FINDINGS OF AN AQUATIC SURVEY DONE IN REGARD TO THE UPGRADING OF A RURAL WATER SUPPLY SCHEME ON THE IBISI RIVER, KWAZULU-NATAL

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For:	GIBB (Pty) Ltd

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1. INTRODUCTION

SiVEST SA (Pty) Ltd, has been appointed by GIBB (Pty) Ltd to undertake a Terrestrial Biodiversity Assessment Report, for the proposed upgrade of bulk water infrastructure and construction of a new water abstraction point, access road and rising main, at the Ibisi River abstraction point and Water Treatment Works, within the Umzimkhulu Local Municipality, Harry Gwala District Municipality (HGDM). The project, which started in 2009 entailed the development of a water supply scheme for the villages of Masameni, Mnqumeni, Ndlovini and Ehlanzeni in the Umzimkhulu Local Municipality. The scheme is supplied via a run of river abstraction on the Ibisi River and a 2Mℓ/day Water Treatment Works (WTW) located approximately 450m from the river abstraction site.

However, the original abstraction point was damaged during floods and is no longer able to supply water in a consistent manner. Therefore the HGDM appointed GIBB (Pty) Ltd to assess the existing system and identify options to address the operational failures and evaluate how best to supply the existing system and ensure that all villages receive water in accordance with its municipal water supply standards.

This report presents the findings of a survey of the aquatic biodiversity and its condition at the site of the proposed new abstraction works. Impacts are considered in terms of both the National Environmental Management Act (Act No. 107 of 1998) (NEMA), and of the National Water Act (Act No. 36 of 1998) (NWA). The findings are that the impacts on the aquatic ecosystem will be minimal although some care will be required in the construction process.

2. PROJECT DESCRIPTION

The project consists of construction of a new water abstraction works to feed into the existing treatment works and thereafter decommissioning the existing water abstraction infrastructure. While the existing site (Option A) was reconsidered it was found to be unsuitable as a result of hydraulic and sediment dynamics at that point and so it was disregarded. Two new sites were considered as shown in Figure 1. The first alternative (Option B) is situated approximately 450 m upstream of the existing works while the second is approximately 3.6 km downstream of the works (Option C). On assessment, the upstream site was found to be preferable in almost all regards including site structure, ease and cost of new access route, and pumping head required to reach the water treatment works.

Figure 1: Location of the three candidate sites for a water abstraction works. (From GIBB, 2021)

The new abstraction works will consist of a tower structure constructed on a rock ledge and housing three submersible pumps which deliver water upwards to feed into a rising main leading the treatment works. The site will not require the construction of a weir across the river but will instead make use of natural structures in the bedrock to bring water to the pumps and to remove surplus flow past the intakes. Minor deepening of the existing channels may have to be done by means of blasting. See Figure 2 and Figure 3.

A new access road will have to be constructed to link the existing road to the new site and the pipeline will follow along the same road routes. Presently estimated water requirements are shown below (GIB, 2021):

- Current (2020) demand (177m3/hr)
- 25-year (2045) demand (354m3/hr)
- 50-year (2050) demand (711m3/hr)

