FRESHWATER ASSESSMENT FOR THE PROPOSED ONSEEPKANS WATER ABSTRACTION AND PIPELINE

JANUARY 2016

Prepared By:

Mr Dana Grobler and Ms Toni Belcher

PO Box 455, Somerset Mall, 7137

Tel: (021) 851 0555

Email: dana@bluescience.co.za ; toni@bluescience.co.za

TITLE:	FRESHWATER ASSESSMENT FOR THE PROPOSED ONSEEPKANS WATER ABSTRACTION AND PIPELINE
PROJECT NUMBER:	P076-Jun13
AUTHORS:	Dana Grobler and Toni Belcher
REPORT STATUS:	Final Draft (January 2016)
Client project reference	

APPROVED BY Mr Dana Grobler

……..

APPROVED by Client

……..

EXECUTIVE SUMMARY

The Orange River dominates the surrounding landscape, and displays braided features with secondary channels that are only active during high flow events. The riparian vegetation in terms of species composition within the channel is still largely natural. The South African side (southern bank) of the Orange River has been developed and cultivated into the alluvial riparian zone. The proposed inlet structure and pump house could potentially impact on these freshwater features.

The freshwater assessment of the proposed activities to the features described above indicates that:

- *The Orange River is in a moderately modified present ecological state and has a high ecological importance in these lower reaches,*

- *In general the ephemeral streams and small drainage lines are largely natural with a low ecological importance,*

- *The biodiversity conservation mapping has indicated that the lower section of the Orange River and its tributaries within the study area have been mapped as a River Freshwater Ecosystem Priority Area and a Fish Sanctuary for on endemic fish species, while the channel of the Orange River has been mapped as a CBA2 (Important Area) due to the fact that it contains Lower Gariep Alluvium vegetation which is considered as endangered and the river provides an important corridor for migration.*

- *There are a number of drainage lines and small ephemeral streams draining from the south into the Orange River within the study area. The ephemeral streams are visible in the landscape due to the relatively wide sandy beds and, in some instances, by vegetation associated with the river beds and riparian zones. The unnamed ephemeral stream that will be impacted is largely modified and of low ecological importance.*

Erosion and sedimentation from the project activities within the riparian and instream zone of the Orange River and its minor tributaries within the study area, together with establishment of invasive alien vegetation within the disturbed areas, are the most likely consequences of the project. These impacts are likely to be of a low significance considering the existing state of the riparian zone of the Orange River and its tributaries in this area and can be easily mitigated. The overall improvement of water use efficiency, and therefore the reduction in the need to use earthen diverted water would contribute towards the overall protection of the water resource and mitigation of the potential impacts.

Thus, provided that the recommended mitigation measures are implemented the significance of the impact is expected low.

A water use authorization may need to be obtained from the Department of Water Affairs Northern Cape Regional Office for approval of the water use aspects of the proposed activities.

TABLE OF CONTENTS

1. BACKGROUND INFORMATION

The applicant proposes to construct a new pump house to abstract water from the southern banks of the Orange River downstream of the Onseepkans Bridge. It is proposed that a 1 MW Photo Voltaic installation would be installed, supplying enough energy to pump water from the river to a storage dam, located 60m higher than the existing canal. From this storage dam, water could be supplied to all the existing farmers, at a pressure of 2.5 bar. At these higher pressures, farmers would be able to cultivate higher income crops.

The Solar plant will consist of PV panels, and will generate between 750 KVA and 1MVA. The area used will not be larger than 1 ha.

The storage reservoir will have a capacity of 100 000m³ and will cover an area of approximately 2.5ha in size.

Both the reservoir and Solar plant will be constructed on Erf 88, Khai Ma Municipality's property.

The new abstraction point will be located on Erf 209, and the new pipeline to the reservoir will cross Erf 730 and Erf 88.

Due to the water pressure generated with the pumps and elevated storage dam, irrigation can be done very efficiently, minimising water losses.

This option will also allow for future expansion of the irrigation scheme to additional agricultural lands.

Both the reservoir and Solar plant will be constructed on Erf 88, Khai Ma Municipality's property.

2. TERMS OF REFERENCE

The suggested and agreed upon work programme based on the above terms of reference were:

Task 1: River/Wetland impact assessment

1.1 Literature survey and initialisation

1.2 Field assessment and freshwater ecological impact assessment

1.3 Compile freshwater assessment report

Based on the data and information collected in the previous two tasks, describe ecological characteristics of the freshwater systems, comment on the conservation value and importance of the freshwater systems and delineate the outer boundary of the riparian

zones/riverine corridors. Provide recommendation of the rehabilitation of the site to be rehabilitated.

1.4 Review and liaison

This task will include the review of the report based on comments from the client. This will also provide time for initial liaison with DWS to determine the Water use licensing information and requirements of DWS.

Task 2: Compilation of the documentation for submission of the water use authorisation application (WULA) to the Department of Water and Sanitation

Compilation of Water use license application sec 21 a, b, c and I, which will include the following tasks:

2.1 Collate relevant information

2.2 Compile section 21, a, b c and i and supplementation forms and reports

2.3 Submit WULA

2.4 Liaison and review

3. LIMITATIONS AND ASSUMPTIONS OF THE STUDY

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 according to nationally developed methodologies as defined by DWA as part of the national River Health Programme (RHP) and was undertaken at a rapid level. This level is considered to be sufficient for the project.
- Recommendations are made with respect to the adoption of buffer zones within the development site, based on the wetlands/river's functioning and site characteristics. These recommendations are based on professional opinion due to the lack of a formal methodology for buffer zone determination within South Africa.

4. USE OF THIS REPORT

This report reflects the professional judgment 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 author.

5. STUDY OVERVIEW

5.1. OVERVIEW OF THE PROJECT AND STUDY AREA

The Orange River is the largest and longest river in South Africa stretching over 2 300 km. It flows through some of the wettest and driest parts of Southern Africa from its origin as the Senqu River in the Maluti Mountains of Lesotho to its mouth in the Atlantic Ocean at Alexander Bay. The Orange River is debatably a perennial river with a flow which varies between around 50 and 1 800 cubic meter per second (cum/s) depending on the season. The flow of the river is largely controlled by the release in dams upstream, like the Bloemhof, Gariep and Van der Kloof dams. Most of the tributaries of the lower Orange River are highly seasonal in flow and are dry for most of the year.

The quality of the water in the Orange River has slowly been degrading. Increasing agricultural and industrial activities upstream from Upington, as well as the lessening of the inflow of high quality water from Lesotho have resulted in water quality that varies with the seasons, as well as depending on which river feeds the main inflow. If the Orange River is the largest contributor to the flow, the turbidity and salinity of the water is usually high. If the inflow comes mainly from the Vaal River, nutrient enrichment of the river results in an increase in algae growth.

Onseepkans is situated in the lower portion of the Orange River (Figure 1a), approximately 50 km north of Pofadder. In this section of the river, the channel is a wide and braided and often flows along many channels separated by islands. It is this stretch of river that is intensively farmed predominantly for the cultivation of table and wine grapes.

Table 1 provides a summary of the main features of the freshwater and hydrological characteristics of the area.

