaminants are contained and managed on-site.

The dam has a potential positive flow impact on the lower Moordkuil River and estuary if the water abstracted to fill the dam primarily takes place largely during the higher flow period and in so doing reduces the current need to abstract when the flow in the river falls below 0.4$m^3$/s. It is thus recommended that water abstracted from the Moordkuil River to fill the Oudrift Dam should preferably primarily take place largely during the higher flow period (August to November) and when the measured flow in the river at the DWS gauging weir K1H005 is above 0.4$m^3$/s. This volume can be translated to a water level that can be read off a calibrated water level plate at the DWS gauging station. This abstraction practice would be in line with the RQOs set for the estuary.

Given the small catchment and low runoff from the catchment of the Klipfontein Dam, there is no recommended EWR requirement for the dam. It is rather recommended that a bypass channel or pipeline be included in the design of the dam that will allow any runoff from the catchment to bypass the dam. The structure should be designed such that it needs very little intervention or management and should have sufficient capacity to convey the natural runoff for the dam's catchment.

The water use on the property, including the monthly volumes of water stored and utilised from the dam should be metered and recorded.

Considering the number of dams and infrastructure within the properties, it is recommended that a Maintenance Management Plan be approved for the property that allows for longer-term maintenance activities within the various watercourses.

The risk rating of the proposed activities is considered to be moderate to low, provided the mitigation measures are implemented. An integrated water use licence application will need to be submitted for the proposed water use activities.

Given the findings of this aquatic biodiversity assessment, there would be no reason why the proposed dam could not be approved with the recommended mitigation measures.

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# APPENDIX A: RISK ASSESSMENT

**PROJECT:** PROPOSED OUDRIFT DAM AND ASSOCIATED INFRASTRUCTURE ON REM OF PTN 13 OF FARM KLIPHEUVEL NO 143, MOSSEL BAY

**RISK ASSESSMENT MATRIX for Section 21 (c) and (i) Water Use activities - Version 2.0**

**Name of Assessor:** Toni Belcher **Signature:**

**SACNASP Registration Number:** 5681 **Date:** 9/03/2026

Risk to be scored for all relevant phases of the project (**factoring in specified control measures**). MUST BE COMPLETED BY SACNASP PROFESSIONAL MEMBER REGISTERED IN AN APPROPRIATE FIELD OF EXPERTISE.

| Phase | Activity | Impact | Potentially affected watercourses | | | Intensity of Impact on Resource Quality | | | | | Overall Intensity (max = 10) | Spatial scale (max = 5) | Duration (max = 5) | Severity (max = 20) | Importance rating (max = 5) | Consequence (max = 100) | Likelihood (Probability) of impact | Significance (max = 100) | Risk Rating | Confidence level |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Abiotic Habitat (Drivers) | | | Biota (Responses) | | | | | | | | | | | |
| | | | Name/s | PES | Ecological Importance | Hydrology | Water Quality | Geomorph | Vegetation | Fauna | | | | | | | | | | |
| CONSTRUCTION | Construction of Oudrift Dam | Habitat, flow and water quality modification and disturbance during construction | Moordkuil Minor Tributary | B | Moderate | 3 | 3 | 3 | 3 | 3 | 6 | 2 | 4 | 12 | 3 | 36 | 100% | 36 | M | High |
| | | Water quality and flow impacts as a result of construction activities | Moordkuil River | C/D | High | 1 | 1 | 0 | 0 | 0 | 2 | 1 | 4 | 7 | 4 | 28 | 40% | 11.2 | L | High |
| | Construction of associated infrastructure | Habitat, flow and water quality modification and disturbance during construction | Moordkuil River | C/D | High | 1 | 2 | 2 | 2 | 2 | 4 | 1 | 2 | 7 | 4 | 28 | 80% | 22.4 | L | High |
| | | Habitat, flow and water quality modification and disturbance during construction | Moordkuil Minor Tributary | B | Moderate | 2 | 2 | 2 | 2 | 2 | 4 | 1 | 2 | 7 | 3 | 21 | 80% | 16.8 | L | High |
| OPERATIONAL | Maintenance of water supply scheme and associated infrastructure | Habitat disturbance and water quality impacts during maintenance | Moordkuil River | C/D | High | 1 | 2 | 1 | 1 | 1 | 4 | 1 | 1 | 6 | 4 | 24 | 40% | 9.6 | L | High |
| | | Habitat disturbance and water quality impacts during maintenance | Moordkuil Minor Tributary | B | Moderate | 1 | 2 | 1 | 1 | 1 | 4 | 1 | 1 | 6 | 3 | 18 | 40% | 7.2 | L | High |
| | Operation of water supply scheme | Habitat modification, flow and water quality impacts due to operation of scheme | Moordkuil River | C/D | High | 2 | 1 | 1 | 1 | 1 | 4 | 2 | 4 | 10 | 4 | 40 | 40% | 16 | L | High |
| | | Habitat modification, flow and water quality impacts due to operation of scheme | Moordkuil Minor Tributary | B | Moderate | 3 | 2 | 3 | 3 | 2 | 6 | 2 | 4 | 12 | 3 | 36 | 100% | 36 | M | High |