

**FRESHWATER ASSESSMENT FOR THE PROPOSED EXPANSION OF A BORROW PIT ON  
PORTION 1 OF THE FARM BLOEDZUIGERFONTEIN NOORD 782 NEAR CALVINIA**

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**Prepared for:**

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## EXECUTIVE SUMMARY

*SANRAL is proposing the further expansion of the borrow pit on Portion 1 of the Farm Bloedzuigerfontein Noord 782 which would entail further excavation in phases to serve as a long term source of road building material for the routine maintenance and repair as well as possible further development of the provincial and national road network in the area. The borrow pit is situated along the R364 approximately 6 km south-west of the R27 and within the catchment of the Oorlogskloof River in the Olifants/Doring River System. A number of small drainage lines are located within the area in which the borrow pit is to be expanded. These drainage lines form the upper reaches of a minor tributary of the Oorlogskloof River.*

*The tributary of the Oorlogskloof River is in a moderately modified ecological state, with low ecological importance and sensitivity. The expected impacts of the proposed activities are likely to be of a very low significance and limited largely to the borrow pit site. Provided that the following recommended mitigation measures are implemented the significance of the impact is expected to be very low to negligible:*

- The drainage lines should be diverted around the proposed expanded borrow pit site such that these channels will not be disturbed again during the further expansion of the pit. The re-established channel should be properly shaped and should be monitored and managed to make sure that the channel(s) at and downstream of the site within the property do not become invaded with invasive alien plants.*
- The diverted drainage feature(s) should be kept free of stockpiled material and rubble from the borrow pit. Where necessary, the potential for erosion of the drainage may need to be addressed. Once use of the borrow pit has ceased, the site should be rehabilitated and shaped to allow for the revegetation of the site and to reduce the risk for erosion of the drainage channels after activities at the site have ceased.*
- Contaminated runoff from the borrow pit should be prevented from entering the drainage features at the site. All materials on the site should be properly stored and contained. Disposal of waste from the site should also be properly managed. Ablution facilities should be provided at the borrow pit that are located away from the drainage features and regularly serviced. These measures should be addressed, implemented and monitored in terms of the Environmental Management Plan for the construction phase.*

*It is likely that the proposed activity will fall within the listed activities that can be Generally Authorised at the Western Cape Regional Office of the Department of Water and Sanitation however the regional office will need to be approached for comment in this regard.*

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## 1. BACKGROUND

A borrow pit on Portion 1 of the Farm Bloedzuigerfontein Noord 782, known as Merino, situated along the R364 approximately 6 km south-west of the R27 has been used for the strengthening (partial reconstruction) of National Route R27 Sections 10 & 11 between the Western/Northern Cape border (km 40.0) and Calvinia (km 70.0). SANRAL is proposing the further expansion of the borrow pit on the same property which would entail further excavation in phases to serve as a long term source of road building material for the routine maintenance and repair as well as possible further development of the provincial and national road network in the area.

CCA Environmental (Pty) Ltd (CCA) has been appointed to act as the independent environmental consultant to undertake the necessary process to apply for expansion of the borrow pit in terms of the Mineral and Petroleum Development Resources Act, 2002 and associated public consultation process for the proposed project. This freshwater report is to inform the freshwater component of the Amendment Environmental Management Programme (EMP) to be compiled for this purpose.

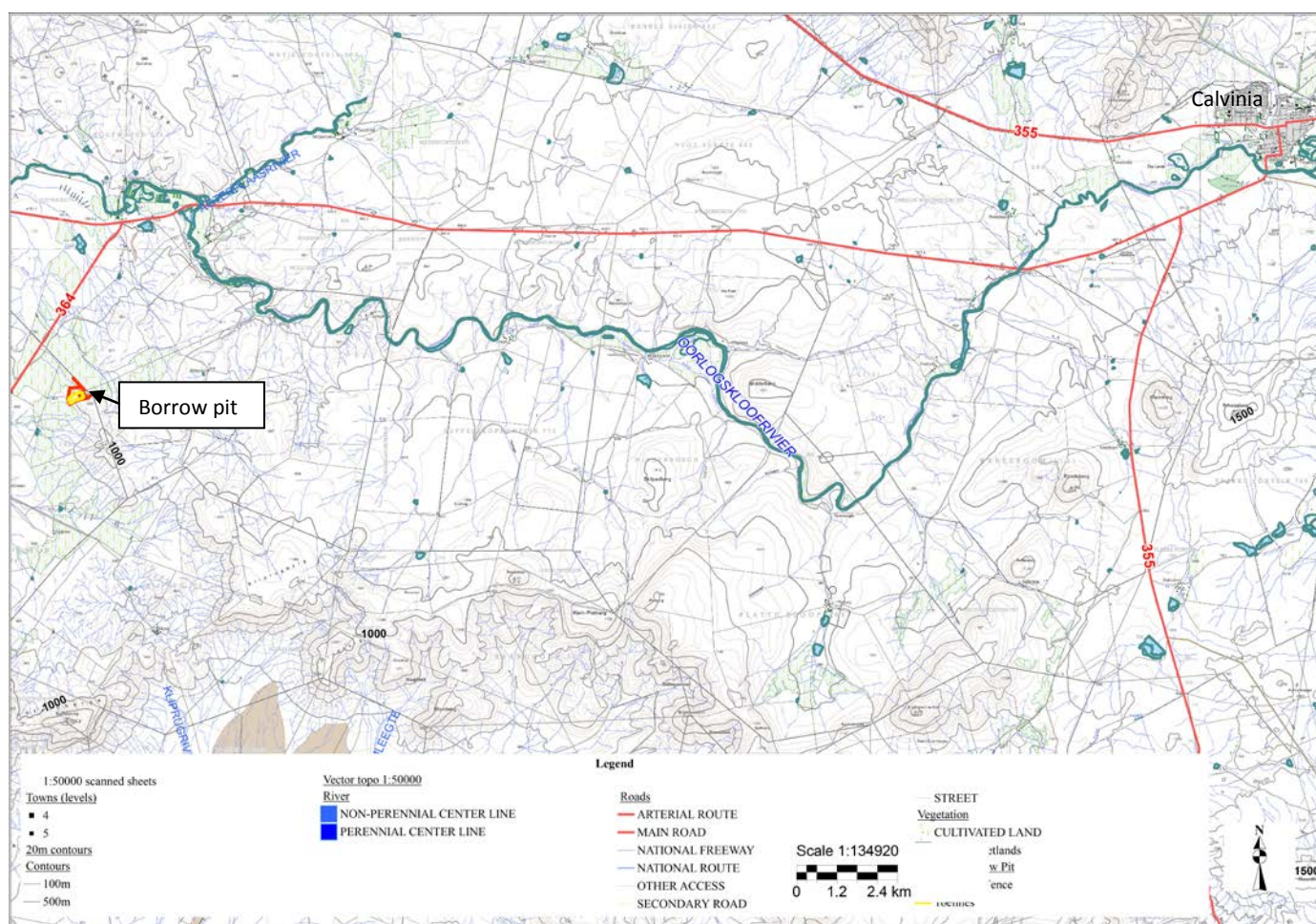


Figure 1. Topographical map (3119 AD, BC, BD, CB, DA & DB) showing the locality of the borrow pit

## 2. TERMS OF REFERENCE

The agreed upon scope of works for the freshwater assessment is provided below:

### *Task 1: Freshwater impact Assessment*

- 1.1. Literature survey and project initialisation;
- 1.2. Field assessment to determine the impact on freshwater resources;
- 1.3. Compile freshwater assessment report; and
- 1.4. Review of report and liaison with client.

## 3. APPROACH TO THE STUDY AND STUDY LIMITATIONS AND ASSUMPTIONS

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 March 2014. During the field visit, the characterisation, mapping and integrity assessments of the freshwater features were assessed. This information/data was used to inform the potential impact of the proposed activities as well as the recommended mitigation measures.

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

- Analysis of the freshwater ecosystems was undertaken according to nationally developed methodologies and was undertaken at a rapid level which was considered a suitable level of evaluation for this freshwater impact assessment.

## 4. USE OF THIS REPORT

This report reflects the professional judgment of its author. 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 author.

## 5. OVERVIEW OF THE PROPOSAL

### 5.1. OVERVIEW OF THE STUDY AREA

The borrow pit proposed to be extended lies approximately 35km south-west of Calvinia in the Northern Province (Figure 2). The study area lies on the Onder-Bokkeveld Plateau along the wide Oorlogskloof River Valley. The surrounding landscape consists largely of natural and open areas with some livestock farming and the towns of Nieuwoudtville and Calvinia. There is an existing borrow pit at the site that has significantly transformed the immediate area.