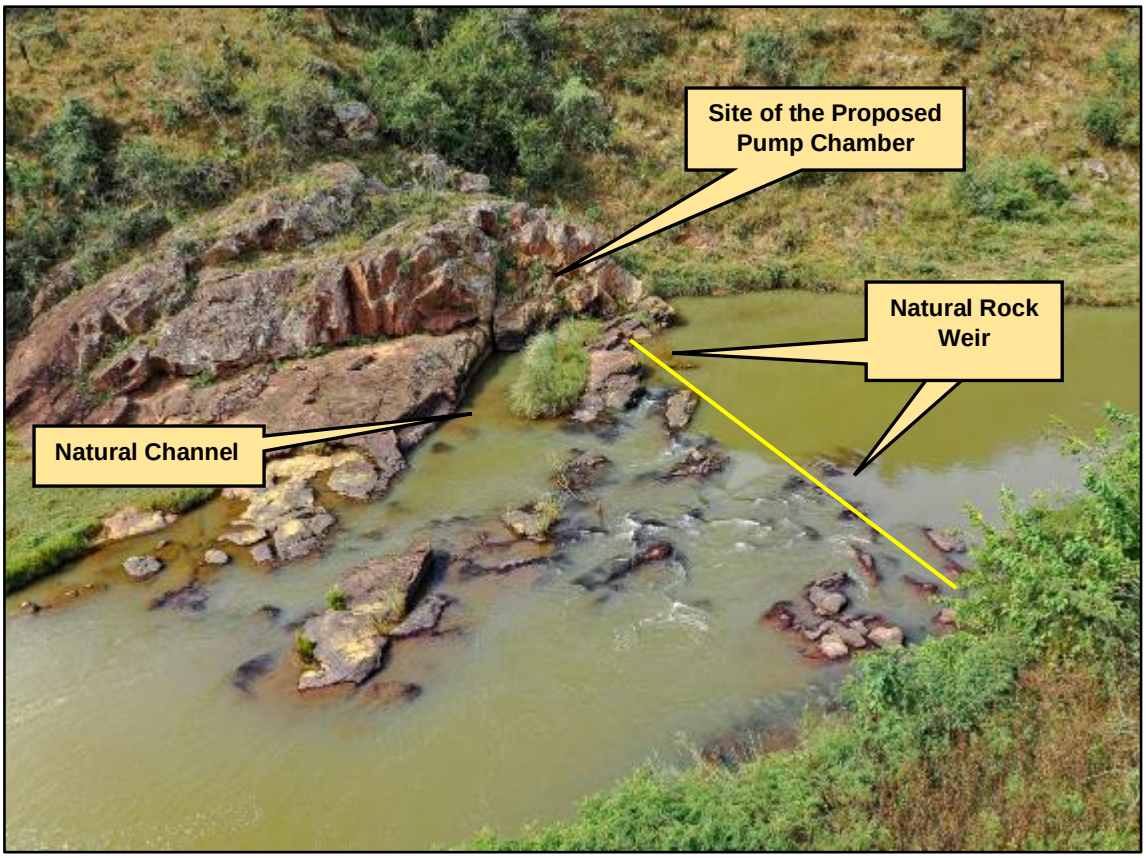

Figure 2: Location of the proposed water abstraction works.

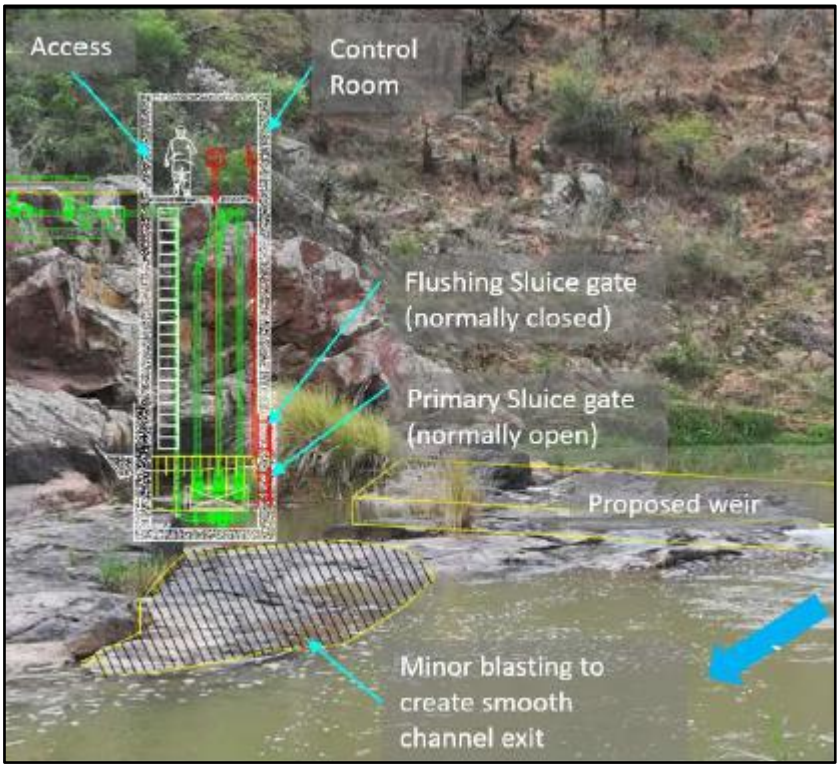

Figure 3: Proposed water abstraction works (from GIBB, 2021)

3. STUDY SITE

The project site is located within the Mvoti to Umzimkulu Water Management Area and is in Quaternary Catchment T52H. The study area is at the lower end of the catchment and the Ibisi River flows into the Umzimkulu River at a point some 11 km by run of channel downstream. The Ibisi is NFEPA listed as it is an important tributary of the Umzimkulu River and is classified as being in Class C (Moderately Modified). A single study site was selected for the purposes of the aquatic survey and included a section of river which was approximately 250 m in length. This section was chosen after looking at a greater length of river and was selected on the basis of the following criteria:

- The section had to be representative of the general characteristics of the river in the vicinity of the proposed new water abstraction works since any future monitoring would need to consider the river as a complete and functional system and would not focus on just one small site. Criteria considered included channel width and depth, presence of pools riffles and rapids, substrate types, and marginal and riparian vegetation.
- The study site had to be usable in terms of the instream habitats that could be sampled. Since the preferred abstraction site is bedrock and boulder dominated, it is very limited in extent and habitat diversity and is too restrictive to be used as a study area. A common situation in the larger rivers in the area is that the bed becomes “armoured” with there being few stones/cobbles that can be dislodged in order to sample the fauna which commonly occupy spaces under stones. It is noted that the study area does not include the development site as required by the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity, but it is just 110 m downstream of the site for functional reasons and so can serve the intended purpose.
- The study site had to be close to the proposed abstraction works but, at the same time, not be affected by them during the operational phase.
- The study site had to be accessible and be clearly identifiable.

The coordinates of the site selected are shown in Table 1.