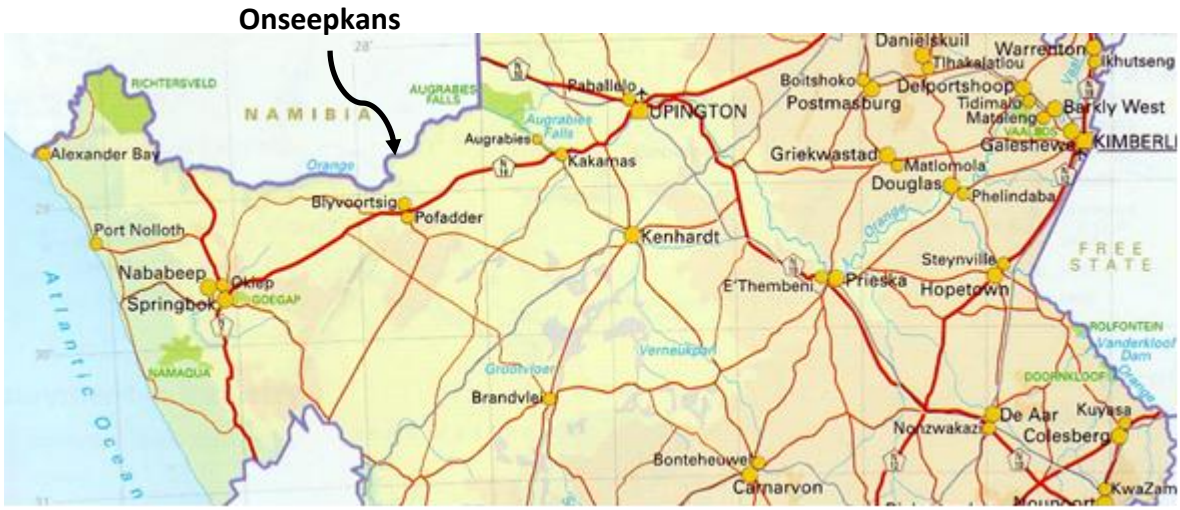

Figure 1a: Locality map for Onseepkans

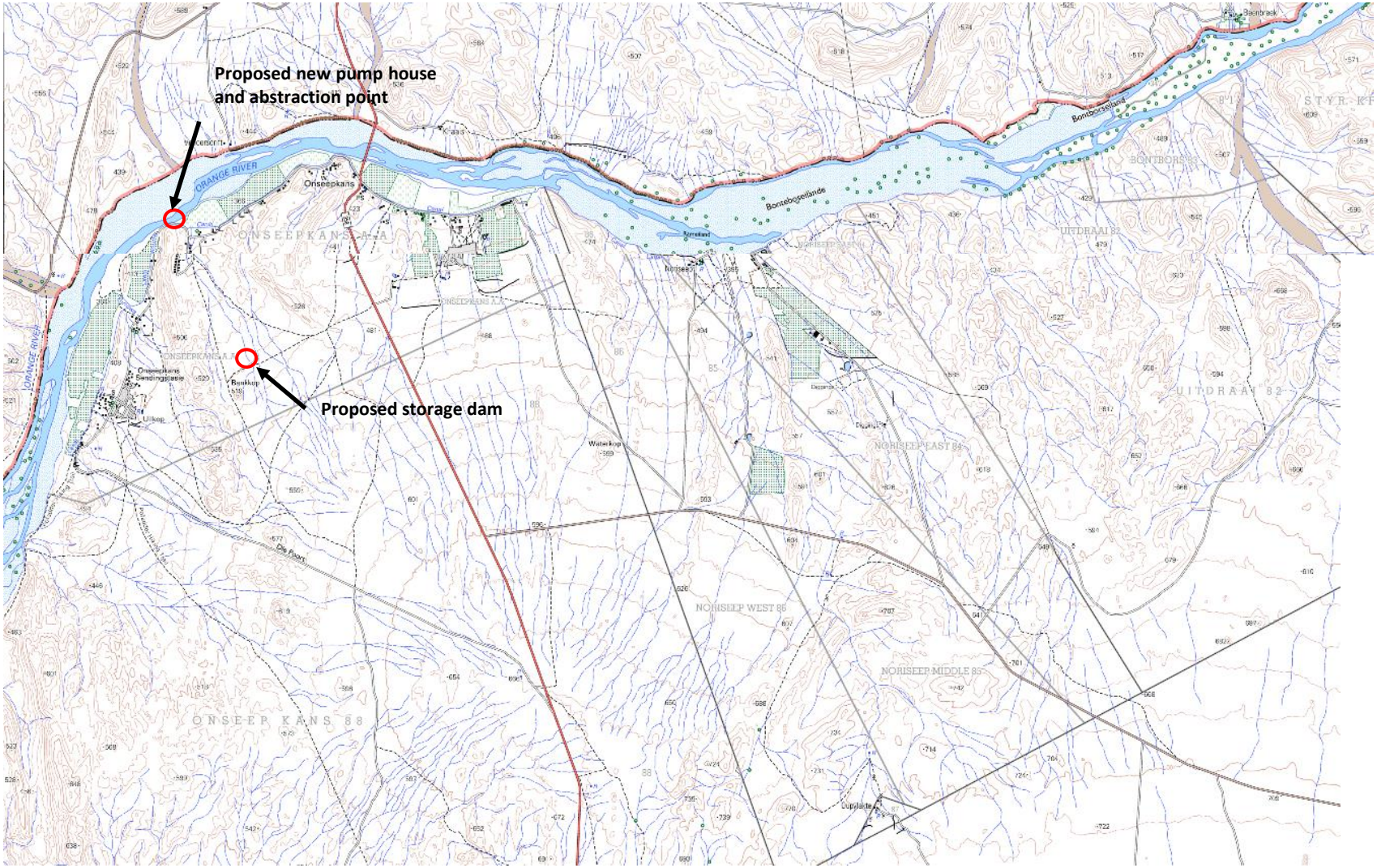

Figure 1b: A topographical (2819CB Onseepkans & 2819CD Oupvlakte) map of the study area, indicating the locality of the abstraction and storage dam Orange River

5.2. ACTIVITY DESCRIPTION – WATER SUPPLY CANAL UPGRADE

The construction of the following infrastructure is proposed:

Abstraction point on the southern banks of the Orange River;

Pump house on the bank of the Orange River;

Storage dam (100 000 cubic meter storage space);

Pipeline to supply the new proposed off channel storage dam; and

Photo Voltaic facility to enable pumping of water to the new storage facility.

The water supply infrastructure in Onseepkans has been damaged by the 2011 Orange River flood and needs to be upgraded. The infrastructure currently consists of a diversion weir in the southern channel of the Orange River upstream of Onseepkans and a distribution canal with outlet points and sluices to manage the distribution to users and return flow to the Orange River.

These events have prompted the applicant to reconsider the abstraction, use and distribution systems in the area and therefore the proposal to create new infrastructure to more effectively and to use water more efficiently.

Figure 2 provides an overview and layout of the proposed new infrastructure.

Table 1: Summary of key information related to the water resources which may be impacted by the proposed activities

Descriptor	Name / details	Notes
Water Management Area	Lower Orange WMA	
Catchment Area	Orange River	Upstream and downstream of Onseepkans (southern bank)
Quaternary Catchment	D81E D81F	nMAR: 11 248 million m^3 nMAR: 11 249 million m^3
Present Ecological state	D81E – B category D81F – B category	DWAF 1999
EISC – Ecological Importance and Sensitivity	D81E – High D81F - High	DWAF 1999
Type of water resource	River, ephemeral streams and drainage lines	
Water resource component potentially impacted	Riparian and instream zones of the Orange River and unnamed ephemeral tributaries of the Orange River flowing from the south into the Orange River	
Latitude	28°44'44.35"S	Proposed abstraction point
Longitude	19°16'28.16"E	
Latitude	28°45'37.23"S	Proposed off channel storage dam
Longitude	19°16'59.62"E	
Status of Environmental authorisation process	This freshwater assessment report is prepared as input into the EIA process	Mr Bernard de Witt EnviroAfrica cc Office: tel +27 21 851 1616 fax 0865120154 P. O. Box 5367, Helderberg, 7135 29 St James St, Somerset West
Site visit	Ms Toni Belcher and Mr Dana Grobler	1 July 2013

Figure 2: Google Earth image indicating the Orange River and proposed new infrastructure