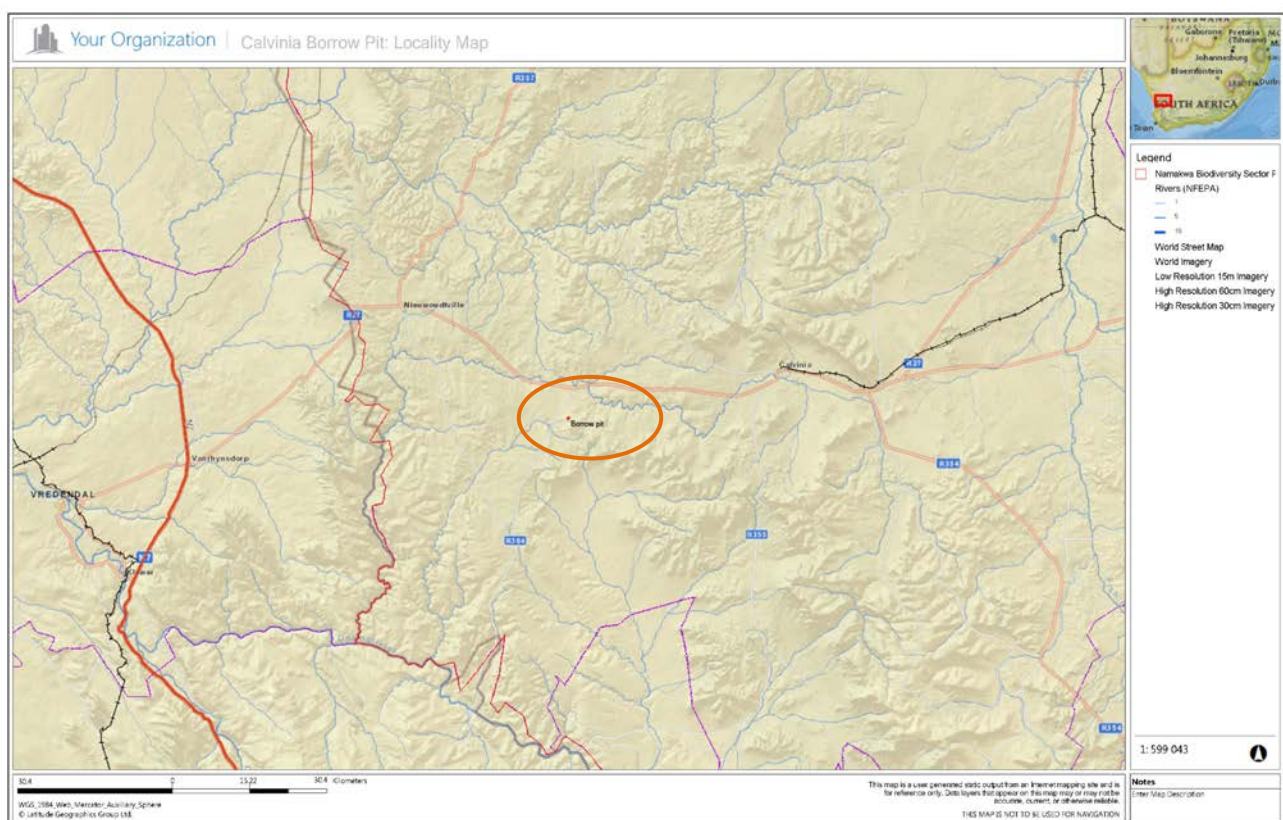


Figure 2. Locality map of the study area (SANBI Biodiversity GIS, 2014)

### 5.2. ACTIVITY DESCRIPTION

The existing borrow pit area covers an area of 7540 m<sup>2</sup> in the north-eastern corner of the excavation boundary with a crusher and stockpile area located to the north of the pit. It is proposed to expand the pit in four phases or areas as shown in Figure 3 and indicated in Table 1. The proposed expansion is to take place to the south and west of the existing pit (Figure 3). Topsoil and overburden stockpiles will be placed on the north-western extent of the excavation boundary.

Table 1. Proposed expansion of the borrow pit area

Expansion Area	Surface Area (m <sup>2</sup> )	Total cut volume (m <sup>3</sup> )
Existing Area 1	7540	176827.6
Expansion Area 2	11590	371133.3
Expansion Area	7660	146526.2
Expansion Area	7310	145770
Expansion Area	13520	301233.5
<b>Total</b>	<b>47620</b>	<b>1141490.6</b>

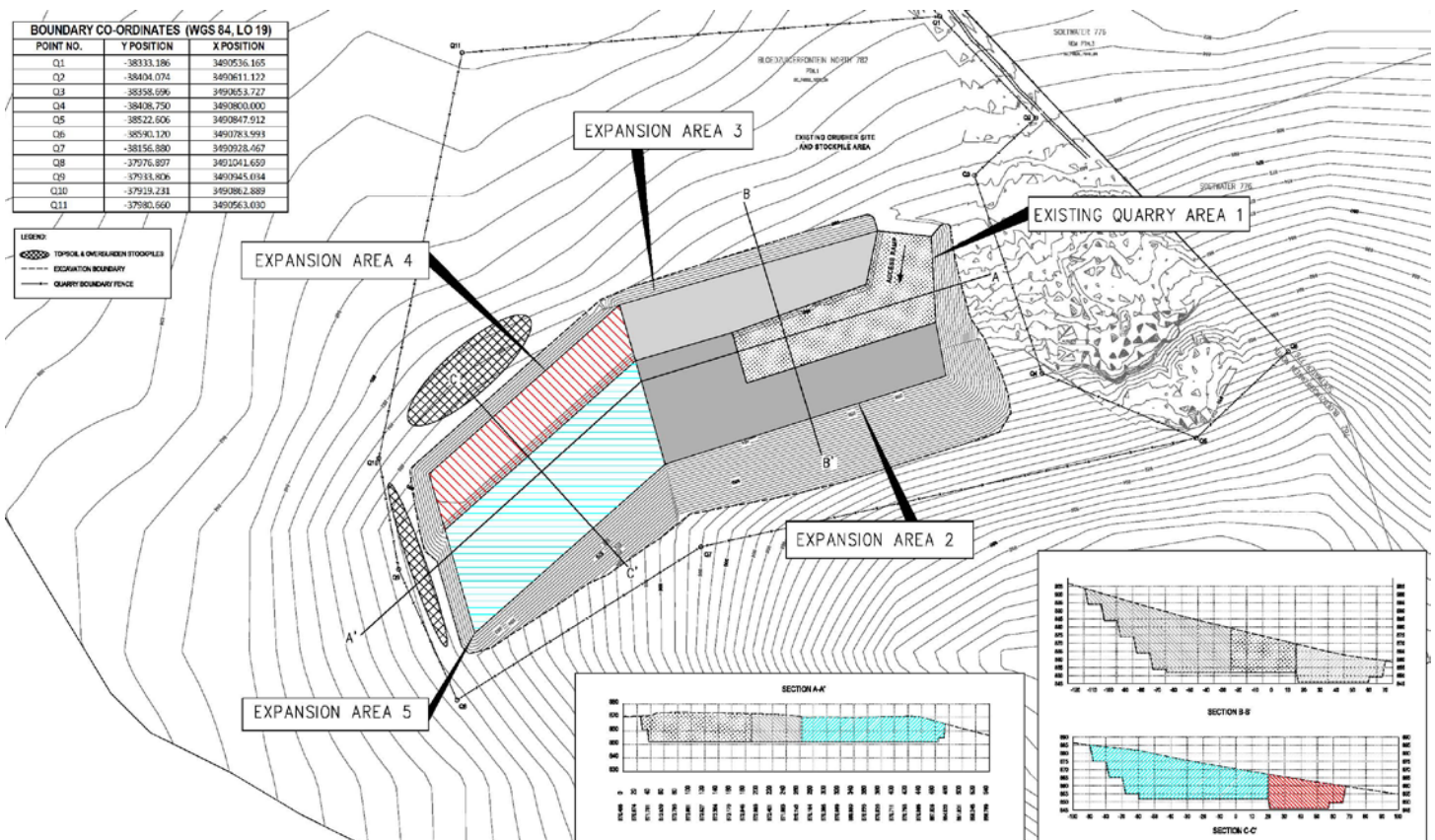


Figure 3. The proposed expansion to the borrow pit (Aurecon, 2014)

### 5.3. LEGAL REQUIREMENTS

The following Acts, regulations and ordinances are applicable to the development:

#### 5.3.1. MINERAL AND PETROLEUM RESOURCES DEVELOPMENT ACT, 2002 (ACT NO. 28 OF 2002)

An objective of this Act is to “give effect to section 24 of the Constitution by ensuring that the nation’s mineral and petroleum resources are developed in an orderly and ecologically sustainable manner while promoting justifiable social and economic development”. The principles set out in section 2 of the National Environmental Management Act, 1998 (Act No.107 of 1998) apply to all prospecting and mining operations



and serve as guidelines for the implementation of the environmental requirements of this Act. No person may undertake any prospecting or mining related operations for any mineral or petroleum without an environmental authorisation or the applicable mining / exploration permit or right.

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

The purpose of the National Water Act 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 to which are not automatically coupled to land rights, but for which prospective users must apply for authorisation and register as users. The National Water Act also provides for measures to prevent, control and remedy the pollution of surface and groundwater sources.

#### 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 the Department of Water Affairs (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.