Table 1: Location of the survey site on the Ibisi River

Point	Latitude	Longitude
Upper End	30° 27' 17.02"	30° 0' 39.21"
Centre	30° 27' 13.86"	30° 0' 38.14"
Lower End	30° 27' 10.60"	30° 0' 37.00"

The river has rough bedrock sections which form runs or rapids depending on water levels and are interspersed with flat sections of linear flow and some pools where upstream counter currents may develop. Because of the bedrock, much of the substrate is armoured but a median bar with loose rock riffles was found at the lower end of the site. A footbridge crosses the river at a point near the centre of the study area, and a drift which is used by cattle and may also be used by vehicles at times of low flow conditions is near the lower end of the study area.

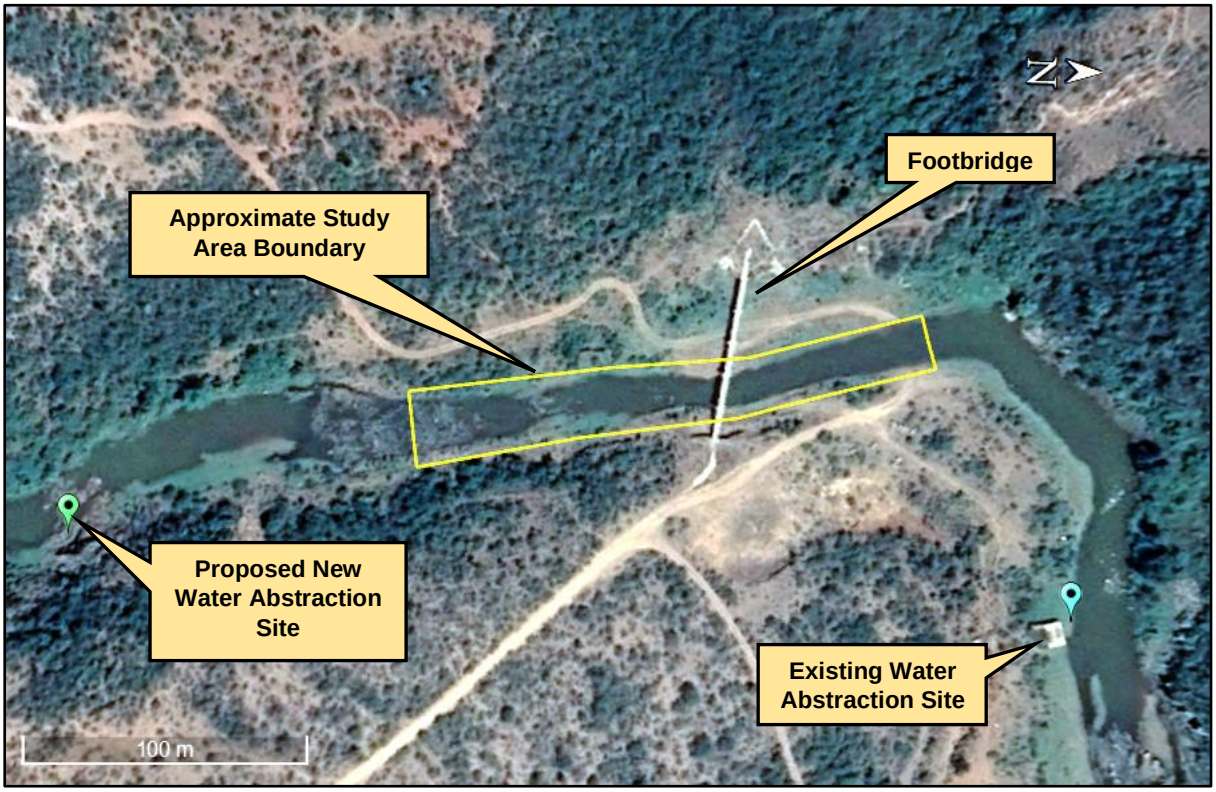

Figure 4: View of the Ibisi River section during low flow conditions to show channel rock structures

The primary channel banks include flood benches with the most important being at approximately 1m above the observed water level at the time of the site inspection (27/04/2021). The whole section is confined by steep and rocky slopes which rise at least 30m – 50m above the channel and so is generally no more than 50m to 60m wide at river level.

Riparian vegetation is included in Eastern Valley Bushveld (Type SVs6) Mucina and Rutherford (2006). Grasses predominate on the flood bench closest to the water with Kweek Grass (*Cynodon dactylon*), Buffalo Grass (*Aristida congesta* subsp. *congesta*), Ngongoni Grass (*Aristida junciformis*), Weeping Love Grass (*Eragrostis curvula*), and Silky Grass (*Imperata cylindrica*) being most abundant. These were heavily grazed by livestock belonging to residents of the area. On the river margin were species such as Spike Reed (*Phragmites mauritianus*), Broom Grass (*Miscanthus capensis*) and some clumps of River Grass

(*Arundunella nepalensis*). The outer parts of the channel on steeper slopes included Bitter Aloe (*Aloe ferox*), River Bushwillow (*Combretum erythrophyllum*), Sickle Bush (*Dichrostachys cinerea*), Euphorbia (*Euphorbia triangularis*) and Blue Spike-Thorn (*Gymnosporia glaucophylla*). No aquatic macrophytes were noted within the water.