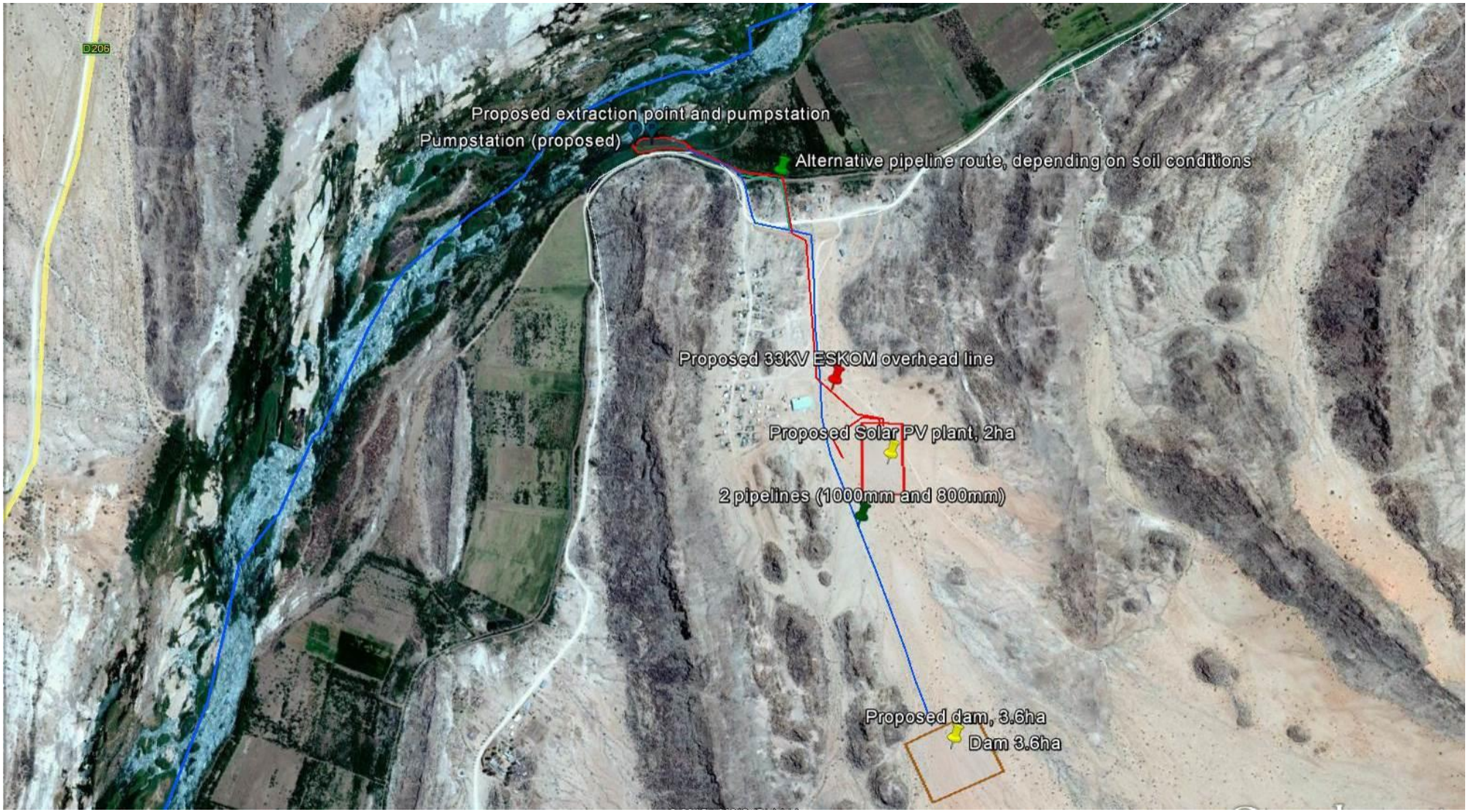

Figure 3: Google Earth image indicating the Orange River and proposed new infrastructure (zoomed)

6. FRESHWATER ECOSYSTEMS IN THE STUDY AREA

6.1. PHYSICAL CHARACTERISTICS OF THE STUDY SITE

A. VISUAL CHARACTERISTICS

The Orange River consists of various braided channels across the 300 – 500m width of the river in the study area. The vegetation is dominated by Phragmites reeds and the river bed consists of rocks with deeper pools in places and some sand deposits in places (Figure 4a and b).

The proposed abstraction point is situated on the inside of a bend with stable rocks on the southern bank of the river and relative deep water.

The existing irrigation distribution canal varies in size and decreases over the distribution distance as the flow in the channel diminishes as a result of the diversion of flow by users along the length of the canal. The canal is mostly earthen but does contain sections that are concrete-lined (at the start of the canal – Figure 4c) and plastic lined (at the end of the canal –Figure 5b).

Figure 4a and b: Braided Orange River channel downstream of the Onseepkans Bridge dominated by *Phragmites* reeds


Figure 4c & d: Diversion weir and sluice gate at start of the canal


Figure 5a and b: Earthen canal and plastic lined canal at the end of the distribution system

B. CLIMATE

Pofadder normally receives about 23mm of rain per year, with most rainfall occurring mainly during autumn. The chart below (lower left) shows the average rainfall values for Pofadder per month. It receives the lowest rainfall (0mm) in January and the highest (11mm) in March. The monthly distribution of average daily maximum temperatures (centre chart below) shows that the average midday temperatures for Pofadder range from 17.5°C in July to 31.4°C in January. The region is the coldest during July when the mercury drops to 2.3°C on average during the night. Consult the chart below (lower right) for an indication of the monthly variation of average minimum daily temperatures.

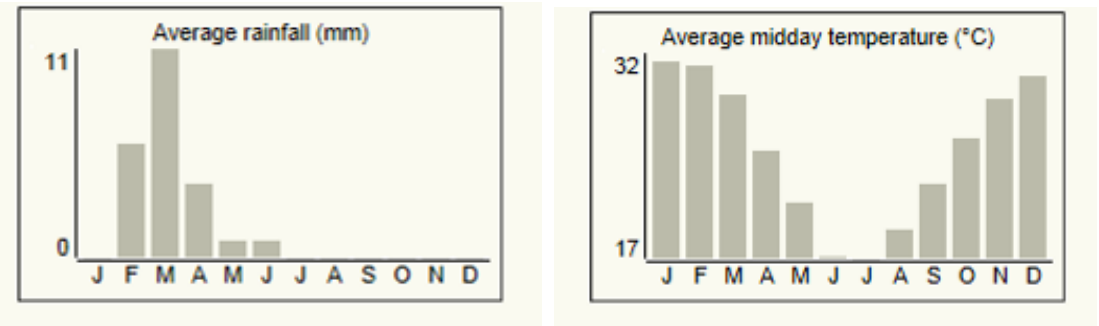

Figure 6a: Average monthly rainfall and temperature values for the Pofadder area (SA Explorer, 2012)

Flow in the Orange River is however not directly related to the regional rainfall patterns due to the fact that there are large instream dams that attenuate most of the flow from the upper Orange River catchment and the main catchment of the river also lies far to the east in Lesotho. Figure 6b shows the average monthly flow in the river for the past 5 years.

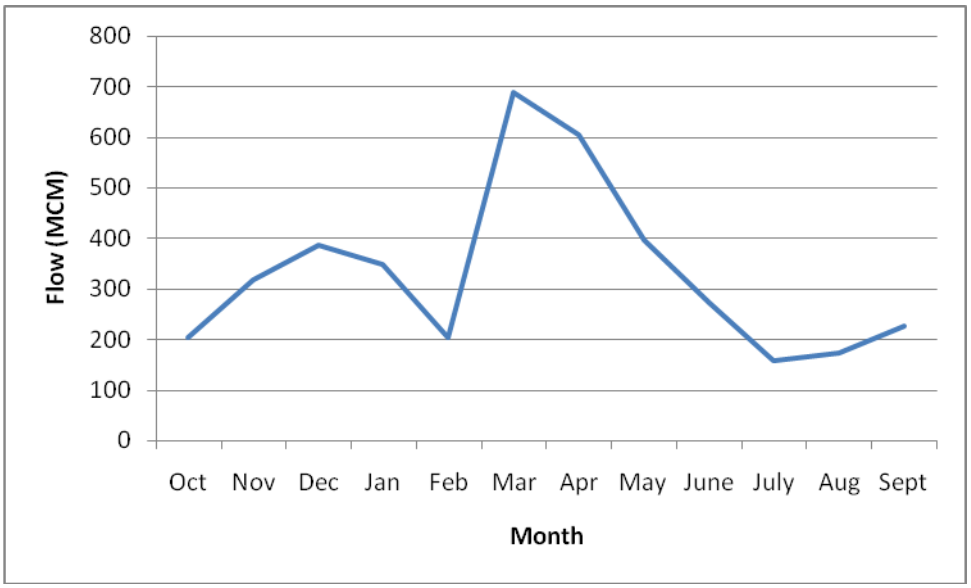

Figure 6b. Average monthly flow in the Orange River at Upington for the period (2003-2008)

C. GEOLOGY AND SOIL

The oldest rocks in Namaqualand belong to the Kheis System which forms part of the Basement Complex. Original sedimentary and volcanic features of the majority of the rocks (represented by granulite, gneiss and schist) have been more or less completely lost through regional and contact metamorphism.

In general the soils along the river channel are limited with shallow soils overlying rock. In the lower length of the canal the soils become slightly deeper although still of a restricted soil depth, with excessive drainage, high erodibility and low natural fertility.