#### GENERAL AUTHORISATION IN TERMS OF S. 39 OF THE NATIONAL WATER ACT, GN R 1199 OF 2009

Government Notice R1199 was issued as a revision of the General Authorisations (No. 1191 of 1999) for Section 21 (c) and (i) water uses as defined under the National Water Act (Act 36 of 1998). The revision was published and came into effect on 2009/12/18. According to the preamble to Part 6 of the National Water Act, *“This Part establishes 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...”*

It is likely that the proposed activity will fall within the listed activities that can be Generally Authorised at the Western Cape Regional Office of the Department of Water and Sanitation however the regional office will need to be approached for comment in this regard.

### 5.3.3. CONSERVATION OF AGRICULTURAL RESOURCES ACT (ACT 43 OF 1983)

The objective of this Act are to provide for the conservation of the natural agricultural resources of the Republic by the maintenance of the production potential of land, by the combating and prevention of erosion and weakening or destruction of the water sources, and by the protection of the vegetation and the combating of weeds and invader plants. The Act makes provision for the Minister to prescribe control measures, which need to be adhered to by landowners to whom they apply. These control measures can relate to activities such as the cultivation of virgin soil, the irrigation of land, the utilization and protection of vleis, marshes, water sponges, water courses and water sources, the regulating of the flow pattern of run-off water, and the utilization and protection of the vegetation. Control measures may contain prohibitions and obligations, but also make provision for exemptions to be granted and for different control measures to be applied to different forms of land use. A landowner who fails to comply with any control measure is guilty of an offence.

### 5.3.4. NATURE AND ENVIRONMENTAL CONSERVATION ORDINANCE (ORDINANCE 19 OF 1974)

The Nature and Environmental Conservation Ordinance makes provision for the Western Cape Nature Conservation Board (CapeNature) to take action to preserve endangered flora and fauna on private lands. Under this Ordinance, CapeNature may “take such measures as it may consider necessary for the preservation, cultivation and propagation on such land of such species or flora”. CapeNature may also authorise other parties to enter the land to take whatever steps are deemed necessary to preserve, cultivate or propagate endangered species or flora.

## 6. AQUATIC SYSTEMS IN THE STUDY AREA

### 6.1. DESCRIPTION OF THE STUDY SITE

#### 6.1.1. PHYSICAL CHARACTERISTICS

The site is located on the Nieuwoudtville/Onder-Bokkeveld Plateau between Calvinia and Nieuwoudtville. The area lies within the Olifants-Doring River catchment, with the Oorlogskloof River and its tributaries flowing parallel to the R27 road approximately 5km north of the site (Figure 4). The existing borrow pit lies on the north-western slope of a low hill. The surrounding topography is relatively flat within the wide river valley of the Oorlogskloof River. The Hantams Mountains lie to the east of the plateau and the escarpment on the Bokkeveld Mountains lies to the west.



Figure 4. A view of the surrounding landscape to the north of the site

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#### 6.1.2. CLIMATE

Calvinia has a Mediterranean climate and normally receives about 146mm of rain per year mostly during winter. The area has its lowest rainfall (0mm) in February and the highest (27mm) in June (Figure 5). The average midday temperatures for Calvinia range from 17°C in July to 29°C in January. The region is the coldest during July when the mercury drops to below 3°C on average during the night.

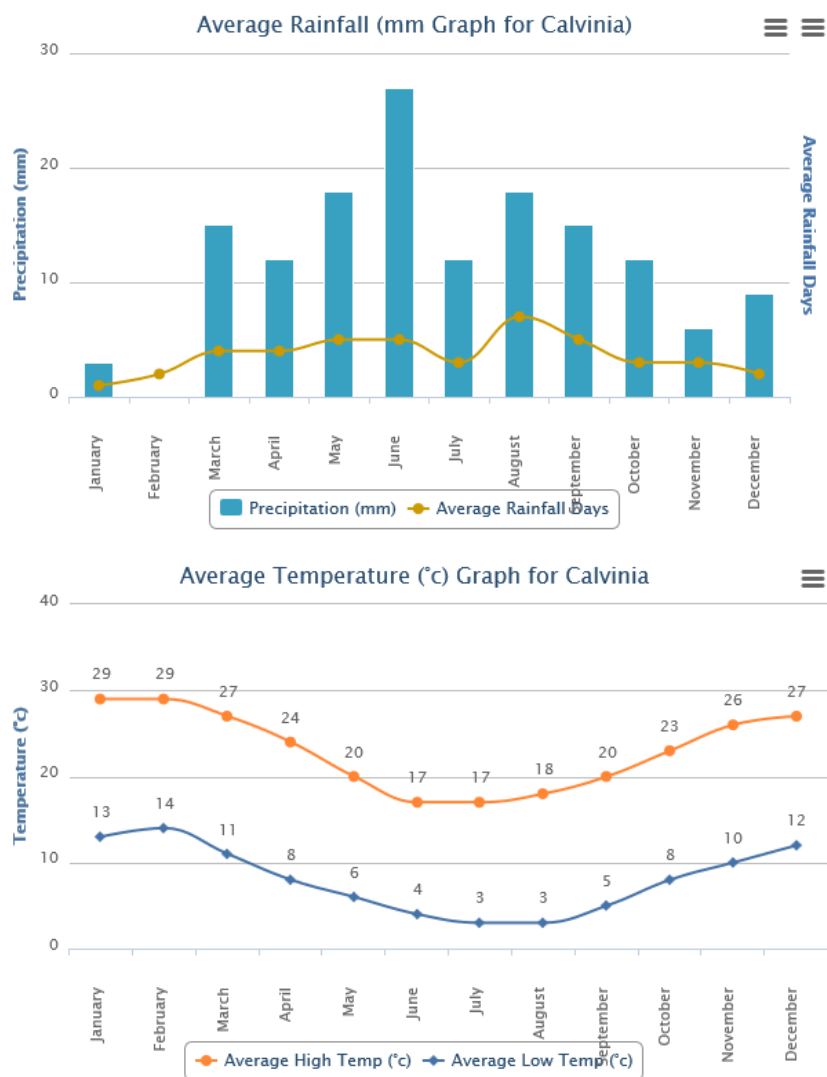


Figure 5. Average monthly rainfall (top) and temperatures (bottom) for the area (Worldweatheronline, 2014)

### 6.1.3. GEOLOGY AND SOIL

The major geological features of the Onder-Bokkeveld plateau area and the adjoining Karoo are sandstone, shale, diamictite and an intrusive rock called dolerite. Table Mountain group sandstones occur primarily within the Vanrhyns Pass while the Bokkeveld Group shale and sandstones and the mixed, glacially-derived Dwyka Group diamictite occur to the east on the plateau. All of these relatively flat lying beds overlie much more ancient, folded and metamorphosed rocks of the Gariep and Nama Groups, which formed between 600 and 500 million years ago by processes involving sedimentation and continental collision. These rocks are the grey phyllites and quartzites of the Knersvlakte and the red sandstones and shales which lie below the escarpment north of Nieuwoudtville and in the Koebee Valley.

The types of soils at the site that are discernable from Figure 6 comprise largely of shallow soils on rock (grey areas in Figure 6). To the west of the site (pink areas in Figure 6), the soils are freely drained and structureless. These soils tend to be highly erodible and have a low natural fertility.