Plate 1: View of the study area upstream of the footbridge

In addition to the consideration of the site in terms of its observed physical conditions, it was also assessed by means of the mandatory Screening Tool as Gazetted in in Government Notice 320 of 20 March 2020 for impacts on aquatic biodiversity. (https://screening.environment.gov.za/ScreeningDownloads/AssessmentProtocols/Gazetted_Aquatic_Biodiversity_Assessment_Protocols.pdf)

The screening indicated Very High Sensitivity for Wetlands and Estuaries as shown in Figure 5 but no aquatic species are listed. Site inspection of the conditions along the river indicated that the wetland characteristics associated with the river consisted of a narrow strip of vegetation as described above in the riparian vegetation. See also Annexure 3.

Figure 5: Extract from the Screening Report indicating Aquatic Sensitivity

4. ASSUMPTIONS AND LIMITATIONS

Assumptions and limitations relating to the aquatic survey are as follows:

- The project sites which were considered were provided by the engineers and so are assumed to be sound;
- The survey was done at a time shortly after the river had experienced very high flow levels and so the aquatic fauna resident in the stream bed may have been disrupted and been in a phase of returning to normal; and
- Water levels were moderately high at the time of the survey making sampling difficult. However, the specialist's previous experience of the same river indicated that the findings were similar to those of other surveys and that the results were credible.

5. SURVEY TECHNIQUES

5.1 SASS Survey

The aquatic invertebrate survey was done in accordance with the SASS procedure (Chutter, 1994, 1998) and the SASS5 protocol (Dickens and Graham, 2002) was adhered to. The work was undertaken by an accredited SASS practitioner. Determination of the River Class was done by means of reference to the Biological Bands of Dallas (2007) with the figure for the South-eastern Uplands (Lower) Ecoregion being used with the definitions of the River Classes as shown in **Error! Reference source not found.**. Conditions at the site were generally suited to the procedure and it was possible to sample all of the mandated habitat types.

Table 2. River Present Ecological Class scoring scale. Modified from Macfarlane et al, 2008

Description	PES Category
Unmodified, natural.	A
Largely natural with few modifications. A slight change in ecosystem processes is discernable and a small loss of natural habitats and biota may have taken place.	B
Moderately modified. A moderate change in ecosystem processes and loss of natural habitats has taken place but the natural habitat remains predominantly intact	C
Largely modified. A large change in ecosystem processes and loss of natural habitat and biota and has occurred.	D
The change in ecosystem processes and loss of natural habitat and biota is great but some remaining natural habitat features are still recognizable.	E
Modifications have reached a critical level and the ecosystem processes have been modified completely with an almost complete loss of natural habitat and biota.	F

5.2 Fish Survey

The fish survey was done by means of electrofishing with a SAMUS 12v DC apparatus. Approximately 150 m of river was shocked and both still and running water were included. Moderately high flows and turbid water (Clarity = 34 cm) at the time of the site survey made for difficult conditions. Only the extreme edges of the channel could be reached and, although suitable habitat was included, no fish were captured.

5.3 General Observations

During the course of the site surveys observations were made on other components of the aquatic environment which would provide pointers toward the health of the system.