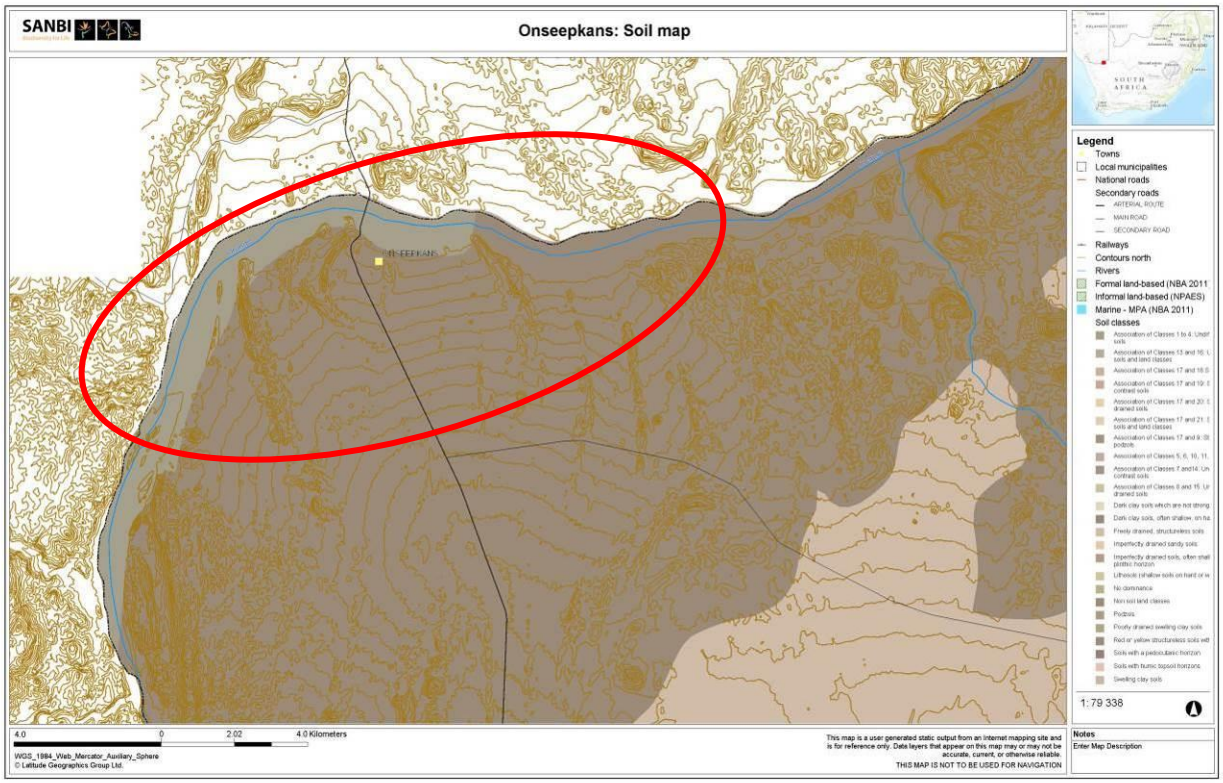

Figure 7: Soils map for the area and surroundings (SANBI Biodiversity GIS)

D. FLORA

The study area consists of the Azonal Vegetation biome along the river channel and a mix of Nama Karoo and Savanna biomes adjacent to the river. The Azonal Vegetation biome comprises of Lower Gariep Alluvial Vegetation (AZa3 blue in Figure 8) which is considered Endangered due to the large-scale loss of this vegetation type that has already taken place. Further away from the river channel is Eastern Gariep Rocky Desert (Dg10 – blue-grey) and Eastern Gariep Plains Desert (Dg9 - mauve), with Lower Gariep Broken Veld (NKb1 - red) occurring further to the east of the study area. There are still large portions of these vegetation types remaining and as a result they are considered to be least Threatened. More detail on the vegetation occurring along the river channel for the study area is provided in the following sections.

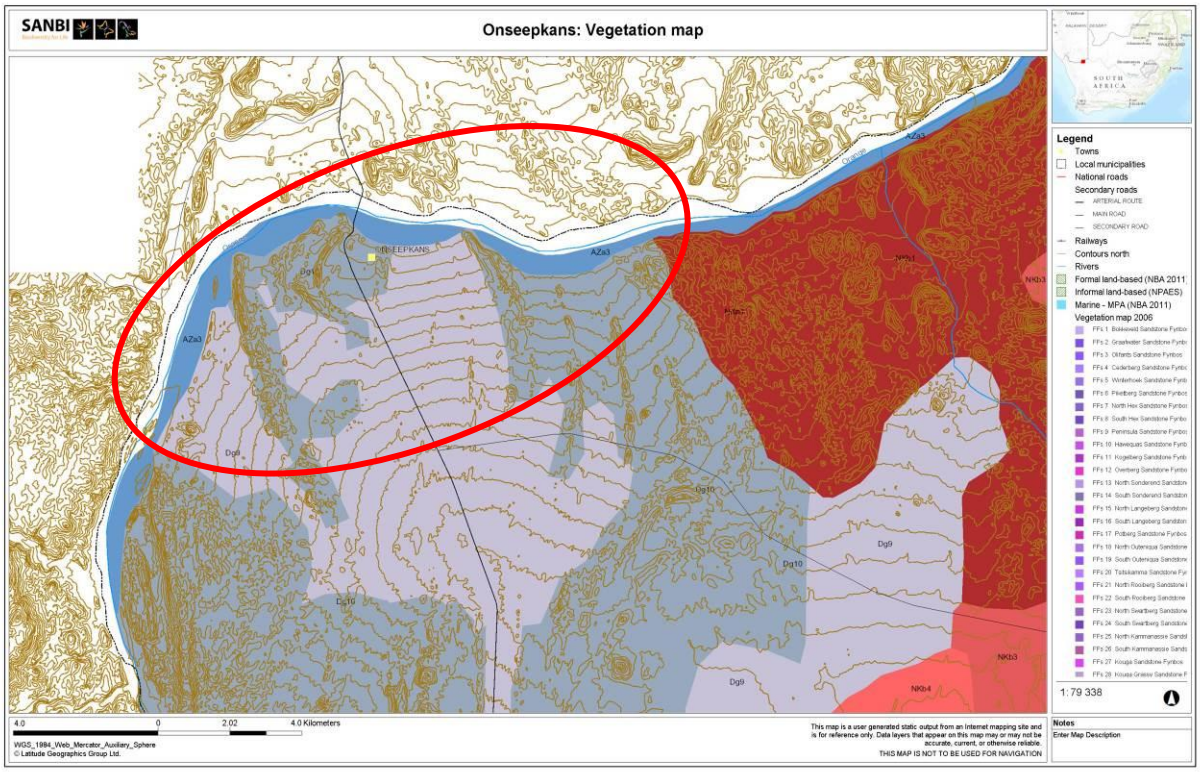

Figure 8: Vegetation map for the area (SANBI Biodiversity GIS)

E. AQUATIC FEATURES AND FAUNA

There are a number of drainage lines and small ephemeral streams draining from the south into the Orange River within the study area. The lower lying alluvial soils along the Orange River have been cultivated and if the ephemeral streams transect the irrigated areas they are canalised through the agricultural fields (Figure 11). The ephemeral streams are visible in the landscape due to the relatively wide sandy beds and, in some instances, by vegetation associated with the river beds and riparian zones. The river beds are typically sandy with shrubs and trees aligning the riparian zones.

The Orange River however dominates the surrounding landscape, and displays braided features with secondary channels that are only active during high flow events. The riparian vegetation in terms of species composition within the channel is still natural and consists largely of common *Phragmites australis* reeds along the river banks in the wetbank and lower wetbank zone and large trees (*Acacia Karoo*) in the upper wet and lower dry banks.

The South African side (southern bank) of the Orange River has been developed and cultivated to within the riparian zone. Vineyards in particular have been established in the riparian zone, resulting in many of the indigenous riparian trees and shrubs being removed in these areas. Some invasive alien plants such as *Arundo donax (*Spanish reed*)* and *Prosopis gladulosa* (mosquito bush) have invaded these disturbed areas.

The existing irrigation canal is situated parallel to the river between the riparian zone and the mountain outcrop in the area of the proposed new abstraction point (Figure 10).

Figure 9a: Orange River upstream from the Onseepkans border post at canal outlet point

Figure 9b: Orange River at Onseepkans Border Post Bridge (upstream view)

Figure 10: Irrigation distribution canal in the area of the newly proposed abstraction point

Figure 11: Ephemeral streams and drainage lines in the study area

F. PROTECTED AREAS

In South Africa two sets of mapping initiatives are available for the study area that are of relevance to the conservation and biodiversity importance of the aquatic ecosystems, that is, the Critical Biodiversity Areas map and the Freshwater Ecosystem Priority Areas map. The result of the mapping initiatives for the study area is included in Figures 12 and 13.