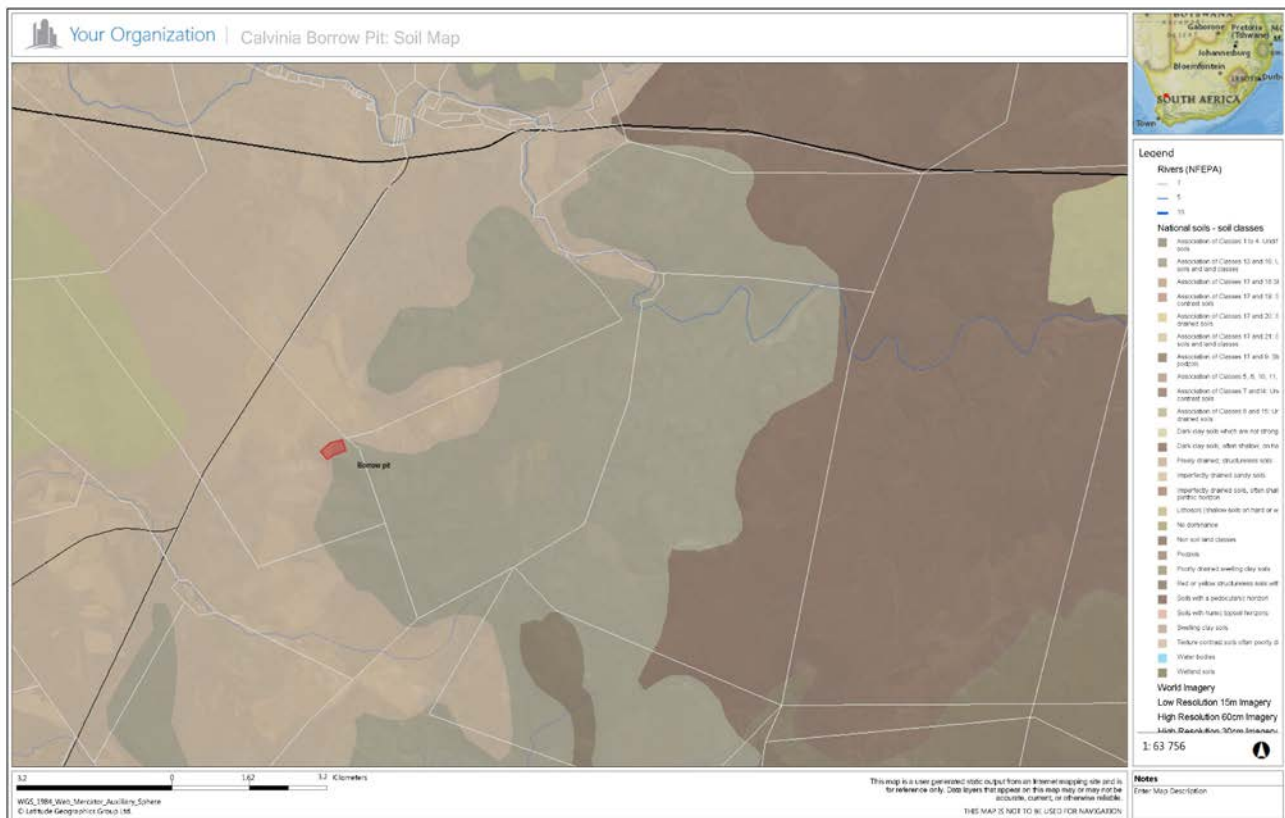


Figure 6. Soil map for the area (Biodiversity GIS, 2009)

#### 6.1.4. FLORA

The natural vegetation type that is dominant throughout the study is Hamtam Karoo vegetation type (SKt2 – yellow area in Figure 7) which is considered to be least threatened from a conservation point of view as there are still large areas of the vegetation type remaining. Within the surrounding areas, the vegetation is still largely natural in the higher lying and more remote areas, however closer to the towns and outside of the towns the vegetation has largely been modified by agricultural as well as urban activities. Within the disturbed areas at the site most of the natural vegetation cover has been removed. Vegetation associated with the tributaries of the Oorlogskloof River that occur at the site consists largely of terrestrial vegetation and there is no distinctive riparian or aquatic vegetation.

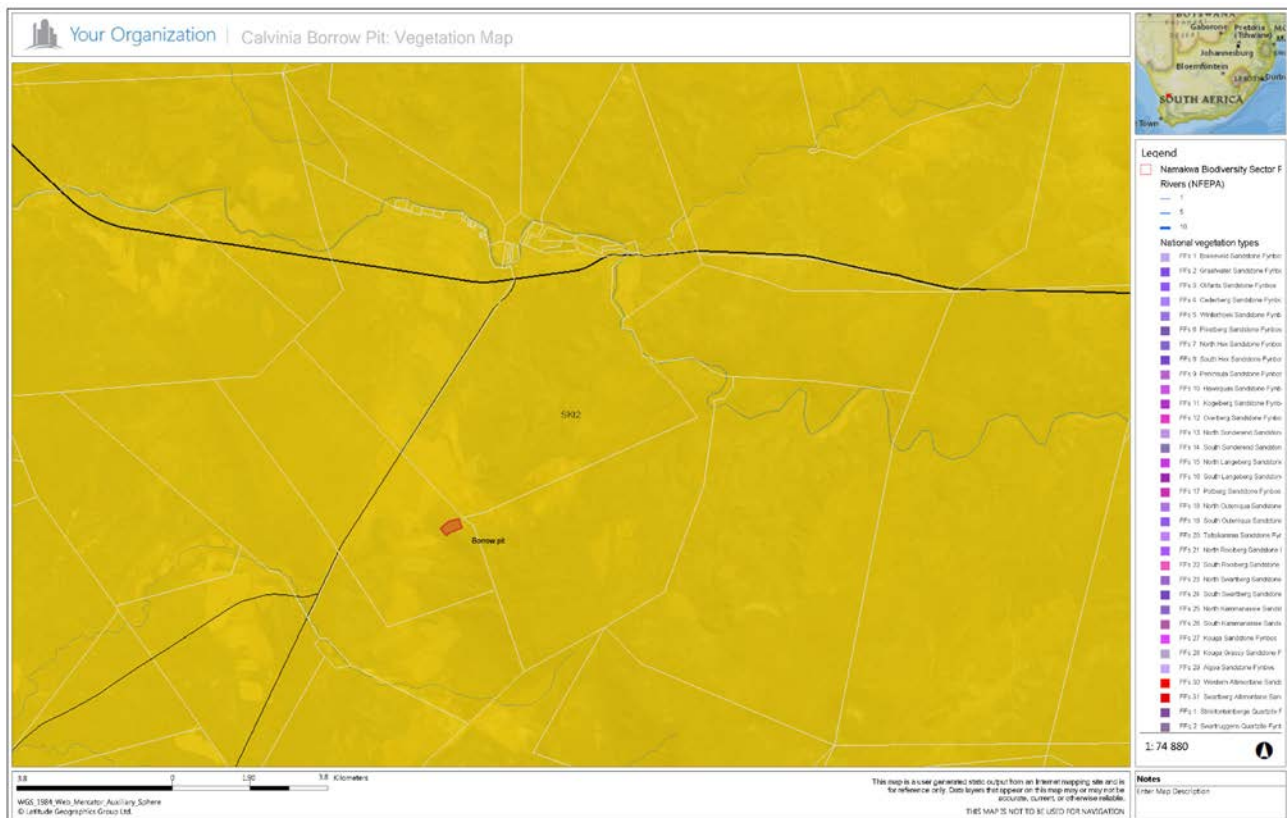


Figure 7. Vegetation map for the area (SANBI Biodiversity GIS)

### 6.1.5. AQUATIC FEATURES

The freshwater features in the study area consist of drainage lines or minor tributaries of the Oorlogskloof River (Figure 10). The Oorlogskloof River originates in the Roggeveldberge and flows westward past Calvinia and Nieuwoudtville. South of Nieuwoudtville it enters the Koebeeberge and flows through a deep riverine gorge where it is known as the Koebee River. It flows southwards to its confluence with the Doring River, a major tributary of the Olifants River which enters the Atlantic Ocean on the west coast of South Africa.

The minor tributaries at the site originate on the north-western slopes of the low hill and flow in a north to north-westerly direction to the confluence with the Oorlogskloof River. The tributary is discussed in more detail in the following section.