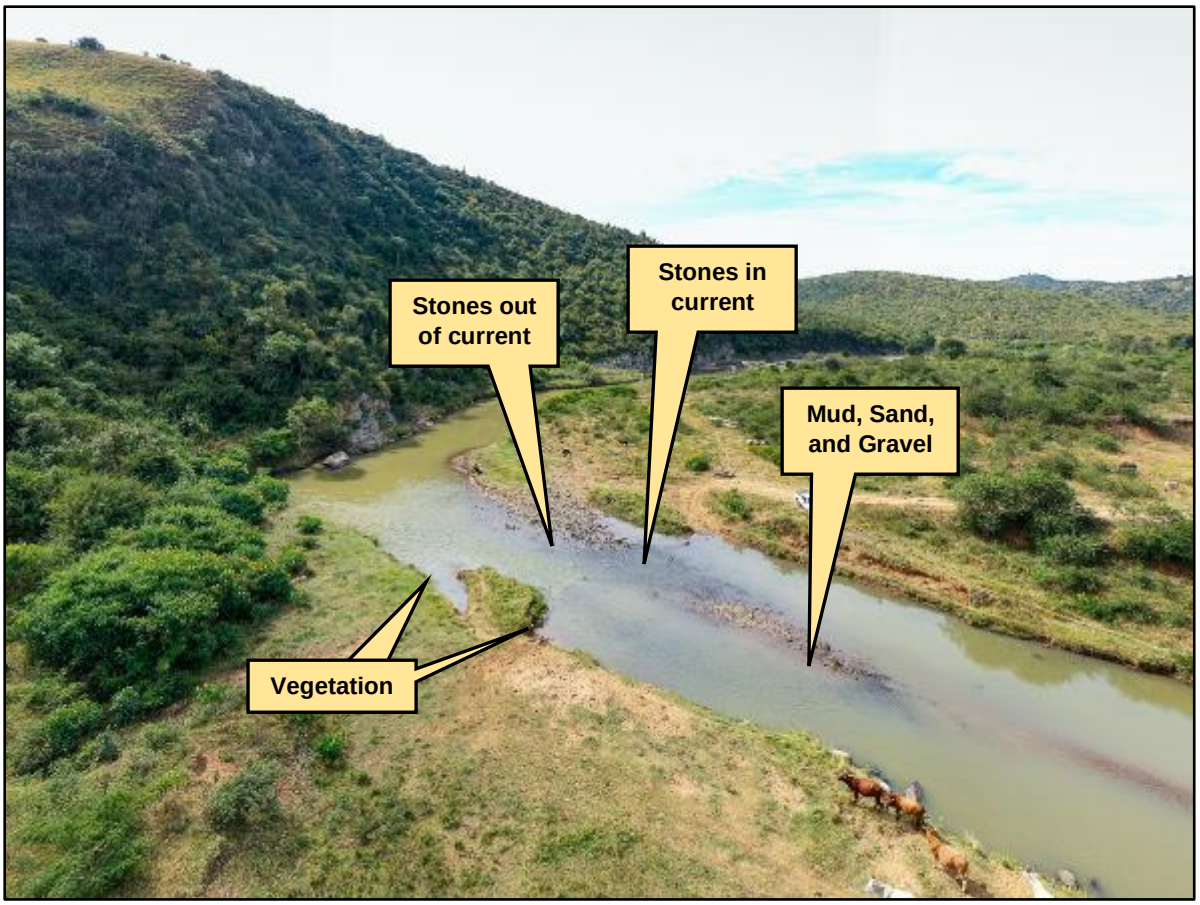

Plate 2: View of the SASS sampling areas

6. SURVEY RESULTS

The field survey was done in April 2021. Late summer is considered to be a suitable time for aquatic surveys as river flows are moderate, water temperatures are not low and the full biota should be present.

6.1 SASS Results

The findings of the SASS survey are presented in Table 3 and **Error! Reference source not found.**. The sampling sites had all the mandated habitat types although the numbers of invertebrates caught were low. However, the site was still placed into Category B (Largely natural). This result is slightly higher than the Present Ecological State (PES) of Class C: Moderately Modified documented in the NFEPA database.

Table 3: Results of the SASS survey

HABITAT TYPE	SCORES	SITE 2
Stones-in-current, and Stones-out-of-current	SASS Score	57
	No. of Taxa	9
	ASPT	6.3
Vegetation	SASS Score	37
	No. of Taxa	9
	ASPT	4.1
Mud, sand, and gravel	SASS Score	17
	No. of Taxa	3
	ASPT	5.7
Composite of all three types	SASS Score	94
	No. of Taxa	13
	ASPT	7.2
	River Class:	**B**