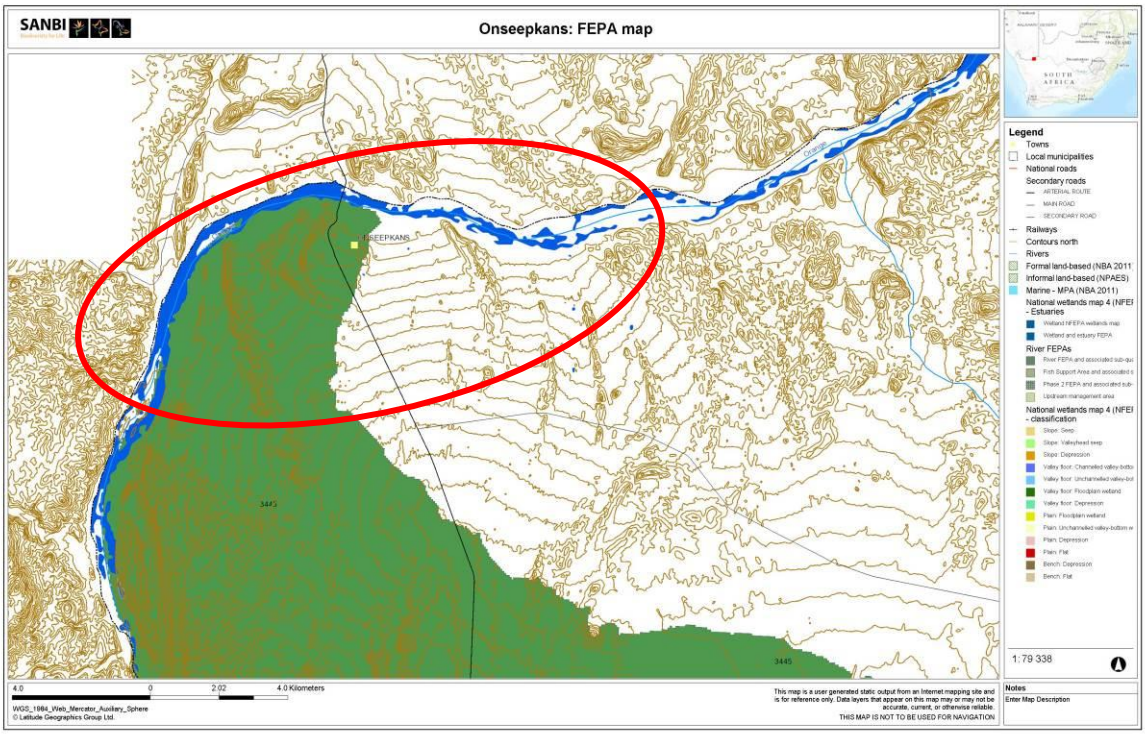

Figure 12: Freshwater Ecosystem Priority Area map for the area

In terms of Freshwater Ecosystem Biodiversity Areas, the lower section of the Orange River and its tributaries within the study area have been mapped as a River Freshwater Ecosystem Priority Area and a Fish Sanctuary for on endemic fish species *Labeobarbus kimberleyensis* (Vaal-Orange Largemouth Yellowfish). Further detail on the fish species of the lower Orange River is provided in the following section.

A goal of FEPA Fish Sanctuary is to keep further freshwater species from becoming threatened and to prevent those fish species that are already threatened from going extinct. In order to achieve this, there should be no further deterioration in river condition in fish sanctuaries and no new permits should be issued for stocking invasive alien fish in farm dams in the associated sub-catchment.

In terms of the Critical Biodiversity Areas (CBA), the channel of the Orange River has been mapped as a CBA2 (Important Area) due to the fact that it contains Lower Gariep Alluvium vegetation which is considered as endangered and the river provides an important corridor for migration. The CBA map indicates areas of land and aquatic features which must be safeguarded in their natural state if biodiversity pattern and process are to persist and ecosystems are to continue functioning. CBAs incorporate (i) areas that need to be safeguarded in order to meet national biodiversity thresholds; (ii) areas required to ensure the continued existence and functioning of species and ecosystems,

including the delivery of ecosystem services; and/or (iii) important locations for biodiversity features or rare species. From a management of aquatic ecosystems point of view, the objective for these areas is to maintain near-natural landscapes with no or limited loss of biodiversity pattern and limited loss of ecosystem processes.

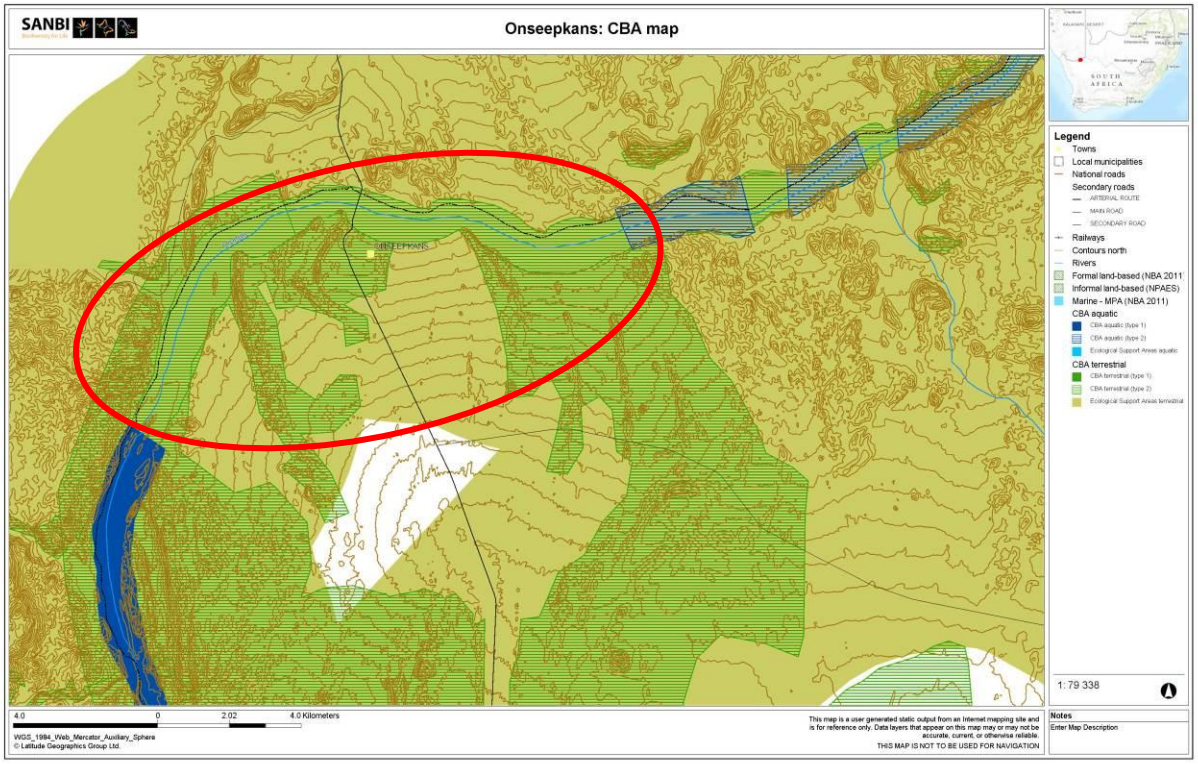

Figure 13: Critical Biodiversity Area map for the area

G. LAND USE

The Orange provides water via an irrigation scheme that has resulted in the establishment of cultivated areas along the river and its small tributaries. Lying in an otherwise arid region, the area along the southern bank of the Orange River is green with irrigated areas (primarily grapes, with lucerne, and wheat and in places mielies) as a result of the canal system (Figure 14). The small town of Onseepkans and the border post is located within the study area.

Although the area is mapped as a CBA the informal nature of the erection of dwellings and even formal structures are dispersed in the study area in particular in the “ephemeral valley” in which the dam and photo voltaic facilities are proposed (Figure 14b).

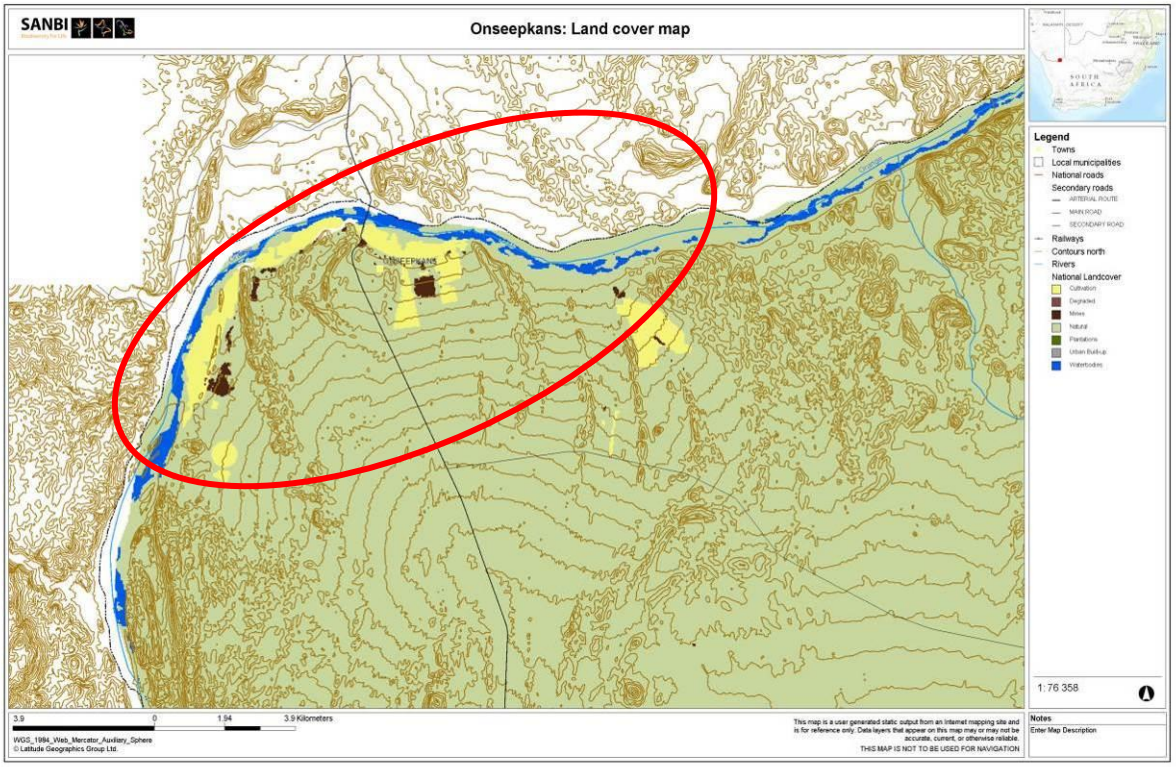

Figure 14a: Land use in the area

Figure 14b: Land use in the area – informal and formal structures erected in the direct study area

6.2. FRESHWATER ASSESSMENT

The purpose of the freshwater assessment is to determine the relative importance, sensitivity and current condition (ecological state) in order to assess the impact of proposed development activities on the freshwater resources. The assessment is also required to make recommendations in terms of mitigation measures that can be used to prevent or minimise the impact on the freshwater resources.