Figure 8. The tributary of the Oorlogskloof River near the borrow pit site



Figure 9. A minor drainage line at the borrow pit site

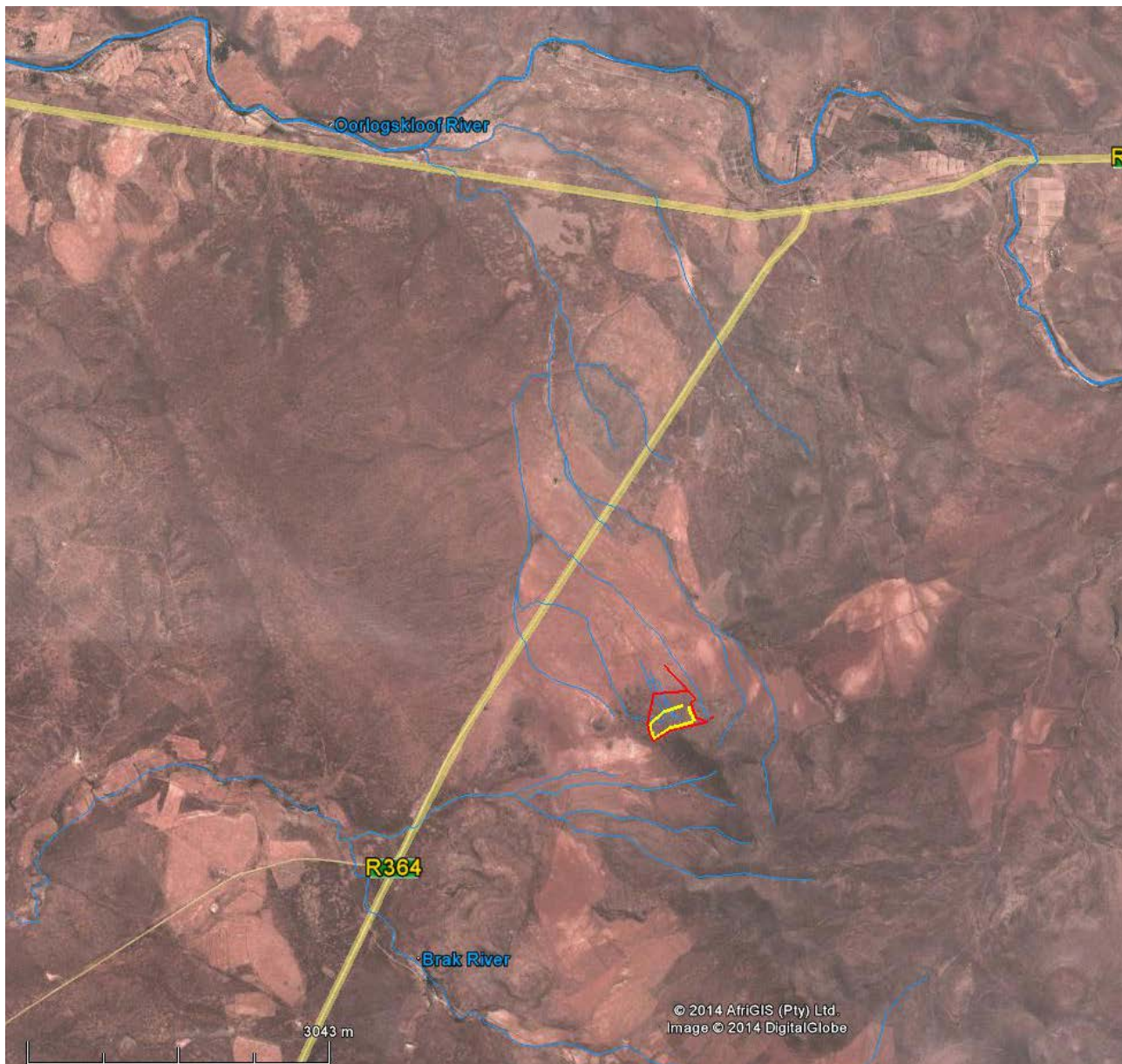


Figure 10. Google Earth image showing the freshwater features in the area

#### 6.1.6. LAND USE

The area surrounding Calvinia consists largely of natural areas (light green areas in Figure 11) with cultivated areas (yellow areas in Figure 11). The town of Nieuwoudtville occurs approximately 33km to the west and the town of Calvinia occurs approximately 36km to the east of the site. These towns are surrounded by some cultivated agriculture, which is scattered mostly along the watercourses in the area and consists largely of grazing for sheep farming. The area is also an important area for eco-tourism, with Nieuwoudtville being well known for its bulbs which flower in the spring.



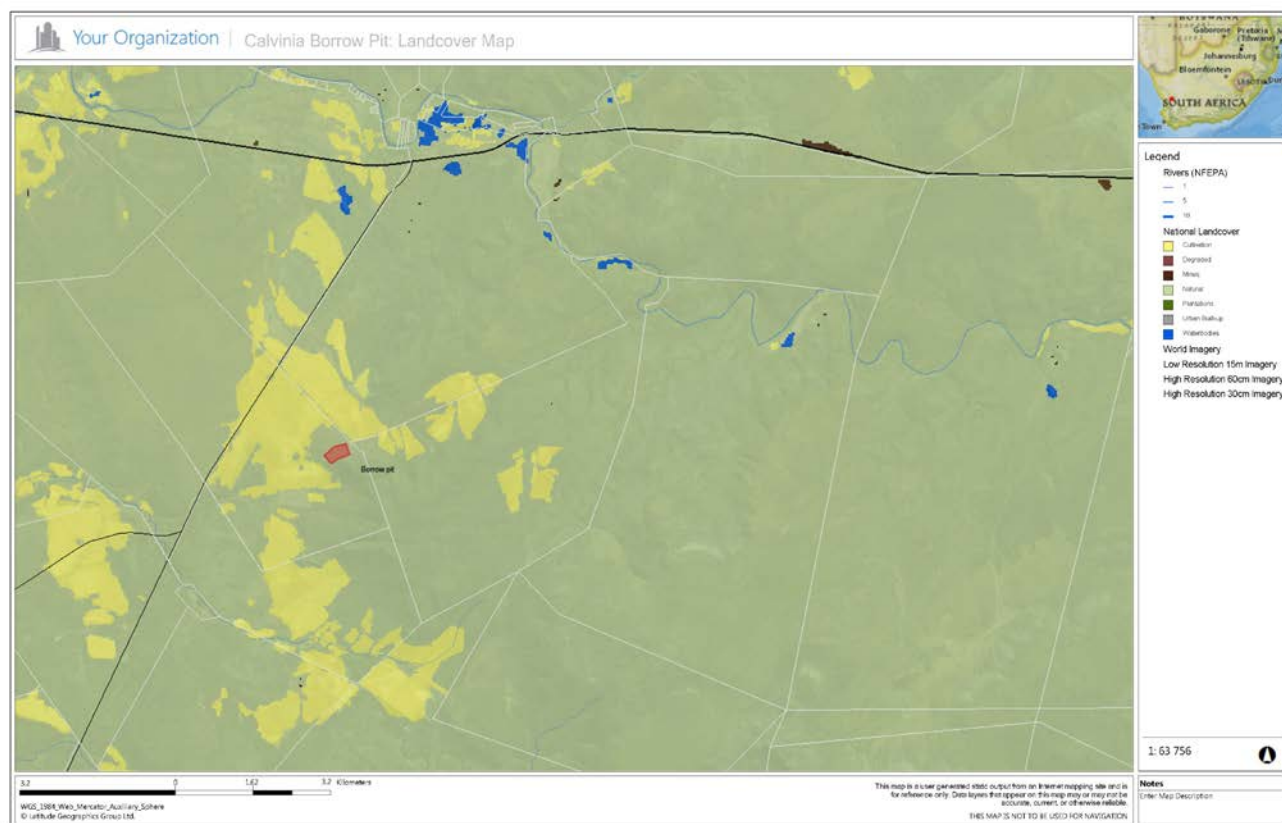


Figure 11. Land cover map for the area (SANBI Biodiversity GIS, 2011)

### 6.1.7. FRESHWATER BIODIVERSITY AND CONSERVATION

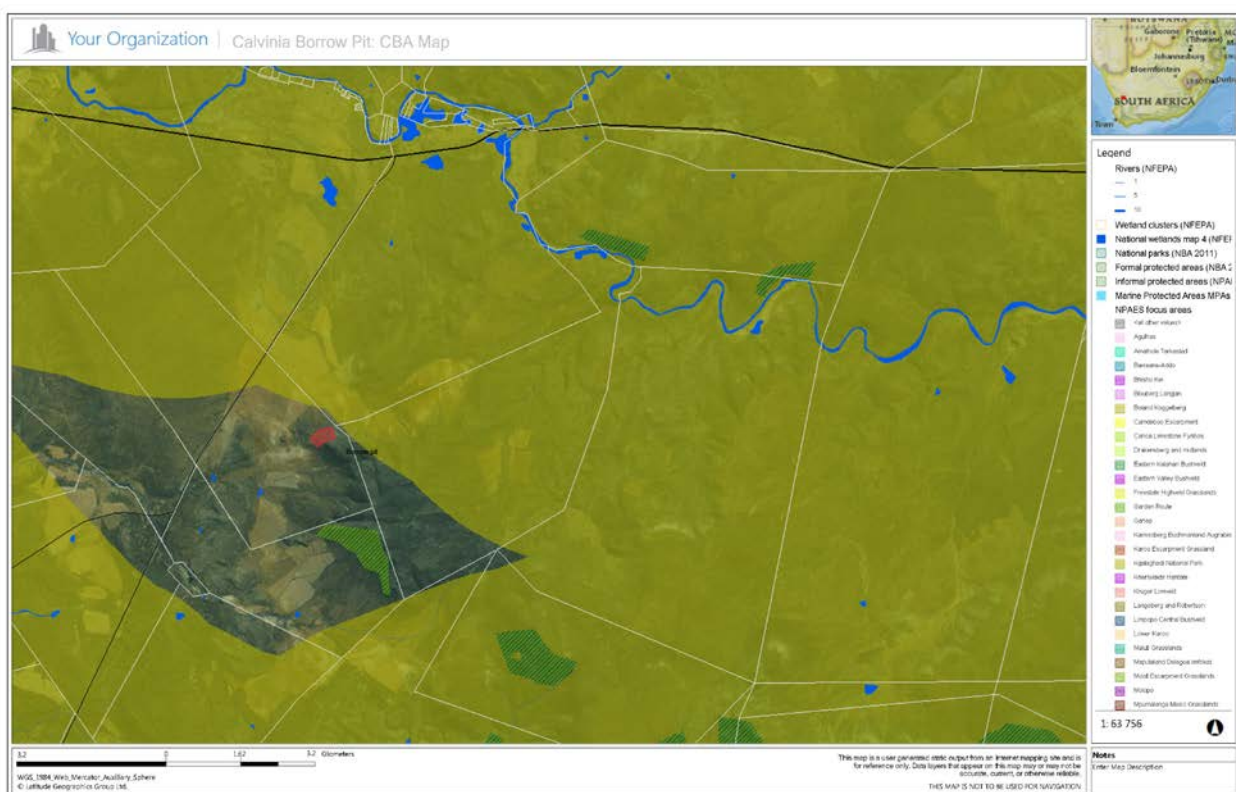
There are two biodiversity conservation mapping initiatives of relevance to the freshwater features within the study area, the Namakwa District Biodiversity Sector Plan and the Freshwater Ecosystem Priority Areas. Figure 12 represents Namakwa District Biodiversity Sector Plan mapping of Critical Biodiversity Areas (CBAs) for the study area. Any development within these CBAs will have the cumulative impact of an irreversible reduction or fragmentation of a network of natural sites (landscape corridor) identified to meet thresholds of vegetation pattern and process. These networks of natural corridors are required to remain natural, regardless of whether they occur within endangered ecosystems or not. The desired management objective for CBAs is to maintain natural land or to rehabilitate degraded areas to natural or near natural and manage for no further degradation.