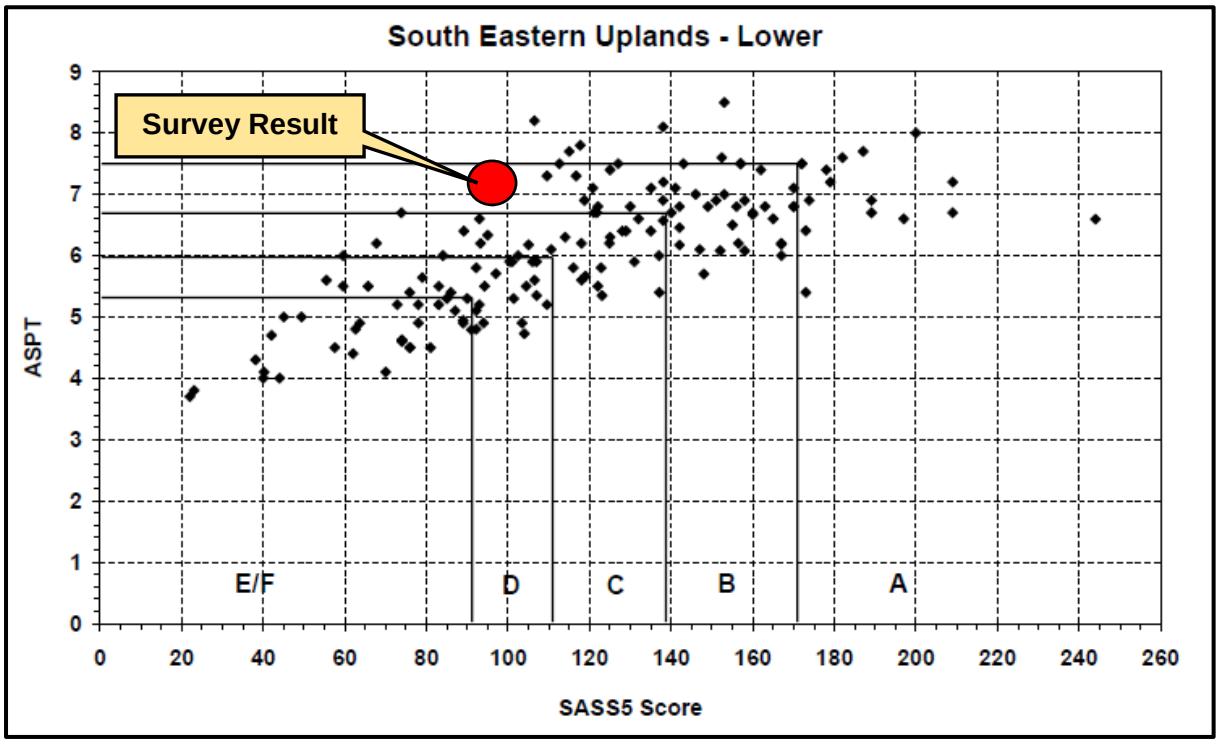

Figure 6: Biological bands for the Lower South Eastern Uplands Ecoregion

6.2 Fish Survey

No fish were captured although a single Natal Yellowfish or Scaly (*Labeobarbus natalensis*) of approximately 150 cm in length was seen. A list of fish indigenous species documented or suspected to be present from the middle and lower Ibisi River is given in Table 4.

Table 4:Indigenous fish species which could occur at the survey site

Scientific Name	Common Name	Likelihood of Occurrence at the site	IUCN Status**
Anguilla mossambica	Longfin Eel	Low	Least Concern
Anguilla bengalensis	Shortfin eel	Very Low	Near Threatened
Anguilla marmorata	Mottled Eel	Very Low	Least Concern
Barbus anoplus	Chubbyhead Barb	Likely	Least Concern
Barbus viviparus	Bowstripe Barb	Unlikely	Least Concern
Clarias gariepinus	Sharptooth Catfish	Very Low	Least Concern
Labeobarbus natalensis	Scaly	Definitely present	Least Concern
Oreochromis mossambicus	Mozambique Tilapia	Possibly present as a result of being introduced into upstream farm dams	Near Threatened

Sources: Kleynhans *et al* (2008), Skelton (2001), Alletson, J. Personal surveys

6.3 General Observations

During the course of the survey, and when moving from one site to the other, two pairs of African Black Ducks (*Anas sparsa*) and an African Pied Wagtail (*Motacilla aguimp*) were seen. Both of these bird species are closely associated with aquatic ecosystems as a large part of their diet consists largely of aquatic insects although the duck also forages on aquatic plants as well. Both prefer pristine or near pristine habitats but can also tolerate some degradation of the system. However, their presence is taken to be an indication of good aquatic health.

It was also noted that alien weed species are generally scarce on the river banks and that relatively little litter in the form of plastics and the like is present.

7. DISCUSSION OF THE RESULTS

7.1 SASS Survey Results

The SASS results were unexpected as an earlier survey done by the author in 2001 at a site near the Road R56 crossing (30°24'33.67"S, 29°54'0.75"E) had produced larger numbers of animals. The two surveys are compared in Table 5. It is apparent that the earlier survey produced samples with greater taxonomic diversity and especially so for the vegetation habitat. It is not known if the change is real and that the river has lost diversity or whether the lower results obtained in the present survey are a consequence of strong flows through the preceding summer season which might have rolled stones and also swept the animals away.

It is not suspected that the expansion of the town of Ibisi since the time of the earlier survey is a threat since it is more than 28 km away by run of river and no intervening threats have been found. Confirmation of the situation could possibly be done through a further survey during the course of the 2021 – 2022 summer season but, because the River Class has remained the same, there is no need to delay the project for a further survey.

Table 5: Results of the SASS surveys done in 2001 and 2021

HABITAT TYPE	CRITERION	SCORES	
		Present Survey	2001 Survey
Stones-in-current, and Stones-out-of-current	SASS Score	57	82
	No. of Taxa	9	12
	ASPT	6.3	6.8
Vegetation	SASS Score	37	128
	No. of Taxa	9	18
	ASPT	4.1	7.1
Mud, sand, and gravel	SASS Score	17	59
	No. of Taxa	3	9
	ASPT	5.7	6.5
Composite of all three types	SASS Score	94	151
	No. of Taxa	13	22
	ASPT	7.2	6.8
River Class:		**B**	**B**

7.2 Fish Survey Results

The fish survey produced no fish but it is known that the middle and lower sections of the Ibisi River do not have high fish species diversity. For this reason, the river is not included in a Fish FEPA or a Fish Corridor even though the river itself is NFEPA listed as a result of being a tributary of the Umzimkulu River. The site referred to by Kleynhans *et al* (2008) is located near the town of Ibisi but the species listed are wide ranging and should be present in the study area. The three eel species are not common anywhere in the region and have low likelihood of being present. The site is at the lower end of the altitude range for *Barbus anoplus* and at the upper end of the altitude range for *Barbus viviparus* and *Clarias gariepinus*. Both of the latter two species are in the river at altitudes nearer the coast. The final species for which there is some doubt is *Oreochromis mossambicus.* It would not have occurred naturally in the area but has been widely spread as a popular angling species in farm dams although there are very few dams in the upper catchment.