The Index for Habitat Integrity (IHI) and Site Characterisation Assessments were utilised to provide information on the ecological condition of the Orange River and the ephemeral tributaries and drainage lines within the study area. No detailed assessments were undertaken in terms of stream geomorphology, fish and aquatic biota, as the river is well studied and documented in terms of aquatic biota and fish. The nature of the proposed activities is such that if the proposed mitigation measures and buffer zones are adhered to it should not have an impact on aquatic organisms *per se*.

The results of the site characterisation assessment were used to provide a desktop estimate of the habitat integrity of the freshwater resources.

A. 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 un-impacted 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: 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.

Sub-regions: 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 Orange River Gorge Ecoregion (dominant types in bold)

Main Attributes	Characteristics
Terrain Morphology	Plains Low Relief (limited); **Closed Hills; Mountains; Moderate and High Relief**
Vegetation types	Upland Succulent Karoo; **Orange River Nama Karoo**
Altitude (m a.m.s.l)	0-1100
MAP (mm)	0 to 100
Coefficient of Variation (% of annual precipitation)	35 to >40
Rainfall concentration index	45 to >65
Rainfall seasonality	Very late summer to winter
Mean annual temp. (°C)	16 to 22
Mean daily max. temp. (°C): February	30 to >32
Mean daily max. temp. (°C): July	16 to 22
Mean daily min. temp. (°C): February	14 to 19
Mean daily min temp. (°C): July	2 to 7
Median annual simulated runoff (mm) for quaternary catchment	<5

B. SITE CHARACTERISATION

From the Site Characterisation assessment, the geomorphological and physical characteristics of the Orange River and one representative tributary that were assessed can be classified together as follows:

Table 3: Geomorphological and Physical features

River	Orange	Unnamed drainage lines and ephemeral streams
Valley Form	River gorge with small terraces	Lower Foothill
Lateral mobility or entrenchment	Stable channel/confined	Semi-Confined
Channel form	Compound	Simple
Channel pattern	Braided/branching channels flowing around islands	Single thread: low sinuosity
Channel type	Mixed alluvial and bedrock/boulders	Sandy/gravel bed
Hydrology	Perennial	Ephemeral

The catchment condition and land-use impacts on the site consist largely of agriculturally related disturbance activities (farming).

C. 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 Orange River and

one representative ephemeral stream on the southern side of the Orange River along the alternative route.

The methodology (DWAF, 1996 and updated in 2013) 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 river, 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 (Table 4a and 4b).

Table 4a: Habitat Integrity categories (From DWAF, 1996 and updated in 2013)

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**. A large loss of natural habitat, biota and basic ecosystem functions has 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 and the lotic system has been modified completely with an almost complete loss of natural habitat and biota. In worst instances, basic ecosystem functions have been destroyed and changes are irreversible.	0

Table 4b: Habitat Integrity categories and weightings (From DWAF, 1996 and updated in 2013)

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

The results of the habitat integrity assessments are summarised in Table 5. Both the riparian and instream habitat integrity of the Orange River can be described as being moderately modified. This is the result of flow modification, water quality changes and vegetation removal that have taken place in the entire catchment.

The unnamed ephemeral stream can be described as moderately to largely modified from its original state large due to the establishment of formal and informal houses and building on the banks of the sandy stream.

Table 5: Index of Habitat Integrity Assessment results and criteria assessed for the Orange River and the ephemeral streams

RIPARIAN ZONE HABITAT INTEGRITY	Orange River	Unnamed Ephemeral stream
Vegetation Removal (Impact 1 - 25)	6	15
Exotic Vegetation (Impact 1 - 25)	4	8
Bank Erosion (Impact 1 - 25)	5	6
Channel Modification (Impact 1 - 25)	8	12
Water Abstraction (Impact 1 - 25)	8	0
Inundation (Impact 1 - 25)	6	0
Flow Modification (Impact 1 - 25)	15	8
Water Quality (Impact 1 - 25)	8	0
INTEGRITY CLASS	**C**	**C/D**

INSTREAM HABITAT INTEGRITY	Orange River	Unnamed Ephemeral stream
Water Abstraction (Impact 1 - 25)	8	0
Flow Modification (Impact 1 - 25)	14	8
Bed Modification (Impact 1 - 25)	8	15
Channel Modification (Impact 1 - 25)	8	12
Water Quality (Impact 1 - 25)	8	4
Inundation (Impact 1 - 25)	4	0
Exotic Macrophytes (Impact 1 - 25)	4	0
Exotic Fauna (Impact 1 - 25)	6	0
Rubbish Dumping (Impact 1 - 25)	4	12
INTEGRITY CLASS	**C**	**C**

D. 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. The median of the resultant score is calculated to derive the EIS category (EISC).

Table 6: Definition of the four-point scale used to assess biotic and habitat determinants presumed 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 (i.e. SA Red Data Books)

Table 7: 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 (in terms of biota and habitat) are generally not very sensitive to flow modifications and usually have substantial capacity for use.	≤1

Table 8: Results of the EIS assessment for the unnamed tributaries

Biotic Determinants	**Orange**	**Tributaries**
Rare and endangered biota	3	0
Unique biota	3	0
Intolerant biota	2	0
Species/taxon richness	2	1
Aquatic Habitat Determinants		
Diversity of aquatic habitat types or features	4	1
Refuge value of habitat type	3	1
Sensitivity of habitat to flow changes	2	2
Sensitivity of flow related water quality changes	2	2
Migration route/corridor for instream and riparian biota	4	2
National parks, wilderness areas, Nature Reserves, Natural Heritage sites, Natural areas, PNEs	3	0
RATINGS	**3.0**	**0.7**
EIS CATEGORY	**High**	**Low**

The quaternary catchment area D81E and D81F has an average score of 3, indicating a high ecological importance and sensitivity. Although the small ephemeral tributaries fall within this catchment, their periodic and low flow contributes very little flow to the larger river system and they are considered to have a low ecological importance and sensitivity.

E. FISH OF THE ORANGE RIVER SYSTEM

The Orange River System is considered to be poor in fish species. Only 16 indigenous fish species occur in the river system, with many of them being cyprinids (especially *Barbus* species). Fish species occurring in the lower Orange River in the Onseepkans area are:

- *Barbus paludinosus* (Straightfin Barb)
- *Barbus trimaculatus* (Threespot Barb)
- *Labeobarbus aeneus* (Vaal-Orange Smallmouth Yellowfish)*
- *Labeobarbus kimberleyensis* (Vaal-Orange Largemouth Yellowfish)*
- *Labeo capensis* (Orange River Mudfish)*
- *Labeo umbratus* (Moggel)
- *Clarius gariepinus* (Sharptooth Catfish)
- *Tilapia sparrmanii* (Banded Tilapia)
- *Pseudocrenilabrus philander* (Southern Mouthbrooder)

**endemic to the Orange River System*

The Orange River fish are well adapted to unpredictable flow regime; in particular the increased flow rates and floods that normally occur in spring and summer (September to March) and all the indigenous fish species breed then. *T. sparrmanii* and *P. philander* are multiple spawners and breed locally through the summer months. *T. sparrmanii* prefers to establish breeding territories in sheltered macrophytes. *P. philander* nests are usually excavated in sand but have been found to make use of a variety of habitats.

Embryonic development times depend on the various spawning habits and habitats of the fish species. Species that breed in flooded margins (for example, *L. capensis, L. umbratus* and *C. gariepinus*) have rapidly hatching eggs (less than 24 hours). Eggs of the river spawning, *L. aeneus*, hatch in 2 to 5 days. Similarly, larval behaviour of the fish also depends on habitat - *L. umbratus* lay eggs on the temporary flooded banks and larvae swim repeatedly to the surface. Larvae of, *L. aeneus* however are inactive and sink to the bottom. The main threat during hatching is the washing down of larvae to unfavourable habitats.

Most Orange River fish are omnivorous, ranging from dominantly herbivorous to carnivorous. *Labeo* species are benthic detritus and epiphytic feeders, *L. kimberleyensis* are piscivorous, and *P. philander* eat small fish and invertebrates. Feeding seasonality depends largely on the availability of the availability of the source of food.