CBAs affected by the proposed development area relate to terrestrial habitats only and include the following:

- The green hatched areas in Figure 16 represent the terrestrial CBAs. Although the vegetation type is not considered endangered, this section forms part of a larger natural corridor that is identified to meet biodiversity thresholds. The proposed activities fall outside of these areas.

- The yellow area forms an Ecological Support Area or buffer area around the CBAs. It is recommended that ecological processes be maintained within such areas.

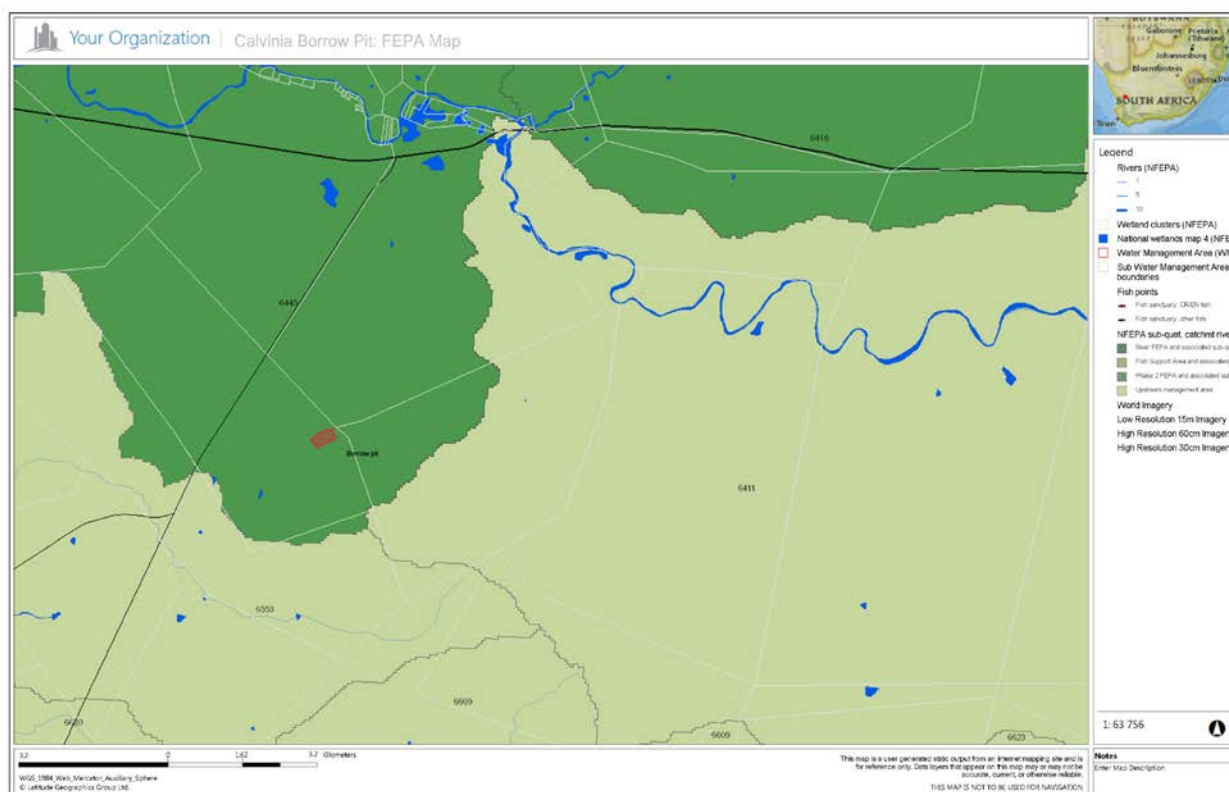
Freshwater Ecosystem Priority Areas (FEPAs) are intended to provide strategic spatial priorities for conserving South Africa's freshwater ecosystems and supporting sustainable use of water resources. FEPAs were determined through a process of systematic biodiversity planning and were identified using a range of criteria for serving ecosystems and associated biodiversity of rivers, wetlands and estuaries. The river and wetland FEPAs are required to be maintained in a largely natural ecological state while fish support areas should not be allowed to degrade from their existing ecological condition. The shading of the whole sub-quaternary catchment (FEPA) indicates that the surrounding land and smaller stream network need to be managed in a way that maintains the good condition of the river reach.



**Figure 12. Critical biodiversity mapping for the area (SANBI Biodiversity GIS, 2014)**

In terms of FEPAs within the study area, the Oorlogskloof River at and downstream of the site has been mapped as a FEPA River (darker green area in Figure 13). River FEPAs achieve biodiversity targets for river ecosystems and threatened fish species, and were identified in rivers that are currently in a good condition. Their FEPA status indicates that they should remain in a good condition in order to contribute to national biodiversity goals and support sustainable use of water resources. For River FEPAs the whole sub-quaternary catchment is shown in dark green to indicate that the surrounding land and smaller stream network need to be managed in a way that maintains the good condition (A or B ecological category) of the river reach.

Upstream of the site, the Oorlogskloof Catchment has been mapped as an Upstream FEPA (lighter green area in Figure 13). Upstream Management Areas are catchments in which human activities need to be managed to prevent degradation of downstream River FEPAs. No wetland clusters or wetland areas occur within the study area.



**Figure 13. Freshwater ecosystem Priority Areas mapped for the area (SANBI Biodiversity GIS, 2014)**

## 6.2. FRESHWATER ASSESSMENT OF THE STUDY AREA

The Index for Habitat Integrity (IHI) and a Site Characterisation were used to provide information on the ecological condition of the tributary of the Oorlogskloof River near the site.

### 6.2.1. RIVER CLASSIFICATION

In order to assess the condition and ecological importance and sensitivity of the stream, it is necessary to understand how the stream might have appeared under unimpacted conditions. This is achieved through classifying rivers according to their ecological characteristics, in order that it 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 Department of Water Affairs and Forestry in 1999, which divides the country's rivers into ecoregions, was used. The river assessed lies within the Great Karoo Ecoregion, with the characteristics as described in 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 3 provides the geomorphological features of the streams assessed.

**Table 2. Characteristics of the Great Karoo Ecoregion (Dominant Types In Bold)**

Main Attributes	Characteristics
Terrain Morphology: Broad division	<b>Plains; Low Relief;</b> Plains Moderate Relief; Lowlands; Hills and Mountains; Moderate and High Relief; Open Hills, Lowlands; Mountains; Moderate to High Relief; <b>Closed Hills; Mountains; Moderate and High Relief;</b> Table-Lands: Moderate and High Relief
Vegetation types	Valley Thicket; <b>Central Nama Karoo;</b> Eastern Mixed Nama Karoo; <b>Great Nama Karoo;</b> Upper Nama Karoo; Lowland Succulent Karoo; Upland Succulent Karoo; Escarpment Mountain Renosterveld;
Altitude (m a.m.s.l)	300-1700
MAP (mm)	0 to 500
Rainfall seasonality	Very late summer to winter
Mean annual temp. (°C)	10 to 20

### 6.2.2. SITE CHARACTERISATION

The tributary of the Oorlogskloof River has a sand/silt substrate and flows only sporadically after rainfall events. Vegetation within the stream is largely terrestrial and not indicative of an aquatic ecosystem. From the Site Characterisation assessment, the geomorphological and physical characteristics of the tributary can be classified as shown in Table 3.

**Table 3. Geomorphological and Physical features of the tributary of the Oorlogskloof River**

Geomorphological Zone	Foothill stream
Lateral mobility	Unconfined
Channel form	Multiple threads
Channel pattern	Single and multiple thread: low sinuosity
Channel type	alluvium
Channel modification	Moderate modification (farming and excavation into riparian zone)
Hydrological type	Ephemeral
Ecoregion	Great Karoo
DWA catchment	E40C
Vegetation type	Hantam Karoo
Rainfall region	Winter

### 6.2.3. INDEX OF 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. This assessment was undertaken for the Oorlogskloof Tributary (Table 4). 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 degradation of a river. The severity of each impact is ranked using a six-point scale with 0 (no impact), 1 to 5 (small impact), 6 to 10 (moderate impact), 11 to 15 (large impact), 16 to 20 (serious impact) and 21 to 25 (critical impact).

The IHI assessment is based on an evaluation of the impacts of two components of the rivers, the riparian zone and the instream habitat. Assessments are made separately for both components, but data for the riparian zone are interpreted primarily in terms of the potential impact on the instream component.

The estimated impact of each criterion is calculated as follows:

*Rating for the criterion/maximum value (25) x weight (percent)*

The estimated impacts of all criteria calculated in this way are summed, expressed as a percentage and subtracted from 100 to arrive at an assessment of habitat integrity for the instream and riparian components respectively. 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. Results from the habitat integrity assessment are shown in Table 4.