8. IMPACT AND RISK ASSESSMENT

While the aquatic survey has been conducted primarily in terms of the National Environmental Management Act (Act No. 107 of 1998), as well as being investigated by means of the National Screening Tool, the development within the Regulated Area of a watercourse implies that the National Water Act (Act No. 36 of 1998) (NWA) must also be considered. For this reason, the impacts and risks that might arise as a result of the construction and operation of the new water abstraction works are assessed according to requirements of both Acts.

The impacts on the aquatic ecosystem as a result of the construction of a new abstraction works are listed below. It is to be noted that, while most consideration has been given to the preferred site as presented in Section 3 above, it may be safely assumed that very similar impacts would be experienced at the second new abstraction point located downstream of the current site.

- Spillage of oils or other hydrocarbons from vehicles or machines during the construction phase. The construction will entail the use of vehicles and machines at a point close to the edge of the river although not actually within the river. However, while any spillage or leakage is likely to be small, it is possible that fuels or oils, including hydraulic oil, could enter the water where they would be toxic to the aquatic fauna and flora.

- Dispersal of uncured cement-based products into the river water during the construction phase. Uncured cement may be toxic to aquatic animals and especially so those with gills. Thus spillage of such materials could be harmful.

- The blasting of the rock channel, if needed, will result in mortality of some animals in close proximity to the site.

- Dispersal of solid wastes into the river. The construction process will inevitably result in some waste materials being generated at the site. Such wastes could include shuttering board, steel offcuts, paper, cardboard, and a variety of plastics including food containers and the like. These materials are unlikely to be toxic but any litter in the river channel is undesirable and should be avoided. Livestock could be harmed if plastics are eaten.

- Sediment from the new access road and pipeline trench. The new access road which links the pump station site to the existing road will be approximately 180 m in length. It will cut across a steep hill slope above the river. Sediment from the construction of this road and from the rising main pipeline trench could slide down the slope into the

river channel or could be washed there by surface flows as a result of rain. Sediment in the river system has the impact of infilling the habitat used by aquatic invertebrates and also smothering plant growths.

- Human wastes from toilets and ablution facilities. Human wastes if spilled or leaked from a toilet or drain could reduce water quality and create a health hazard.

8.1 Impacts in terms of NEMA

In order to assess the listed impacts in terms of NEMA, the system shown in Annexure 2 has been used. The instream fauna is considered to be identical at both sites. The results of the assessments for the Construction Phase are shown in Table 6 and for the Operational Phase in Table 7. Consideration of the two phases of the potential impacts at the alternative Option C site are considered in Table 10 and Table 11.

It is apparent that the impacts at both sites are rated as being negative Low Impact. However, both the Construction Phase and the Operational Phase impacts at the alternative Option C site are slightly higher as a result of the longer access road and pipeline trench potentially producing more soil erosion, and of the possibility of greater damage on the river bank.

Table 6: Scoring of impacts associated with the Construction Phase of the new water abstraction facility on the Ibisi River

Mitigation	Environmental Impact	Consequences of the impact	Spatial extent	Probability	Reversibility	Resource Loss	Duration	Intensity / Magnitude	Significance
Without Mitigation	Spillage of hydrocarbons such as fuels and oils	Hydrocarbons are toxic to aquatic life and may be spread by the flow of water	2	2	1	2	1	2	16 Negative Low Impact
With Mitigation			2	1	1	2	1	1	7 Negative Low Impact
Without Mitigation	Dispersal of uncured cement-based products into the river water	Uncured cement can be toxic to certain aquatic species	1	3	1	2	1	1	8 Negative Low Impact
With Mitigation			1	2	1	1	1	1	6 Negative Low Impact
Without Mitigation	Blasting of the rock channel in order to deepen it	The shock wave will kill some animals	1	4	1	2	1	2	18 Negative Low Impact
With Mitigation			No Mitigation is Possible						
Without Mitigation	Dispersal of solid wastes into the river	Solid wastes are unsightly and could affect animals	2	3	1	2	1	1	9 Negative Low Impact
With Mitigation			2	1	1	1	1	1	6 Negative Low Impact
Without Mitigation	Sediment from the new road and the pipeline trench entering the river	Sediment can cover the substrate and fill animal habitat, and smother plants	2	2	1	2	2	2	18 Negative Low Impact
With Mitigation			2	2	1	1	1	1	7 Negative Low Impact
Without Mitigation	Toilets and ablution facilities could spill or leak human wastes into the river	Human wastes could constitute a health hazard	1	1	1	2	1	2	12 Negative Low Impact
With Mitigation			1	1	1	1	1	1	5 Negative Low Impact

Table 7: Scoring of impacts associated with the Operational Phase of the new water abstraction facility on the Ibisi River