Of specific concern in terms of the different indigenous fish species occurring in the Orange River at Groblershoop are the Orange River yellow fishes and the Orange River Mudfish, which are endemic to the river system. The smallmouth yellowfish (*L. aeneus*) is typically the more abundant and widespread and occurs in the mainstream sections of the Orange and Vaal Rivers and also penetrates high up into smaller tributary sub-systems (Conservation status: Not threatened). The fish is hardy, adaptable and an opportunistic feeder of plants, invertebrates and small fish. They spawn in shallow rocky areas (including riffles and rapids) from spring (October to February when the water temperature rises above 19 ^{0}C).

Similarly, the Orange River Mudfish is common and abundant to the Orange River both below and above Augrabies Falls. The species is well adapted to many habitats but prefers the flowing rocky channels of the lower Orange River.

In contrast the largemouth yellowfish (*L. kimberleyensis*) appears to be confined to the mainstream sections on the Vaal and Orange Rivers and has been given the conservation status of near threatened. It is sensitive to changes in water quality, flow and habitat and is therefore a good indicator of human impacts. This large fish (up to 22 kg) prefers large rivers with large pools and adapts well to dams and weirs. It is a predator fish, feeding on smaller fish, crabs, frogs and insects.

7. IMPACTS OF PROPOSED CONSTRUCTION OF THE PIPELINE AND STORAGE DAM

A. DESCRIPTION AND ASSESSMENT OF IMPACTS OF PROPOSED ACTIVITIES

This section provides an assessment of the impacts to freshwater ecosystems that are likely to be associated with proposed construction of the pump house, pipeline and storage reservoir.

The potential impacts on the freshwater resources can be divided into impacts associated with the construction of the pump house, pipeline and storage dam and those impacts related to the maintenance of the infrastructure.

IMPACT OF CONSTRUCTION PHASE

The construction phase will include the following activities:

- Installation of pump house and abstraction point;
- Excavation of trenches for pipeline to storage dam;
- Excavation of storage reservoir; and
- Construction of the storage dam.

Nature of Impact: Construction activities would include the removal of vegetation to obtain access to the abstraction point and pipeline route. The excavation of the trenches to install the abstraction pipes and back filling the trenches.

Activities during the construction phase of the project could thus be expected to result in ***disturbance of vegetation cover*** in the riparian zones of the Orange River and possible disturbance of the area. There would also be disturbance along the ephemeral streams where the pipeline will be installed.

Significance of impacts without mitigation: A localized shorter term impact of **moderate to high** intensity (depending on the footprint of the construction activities in the riparian zone) that is expected to have a **low** overall significance in terms of its impact on the identified aquatic ecosystems in the area.

Proposed mitigation:

- Construction activities should be kept to a minimum within the Phragmites zone of the riparian area.

- Material (infill) should not be sourced from the riparian zones;
- Excess excavated material should not be dumped into the riparian zones;
- Existing dumped material along the maintenance road should be removed and placed back into the trench as backfilling. This should be done in such a way as not to bulldoze non disturbed areas or to widen the existing road;
- The exotic trees currently growing in the riparian zones should be cut and the stumps treated with herbicide to prevent re-growth;
- Where possible the ephemeral streams previously cut off from the Orange River by the trench should be reconnected with the river; and
- Appropriate construction methods should be deployed to ensure the prevention of erosion of the filled-in trenches during flood events which would prevent the need to undertake repetitive infilling of eroded areas once construction is completed.
- The riparian zone areas should be re-planted with Phragmites in the areas where Phragmites has been removed. This can be done to digging sods out and replanting it in the affected area.
- The design of the pump house and inlet pipes must be done in such a way as to minimize the amount of infrastructure that needs to be placed in the rocky river banks. This could be achieved by the creation of a sump area for the inlets with a pump house some distance away from the actual inlet and riparian zone. See example in Figure 15.

Significance of impacts after mitigation: A localized, short-term impact will still occur during the construction phase; however, the overall significance of the impact on the aquatic ecosystems is expected to be **low.**

Figure 15: Example of pump sump situated away from the water resource (connected with pipes underground)

IMPACT OF OPERATIONAL AND MAINTENANCE PHASE

The operation phase activities relates to the following:

- Use of the maintenance roads and repairs to infrastructure in the riparian zone;
- Dredging inlet sump; and
- The operation of the reservoir and pipeline system.

Use of the maintenance road and pipeline

Nature of Impact: The creation of truck turning circles and widening of the maintenance road may occur during regular use of the road and servicing the inlet pipes and inlet structure.

The dredging of inlet sump to prevent that water with a high sediment load is abstracted.

The disposal of excess material from the road and other maintenance activities into the riparian zone may take place during this phase. The establishment of alien vegetation in the riparian zones and ephemeral stream bed and banks will also most likely occur.

Significance of impacts without mitigation: A localized longer term 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.

Proposed mitigation:

The design of the inlet sump should be such that an attempt is made to prevent the siltation of the sump and therefore minimise the need to clean the inlet sump.

Alien vegetation should be removed from the disturbed areas along the pipeline and road that are within or adjacent to the riparian zone and the areas should be kept clear of alien invasive vegetation. No material should be disposed into the riparian zone. The maintenance road should not be widened into the riparian zones. Erosion should be prevented especially in the upper reaches of the pipeline where steeps slopes down to the river occur.

Significance of impacts after mitigation: A localized, long-term impact of a low overall significance could be expected to occur.

Cumulative impact of the activities on freshwater ecosystems:

Erosion and sedimentation from the project activities within the riparian and instream zone of the Orange River and its minor tributaries within the study area, together with establishment of invasive alien vegetation within the disturbed areas, is the most likely consequences of the project. These impacts are likely to be of a low significance considering the existing state of the riparian zone of the

Orange River and its tributaries in this area and can be monitored and easily mitigated. The overall improvement of water use efficiency, and therefore the reduction in the need to divert water would contribute towards the overall protection of the water resource and mitigation of the potential impacts.

B. SUMMARY OF ASSESSMENT OF POTENTIAL IMPACTS OF THE PROPOSED ACTIVITIES:

CONSTRUCTION PHASE ACTIVITIES:

Table 9: Construction phase impact summary for the proposed pump house, inlet sump and pipeline

Potential impact on freshwater features	**Proposed constriction of pump house, pipeline and storage reservoir**
Nature of impact:	Disturbance of riparian habitat
Extent and duration of impact:	Localised short term impacts
Intensity of Impact	Moderate
Probability of occurrence:	Probable depending on the extent of the construction activities in the riparian zone and the existing service road and canal
Degree to which impact can be reversed:	High
Irreplaceability of resources:	Medium to Low
Significance of impact pre-mitigation	Low
Cumulative impact prior to mitigation:	Moderate
Degree of mitigation possible:	High
Proposed mitigation:	➢ Construction activities should not widen the existing maintenance road along the existing canal or create disturbed areas within the riparian zone which is more than what is really required in the riparian zone; ➢ Material (infill) should not be sourced from the riparian zones; ➢ Backfilling of excess material should not take place in the riparian zones; ➢ Excess material (and concrete slabs and pipes) should not be dumped into the riparian zones; ➢ Existing dumped material along the maintenance road should be removed and placed back into the trench as backfilling. This should be done in such a way as not to bulldoze non disturbed areas or to widen the road; ➢ The alien invasive trees currently growing in the riparian zones should be cut and the stumps treated with herbicide to prevent re-growth; ➢ The unnamed ephemeral stream previously cut off from the Orange River by the trench and road should be reconnected with the river; and ➢ Appropriate construction methods should be deployed to ensure the prevention of erosion of the filled-in trenches during flood events which could require the repetitive refilling the pipeline trenches once construction is completed.
Significance after mitigation	Low
Cumulative impact post mitigation:	Low impact

OPERATION PHASE ACTIVITIES:

Table 10a: Operational phase impact summary for the proposed pipeline

Potential impact on freshwater features	**Proposed maintenance of the roads and infrastructure**
Nature of impact:	Disturbance of habitat and widening of the road along the Orange River
Extent and duration of impact:	Localised longer term impacts
Intensity of Impact	Low
Probability of occurrence:	Probable
Degree to which impact can be reversed:	High (can be prevented)
Irreplaceability of resources:	Moderate to Low
Significance of impact pre-mitigation	Low
Cumulative impact prior to mitigation:	Low
Degree of mitigation possible:	High
Proposed mitigation:	➢ Alien vegetation should be removed from the disturbed areas along the pipeline and road that are within or adjacent to the riparian zone and the areas should be kept clear of alien vegetation. ➢ No material should be disposed into the riparian zone. ➢ The maintenance road should not be widened into the riparian zones. ➢ Erosion should be prevented especially in the upper reaches of the pipeline where steeps slopes down to the river occur.
Significance after mitigation	Low
Cumulative impact post mitigation:	Low impact

8. CONCLUSIONS AND RECOMMENDATIONS

The Orange River dominates the surrounding landscape, and displays braided features with secondary channels that are only active during high flow events. The riparian vegetation in terms of species composition within the channel is still largely natural. The South African side (southern bank) of the Orange River has been developed and cultivated into the alluvial riparian zone. The proposed inlet structure and pump house could potentially impact on these freshwater features.