**Table 4. Index of Habitat Integrity Assessment results and criteria assessed in the tributary of the Oorlogskloof River**

Instream Criteria	Weight	Score	Riparian Zone Criteria	Weight	Score
Water abstraction	14	3	Water abstraction	13	3
Flow modification	13	8	Inundation	11	3
Bed modification	13	12	Flow modification	12	8
Channel modification	13	10	Water quality	13	6
Water quality	14	6	Indigenous vegetation removal	13	9
Inundation	10	3	Exotic vegetation encroachment	12	7
Exotic macrophytes	9	3	Bank erosion	14	13
Exotic fauna	8	3	Channel modification	12	10
Solid waste disposal	6	6			
Category		C	Category		C/D

The Oorlogskloof Tributary is in a moderately modified state with the major impacts being farming within the riparian zone (removal of riparian vegetation and tramping of livestock within the river channel), channel modification as a result of the existing borrow pit and a low density of invasive alien vegetation growth (*Prosopis* sp.) and old man saltbush (*Atriplex nummularia*).

#### 6.2.4. ECOLOGICAL IMPORTANCE AND SENSITIVITY (EIS)

The EIS Assessment (Table 5) 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).

**Table 5. Ecological importance and sensitivity categories (DWAf, 1999)**

EISC	General description	Range of median
Very high	Quaternaries/delineations that are considered to be unique on a national and international level based on unique biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) are usually very sensitive to flow modifications and have no or only a small capacity for use.	>3-4
High	Quaternaries/delineations that are considered to be unique on a national scale based on their biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) may be sensitive to flow modifications but in some cases may have substantial capacity for use.	>2-≤3
Moderate	Quaternaries/delineations that are considered to be unique on a provincial or local scale due to biodiversity (habitat diversity, species diversity, unique species, rare and endangered species). These rivers (in terms of biota and habitat) 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 6. Definition of the four-point scale used to assess biotic and habitat determinants presumed to indicate either importance or sensitivity**

Four point 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 (i.e. SA Red Data Books)

**Table 7. Results of the EIS assessment for the Oorlogskloof River**

Biotic Determinants	Tributary of the Oorlogskloof River
Rare and endangered biota	0.5
Unique biota	0.5
Intolerant biota	1
Species/taxon richness	0.5
Aquatic Habitat Determinants	
Diversity of aquatic habitat types or features	1
Refuge value of habitat type	1
Sensitivity of habitat to flow changes	2
Sensitivity of flow related water quality changes	1
Migration route/corridor for instream and riparian biota	1.5
National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs	1.5
RATINGS	1.05
EIS CATEGORY	low

The Oorlogskloof River considered to be of a low Ecological Importance and Sensitivity.

### 6.3. ASSESSMENT OF THE OPPORTUNITIES AND CONSTRAINTS AT THE BORROW PIT SITE

The proposed expansion of the existing borrow pit will occur within an area where there are some minor drainage features associated with the Oorlogskloof River. These drainage features would only carry runoff sporadically, immediately after rainfall events and do not sustain an aquatic ecosystem. Disturbance / loss of these drainage features would thus not result in any loss of aquatic ecosystems. The most significant impact of the proposed expansion to the borrow pit would be as a result of the need to divert the runoff from the hill side around the borrow pit. This would result in an intensification of the flow in the diverted drainage channel which would increase the risk of erosion within this drainage feature.

Thus, the freshwater features (small drainage lines) within the area that is proposed for the expansion of the borrow pit are not considered a constraint to the proposed activities. These features will however need to be diverted around the borrow pit and mitigation measures will need to be implemented to prevent erosion of the drainage channel(s) downstream of the borrow pit.



**Figure 14. Freshwater features / drainage lines within the proposed expansion area of the borrow pit**

## 7. ASSESSMENT OF IMPACTS

### 7.1. DESCRIPTION AND ASSESSMENT OF IMPACTS OF PROPOSED ACTIVITIES

This section provides an assessment of the potential impacts to freshwater ecosystems that are likely to be associated with the proposed borrow pit expansion. The borrow pit is already in existence. Its current activities, together with a number of other physical modifications to the bed and banks of the tributary of the Oorlogskloof River as a result of the surrounding farming activities, have resulted in the moderately modified aquatic ecological condition of this stream. In addition, the stream is a minor tributary in the Oorlogskloof River System that tends to only flow sporadically after rainfall events and does not support any substantial aquatic ecosystem. Therefore it can be expected that the likely impacts of the proposed borrow pit expansion on the freshwater features in the area would be of a low significance.

The proposed activity will result in a permanent modification of the drainage lines that will take place in a phased manner as the borrow pit expands into the four areas identified for expansion. Additional longer term impacts that are likely to occur as a result of the operation phase of the proposed activity are the



erosion of the drainage lines as a result in an increased concentration of runoff due to a need to divert flows around the borrow pit and an encroachment of invasive alien vegetation within the disturbed areas. Some rehabilitation works would need to be undertaken of the borrow pit area during the decommission phase of the project.

Nature of Impact: Modification of the drainage lines within the areas into which the borrow pit is to be expanded.

Significance of impacts without mitigation: There is already some disturbance of these drainage lines as a result of the existing borrow pit. In addition the drainage lines are not considered to be ecologically important. Thus a modification to the drainage features is considered to be of a low significance.

Proposed mitigation: The drainage lines should be diverted around the proposed expanded borrow pit site such that these channels will not be disturbed again during the further expansion of the pit. The re-established channel should be properly shaped and should be monitored and managed to make sure that the channel(s) at and downstream of the site within the property do not become invaded with invasive alien plants.

Significance of impacts after mitigation: A localized, long-term impact will occur during the construction and operation phases of the project however the overall significance of the impact on the aquatic ecosystems is expected to be a very low negative impact.

Nature of Impact: Erosion and sedimentation of the drainage lines downstream of the borrow pit.

Significance of impacts without mitigation: Alterations to the surface topography in and around the streams and the removal of the cover vegetation is likely to result in an increase in the erosion of the steeper slopes and particularly within the drainage channels. The loose and eroded material is likely to result in an increased deposition of sediment within the channels during rain events, particularly at the foot of the slope.

Proposed mitigation: The diverted drainage feature(s) should be kept free of stockpiled material and rubble from the borrow pit. Where necessary, the potential for erosion of the drainage may need to be addressed. Once use of the borrow pit has ceased, the site should be rehabilitated and shaped to allow for the revegetation of the site and to reduce the risk for erosion of the drainage channels after activities at the site have ceased.

Significance of impacts after mitigation: A localized, long-term impact - the significance of the impact on the aquatic ecosystems is expected to be a very low negative impact.

- Nature of impact: Water quality impairment within the tributary as a result of the activities at the borrow pit site.

Significance of impacts without mitigation: A localized impact of low intensity that is expected to have a very low overall significance in terms of its impact on the identified aquatic ecosystems in the area due to the fact that flow within these features is sporadic.

Proposed mitigation: Contaminated runoff from the borrow pit should be prevented from entering the drainage features at the site. All materials on the site should be properly stored and contained. Disposal of waste from the site should also be properly managed. Ablution facilities should be provided at the borrow pit that are located away from the drainage features and regularly serviced. These measures should be addressed, implemented and monitored in terms of the Environmental Management Plan for the construction phase.

Significance of impacts after mitigation: Provided that the mitigation measures are effectively implemented the water quality impacts of the borrow pit activities should be of negligible significance.

## 7.2. CUMULATIVE IMPACT OF THE OVERALL PROJECT ACTIVITIES ON FRESHWATER ECOSYSTEMS:

The freshwater features within the area to be impacted by the proposed activity are already moderately modified as a result of modification of the river banks and drainage channels by adjacent farming activities, infrastructure development and the impacts from the two towns, Calvinia and Nieuwoudtville. These activities have all contributed to a modification of both the instream and riparian aquatic habitats and the introduction of invasive alien plants into the riparian zone of the larger river systems. The impact of the proposed activities will take place within a minor tributary of these larger river systems and is unlikely to have any impact on these freshwater features.

## 7.3. SUMMARY OF ASSESSMENT OF POTENTIAL IMPACTS OF THE PROPOSED ACTIVITIES:

Below are the summary tables of the potential impacts described in Section 7.1:

Potential impact on freshwater features	Proposed expansion of an existing borrow pit into areas where there are minor drainage features
Nature of impact:	Modification of the drainage lines within the areas into which the borrow pit is to be expanded
Extent and duration of impact:	Localised long term impacts
Intensity of Impact	Low
Probability of occurrence:	Definite
Degree to which impact can be reversed:	Irreversible
Irreplaceability of resources:	Low
Cumulative impact prior to mitigation:	Very low

Significance of impact pre-mitigation	Low
Degree of mitigation possible:	Low to Very Low
Proposed mitigation:	The drainage lines should be diverted around the proposed expanded borrow pit site such that these channels will not be disturbed again during the further expansion of the pit. The re-established channel should be properly shaped and should be monitored and managed to make sure that the channel(s) at and downstream of the site within the property do not become invaded with invasive alien plants.
Cumulative impact post mitigation:	Very Low / Negligible
Significance after mitigation	Very Low

Potential impact on freshwater features	Proposed expansion of an existing borrow pit into areas where there are minor drainage features
Nature of impact:	Erosion and sedimentation of the drainage lines downstream of the borrow pit
Extent and duration of impact:	Localised long term impacts
Intensity of Impact	Very Low
Probability of occurrence:	Probable
Degree to which impact can be reversed:	Partially reversible
Irreplaceability of resources:	Low
Cumulative impact prior to mitigation:	Very low
Significance of impact pre-mitigation	Low
Degree of mitigation possible:	Low
Proposed mitigation:	The diverted drainage feature(s) should be kept free of stockpiled material and rubble from the borrow pit. Where necessary, the potential for erosion of the drainage may need to be addressed. Once use of the borrow pit has ceased, the site should be rehabilitated and shaped to allow for the revegetation of the site and to reduce the risk for erosion of the drainage channels after activities at the site have ceased.
Cumulative impact post mitigation:	Very Low / Negligible
Significance after mitigation	Very Low

Potential impact on freshwater features	Proposed expansion of an existing borrow pit into areas where there are minor drainage features
Nature of impact:	Downstream <b>water quality impacts</b> as a result of contaminated runoff from the borrow pit site
Extent and duration of impact:	Localised long term impacts
Intensity of Impact	Low
Probability of occurrence:	Improbable
Degree to which impact can be reversed:	Fully reversible
Irreplaceability of resources:	Low
Cumulative impact prior to mitigation:	Very low
Significance of impact pre-mitigation	Low
Degree of mitigation possible:	Very low
Proposed mitigation:	Contaminated runoff from the borrow pit should be prevented from entering the drainage features at the site. All materials on the site should be properly stored and contained. Disposal of waste from the site should also be properly managed. Ablution facilities should be provided at the borrow pit that are located away from the drainage features and regularly serviced. These measures should be addressed, implemented and monitored in terms of the Environmental Management Plan for the construction phase.
Cumulative impact post mitigation:	Very Low
Significance after mitigation	Very Low

## 8. CONCLUSIONS AND RECOMMENDATIONS

The borrow pit is situated along the R364 approximately 6 km south-west of the R27 and within the catchment of the Oorlogskloof River in the Olifants/Doring River System. A number of small drainage lines are located within the area in which the borrow pit is to be expanded. These drainage lines form the upper reaches of a minor tributary of the Oorlogskloof River.

The tributary of the Oorlogskloof River is in a moderately modified ecological state, with low ecological importance and sensitivity. The expected impacts of the proposed activities are likely to be of a very low significance and limited largely to the borrow pit site. Provided that the following recommended mitigation measures are implemented the significance of the impact is expected to be very low to negligible:

- The drainage lines should be diverted around the proposed expanded borrow pit site such that these channels will not be disturbed again during the further expansion of the pit. The re-established channel should be properly shaped and should be monitored and managed to make sure that the channel(s) at and downstream of the site within the property do not become invaded with invasive alien plants.
- The diverted drainage feature(s) should be kept free of stockpiled material and rubble from the borrow pit. Where necessary, the potential for erosion of the drainage may need to be addressed. Once use of the borrow pit has ceased, the site should be rehabilitated and shaped to allow for the revegetation of the site and to reduce the risk for erosion of the drainage channels after activities at the site have ceased.
- Contaminated runoff from the borrow pit site should be prevented from entering the drainage features at the site. All materials on the site should be properly stored and contained. Disposal of waste from the site should also be properly managed. Ablution facilities should be provided at the borrow pit that are located away from the drainage features and regularly serviced. These measures should be addressed, implemented and monitored in terms of the Environmental Management Plan for the construction phase.

It is likely that the proposed activity will fall within the listed activities that can be Generally Authorised at the Western Cape Regional Office of the Department of Water and Sanitation however the regional office will need to be approached for comment in this regard.

## 9. REFERENCES

Department of Water Affairs and Forestry. (1999). *Resource Directed Measures for Protection of Water Resources. Volume 3: River Ecosystems Version 1.0*. Resource Directed Measures for Protection of Water Resources, Pretoria, South Africa.

Department of Water Affairs and Forestry (2002). *Olifants-Doorn Water Management Area: Water Resources Situation Assessment*. Prepared by Ninham Shand (Pty) Ltd in association with Jakoet and Associates. DWAF Report No P 17/000/00/0101.

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Driver, A., Nel, J., Snaddon, K. Murray, K., Roux, D., and Hill, L. (2011). Implementation Manual for Freshwater Ecosystem Priority Areas Report to the Water Research Commission Draft for NFEPA Steering Committee.

Mucina, L. and Rutherford, M.C. (eds.) (2006). *The vegetation of South Africa, Lesotho and Swaziland*. Strelitzia 19. South African National Botanical Institute, Pretoria.

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River Health Programme. 2006. State of Rivers Report for the Olifants/Doring and Sandveld Rivers. Department of Water Affairs and Forestry, Pretoria. ISBN No: 0-620-36021-6.

## ANNEXURE A: DETAILS OF SPECIALIST AND DECLARATION OF INTEREST

### APPENDIX 1: DECLARATION OF INDEPENDENCE BY THE INDEPENDENT PERSON WHO COMPILED A SPECIALIST REPORT OR UNDERTOOK A SPECIALIST PROCESS

I Antonia Belcher, as the appointed independent specialist hereby declare that I:

- act/ed as the independent specialist in this application;
- regard the information contained in this report as it relates to my specialist input/study to be true and correct, and
- do not have and will not have any financial interest in the undertaking of the activity, other than remuneration for work performed in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- have no and will not have any vested interest in the proposed activity proceeding;
- have disclosed, to the applicant, EAP and competent authority, any material information that have or may have the potential to influence the decision of the competent authority or the objectivity of any report, plan or document required in terms of the NEMA, the Environmental Impact Assessment Regulations, 2010 and any specific environmental management Act;
- am fully aware of and meet the responsibilities in terms of NEMA, the Environmental Impact Assessment Regulations, 2010 (specifically in terms of regulation 17 of GN No. R. 543) and any specific environmental management Act, and that failure to comply with these requirements may constitute and result in disqualification;
- have ensured that information containing all relevant facts in respect of the specialist input/study was distributed or made available to interested and affected parties and the public and that participation by interested and affected parties was facilitated in such a manner that all interested and affected parties were provided with a reasonable opportunity to participate and to provide comments on the specialist input/study;
- have ensured that the comments of all interested and affected parties on the specialist input/study were considered, recorded and submitted to the competent authority in respect of the application;
- have ensured that the names of all interested and affected parties that participated in terms of the specialist input/study were recorded in the register of interested and affected parties who participated in the public participation process;
- have provided the competent authority with access to all information at my disposal regarding the application, whether such information is favourable to the applicant or not; and
- am aware that a false declaration is an offence in terms of regulation 71 of GN No. R. 543.

Signature of the specialist: 

Date: 23 October 2014

## APPENDIX 2: ATTACHED CURRICULUM VITAE:

Full Name	Antonia Belcher
Profession	Aquatic Ecologist and Environmental Management(P. Sci. Nat. 400040/10)
Contact details	60 Dummer Street, Somerset West, 7139; Telephone: 082 883 8055

*Relevant work experience:*

Due to my involvement in the development and implementation of the River Health Program in the Western Cape, I have been a key part of the team that has undertaken six catchment or area wide 'state-of-river' assessments as well as routine monitoring and specialised assessments of rivers and wetlands in all the major catchments for the Western Cape.

*Relevant work experience follows:*

Freshwater Assessment for the Proposed Clanwilliam Dam Secondary Roads Realignment, 2014

Freshwater Assessment for the Proposed Upgrade of MR529 between Piketberg and Velddrif, 2014

Freshwater Assessment for the Proposed Rehabilitation and Upgrading of Trunk Road 28 Section 2 between Hermanus and Stanford, 2013

Freshwater Assessment for the Proposed Improvement of National Route 7 Sections 1 and 2 between Leliefontein and the Hopefield Intersection: Stage 1, 2013

Freshwater Assessment for the Proposed Rehabilitation of Main Road 282 between Stormsvlei (Km 0.00) and Bonnievale (Km 19.03), 2013

Freshwater Assessment for the Proposed Improvement of National Route 7 Section 1 between the Atlantis Intersection and Leliefontein, 2013

Freshwater Assessment for the Proposed Clanwilliam Intersection Upgrade on National Route N7, 2012

Consideration of the Realignment N7 4 km section south of Clanwilliam Interchange from a freshwater point of view, 2012

Freshwater Assessment for the Proposed SANRAL N7 Upgrade Clanwilliam to Trawal, 2012

Freshwater Assessment for the Proposed Upgrade to National Road 7, Section 4 from Trawal to Vanrhynsdorp, 2012

Freshwater Assessment for the Proposed Strengthening of National Route 27 Section 7 & 8 between the Western/Northern Cape Border and Calvinia, 2011

Freshwater Assessment for the Proposed Improvement of National Route 7 Section 1 between the Melkbos and Atlantis Intersections, 2009