The freshwater assessment of the proposed activities to the features described above indicates that:

- The Orange river is in a moderately modified present ecological state and has a high ecological importance in these lower reaches,
- In general the ephemeral streams and small drainage lines are largely natural with a low ecological importance,
- The biodiversity conservation mapping has indicated that the lower section of the Orange River and its tributaries within the study area have been mapped as a River Freshwater Ecosystem Priority Area and a Fish Sanctuary for on endemic fish species, while the channel of the Orange River has been mapped as a CBA2 (Important Area) due to the fact that it contains Lower Gariep Alluvium vegetation which is considered as endangered and the river provides an important corridor for migration.
- There are a number of drainage lines and small ephemeral streams draining from the south into the Orange River within the study area. The ephemeral streams are visible in the landscape due to the relatively wide sandy beds and, in some instances, by vegetation associated with the river beds and riparian zones. The unnamed ephemeral stream that will be impacted is largely modified and of low ecological importance.

Erosion and sedimentation from the project activities within the riparian and instream zone of the Orange River and its minor tributaries within the study area, together with establishment of invasive alien vegetation within the disturbed areas, are the most likely consequences of the project. These impacts are likely to be of a low significance considering the existing state of the riparian zone of the Orange River and its tributaries in this area and can be easily mitigated. The overall improvement of water use efficiency, and therefore the reduction in the need to use earthen diverted water would contribute towards the overall protection of the water resource and mitigation of the potential impacts.

Thus, provided that the recommended mitigation measures are implemented the significance of the impact is expected low.

A water use authorization may need to be obtained from the Department of Water Affairs Northern Cape Regional Office for approval of the water use aspects of the proposed activities.

9. REFERENCES

Agnew, J.D. (1986). *Invertebrates of the Orange-Vaal System with emphasis on Ephemeroptera*. In: The Ecology of River Systems. Editors: Davies, B.R. and Walker, K.F.

Botanical Society of South Africa. (2008). Namakwa District Biodiversity Sector Plan

Cambray, J.A., Davies, B.R. and Ashton, P.J. (1986*). The Orange-Vaal River System*. In: The Ecology of River Systems. Editors: Davies, B.R. and Walker, K.F.

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). *Lower Orange Water Management Area Water Resources Situation Assessment Main Report* (Final): Volume 1 of 2. Report No: 14000/00/0101. Directorate Water Resources Planning, Department of Water Affairs and Forestry, Pretoria.

Department of Water Affairs and Forestry. (2007). *River Ecoclassification: Manual for Ecostatus Determination (Version 2)*. Riparian Vegetation Response Index, Water Research Commission Report Number KV 168/05. Pretoria.

Kleynhans CJ (1996). A qualitative procedure for the assessment of the Habitat Integrity status of the Luvuvhu River (Limpopo system, South Africa). Journal of Aquatic Ecosystem Health 5: 41-54.

Kleynhans, CJ, Thirion, C and Moolman, J (2005). *A Level I River Ecoregion classification System for South Africa, Lesotho and Swaziland.* Report No. N/0000/00/REQ0104. Resource Quality Services, Department of Water Affairs and Forestry, Pretoria, South Africa.

Kleynhans CJ, Louw MD, Graham M. (2008). Module G: EcoClassification and EcoStatus determination in River EcoClassification: Index of Habitat Integrity (Section 1, Technical manual) Joint Water Research Commission and Department of Water Affairs and Forestry report. WRC Report No. TT 377-08

Mucina, L. and Rutherford, M. C. (eds.) (2004) Vegetation map of South Africa, Lesotho and Swaziland. Strelitzia 18. South African National Biodiversity Institute, Pretoria.

SANBI Biodiversity GIS 2012. http://bgis.sanbi.org/capetown/bionetwork.asp

Skelton, P.H. (1986). *Fish of the Orange-Fish System*. In: The Ecology of River Systems. Editors: Davies, B.R. and Walker, K.F.

Skelton, P. (2001). *A complete guide to the freshwater fishes of Southern Africa.* Cape Town.

Wolhuter, L. and Impson, D. (2007). *The State of the Yellowfishes in South Africa*. WRC Report TT 302/07.

10. BACKGROUND AND QUALIFICATIONS OF SPECIALIST CONSULTANTS

Contact details: PO Box 455, Somerset Mall, 7137

Name: Mr Dana Grobler and Ms Antonia Belcher

Profession: Mr Dana Grobler (Environmental Scientist – *Pr. Sci. Nat 400058/93*) and Ms Antonia Belcher (Aquatic Scientist *Pr. Sci. Nat.* 400040/10);

Fields of Expertise: Specialist in environmental water requirements, river and wetland monitoring and reporting.

Relevant work experience (Ms Antonia Belcher):

Due to Ms Belcher's involvement in the development and implementation of the River Health Programme as well as the Resource Directed Measures (RDM) directorate of the Department of Water Affairs in the Western Cape, she has 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 in the Western Cape.

Relevant publications:

- More than **200 freshwater assessments** studies as input into EIA decision making processes. Toni has conducted more than **100 water use license applications**.
- Completed more than **25 roads, power line and substation and alternative energy projects**.
- Belcher, A. 2012. Freshwater Assessment for the Proposed Fourth Kloof Diversion Scheme.
- Belcher, A. 2012. Freshwater Assessment for the Proposed Enlargement of the Brakleegte and Rietvlei dams on Farm De Rietvalley 150, Robertson.
- Belcher, A. 2011. Freshwater Assessment: Mapoteng Water Supply Infrastructure Project Environmental Management Plan.
- Belcher, A. 2010. Freshwater Assessment for the Proposed Dam at L'Ormarins, Portions 1 and 4 of Farm 1206, Riebeeksrivier, in the District of Malmesbury.
- Belcher, A. 2010. Freshwater Assessment for the Proposed Dam at L'Ormarins, Franschhoek
- Belcher, A. 2010. Freshwater Assessment for the Proposed Storm Water Rehabilitation Work at Zevenwacht.
- Belcher, A. 2009. Freshwater Assessment for the Proposed Raising of Lushof Dam, Prince Alfred Hamlet.
- Belcher, A. 2009. Freshwater Assessment input into the Environmental Management Plan for Moorreesburg and Malmesbury.
- Belcher, A. 2008. Ecological Assessment of the Vlermuiskelderskloof Spruit. Proposed construction of an instream dam, Farm 143 Portion 4, Napier.
- Belcher, A. 2007. Assessment of the Proposed Second Hiking Route on the Whale Route, De Hoop Nature Reserve: Impacts to Freshwater Ecosystems, Cape Nature.

Relevant work experience (Mr Dana Grobler):

- More than **35 freshwater assessment studies** and has assisted in the compilation of more than **50 Water use authorisation applications**.
- More than **15 power line and substation applications** and more than **5 alternative energy projects**.
- Freshwater impact assessments and water use authorisation applications for various solar and other renewal energy projects in South Africa;
- Feasibility study phase of the regional integration of the bulk water supply systems of the Knysna and Bitou municipalities. Subcontractor to Aurecon for the Ecological Reserve and water environmental aspects;
- Development of RDM curriculum for a Master degree programme at University of science institutions in South Africa. Module 9 – Implementation, system operations and management to give effect to environmental water requirements;
- Low level helicopter survey and video recording of rivers of the Stellenbosch local municipal area and the Berg River;
- IWETS – **I**mplementation of **W**ater **E**ducation, **T**raining and **S**kills development in South Africa. Research team member and South African representative of a Dutch/DBSA funded research project (2011-2012);
- Technical team member for various water use license applications in the Western Cape Province, South Africa (2010 – 2012);
- Project manager and technical team member for the Free State River Health monitoring programme (2011 – 2013); and
- Project manager for the classification of water resources in the Olifants Doorn Water Management Area, Western Cape, South Africa (2010 – 2012). The study included economic, ecological and social aspects of water use and management in the catchment.

10.1 DECLARATION OF INDEPENDENCE (MR DANA GROBLER)

I, Dana Grobler, 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, 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 and will not have no 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.

Note: The terms of reference is included in the following section.

Signature of the specialist:

Mr Dana Grobler
Date: 17 January 2016

10.2 DECLARATION OF INDEPENDENCE (MS ANTONIA BELCHER)

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, 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 and will not have no 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.

Note: The terms of reference is included in the following section.

Signature of the specialist:

Ms Antonia Belcher
Date: 17 January 2016