Mitigation	Environmental Impact	Consequences of the impact	Spatial extent	Probability	Reversibility	Resource Loss	Duration	Intensity / Magnitude	Significance
Without Mitigation	Spillage of hydrocarbons such as fuels and oils	Hydrocarbons are toxic to aquatic life and may be spread by the flow of water	2	1	1	1	1	2	12 Negative Low Impact
With Mitigation			2	1	1	1	1	1	6 Negative Low Impact
Without Mitigation	Dispersal of solid wastes into the river	Solid wastes are unsightly and could affect animals	1	1	1	1	1	1	5 Negative Low Impact
With Mitigation			1	1	1	1	1	1	5 Negative Low Impact
Without Mitigation	Sediment from the new road and the pipeline trench entering the river	Sediment can cover the substrate and fill animal habitat, and smother plants	1	1	1	1	2	1	6 Negative Low Impact
With Mitigation			1	1	1	1	1	1	5 Negative Low Impact

Table 8: Scoring of impacts associated with the Construction Phase of the new water abstraction facility at the alternative Site C on the Ibisi River

Mitigation	Environmental Impact	Consequences of the impact	Spatial extent	Probability	Reversibility	Resource Loss	Duration	Intensity / Magnitude	Significance
Without Mitigation	Spillage of hydrocarbons such as fuels and oils	Hydrocarbons are toxic to aquatic life and may be spread by the flow of water	2	2	1	2	1	2	16 Negative Low Impact
With Mitigation			2	1	1	2	1	1	7 Negative Low Impact
Without Mitigation	Dispersal of uncured cement-based products into the river water	Uncured cement can be toxic to certain aquatic species	1	3	1	2	1	1	8 Negative Low Impact
With Mitigation			1	2	1	1	1	1	6 Negative Low Impact
Without Mitigation	Damage to the riparian vegetation at the site of the pump station	Loss of the vegetation could lead to bank erosion and sediment entering the river	2	3	1	2	2	2	20 Negative Low Impact
With Mitigation			2	2	1	1	1	1	7 Negative Low Impact
Without Mitigation	Dispersal of solid wastes into the river	Solid wastes are unsightly and could affect animals	2	3	1	2	1	1	9 Negative Low Impact
With Mitigation			2	1	1	1	1	1	6 Negative Low Impact
Without Mitigation	Sediment from the new road and the pipeline trench entering the river	Sediment can cover the substrate and fill animal habitat, and smother plants	3	2	1	2	2	2	20 Negative Low Impact
With Mitigation			2	2	1	1	1	1	7 Negative Low Impact
Without Mitigation	Toilets and ablution facilities could spill or leak human wastes into the river	Human wastes could constitute a health hazard	1	1	1	2	1	2	12 Negative Low Impact
With Mitigation			1	1	1	1	1	1	5 Negative Low Impact

Table 9: Scoring of impacts associated with the Operational Phase of the new water abstraction facility at the alternative Site C on the Ibisi River

Mitigation	Environmental Impact	Consequences of the impact	Spatial extent	Probability	Reversibility	Resource Loss	Duration	Intensity / Magnitude	Significance
Without Mitigation	Spillage of hydrocarbons such as fuels and oils	Hydrocarbons are toxic to aquatic life and may be spread by the flow of water	2	1	1	1	1	2	12 Negative Low Impact
With Mitigation			2	1	1	1	1	1	6 Negative Low Impact
Without Mitigation	Damage to the riparian vegetation at the site of the pump station	Loss of the vegetation could lead to bank erosion and sediment entering the river	1	2	1	1	2	1	7 Negative Low Impact
With Mitigation			1	1	1	1	1	1	5 Negative Low Impact
Without Mitigation	Dispersal of solid wastes into the river	Solid wastes are unsightly and could affect animals	1	1	1	1	1	1	5 Negative Low Impact
With Mitigation			1	1	1	1	1	1	5 Negative Low Impact
Without Mitigation	Sediment from the new road and the pipeline trench entering the river	Sediment can cover the substrate and fill animal habitat, and smother plants	1	2	1	1	2	1	7 Negative Low Impact
With Mitigation			1	1	1	1	1	1	5 Negative Low Impact

The regulations under NEMA require that Cumulative Impacts be considered. However, while the proposed pumping facility would be a new structure, it will replace an existing facility which is to be decommissioned. Therefore the outcome will be just a single abstraction point and it is thus not regarded as a cumulative impact in regard to the river.

8.2 Impacts in terms of the National Water Act

In order to assess impacts in terms of the NWA, attention was given to the definition of the "Regulated Area of a watercourse". The following applies:

> In terms of the "General Authorisation in terms of Section 39 of the National Water Act, 1998 (Act No. 36 of 1998) for Water Uses as defined in Section 21(c) and (i)", Notice 509 of 2016, specifies that the "regulated area of a watercourse" is to mean:
> *The outer edge of the 1 in 100 year flood line and / or delineated riparian habitat, whichever is the greatest distance, measured from the middle of the watercourse of a river, spring, natural channel, lake or dam;*
> *In the absence of a determined 1 in 100 year flood line or riparian area, the area within 100m from the edge of a watercourse where the edge of the watercourse is the first identifiable annual bank fill flood bench; or*
> *A 500m radius from the delineated boundary (extent) of any wetland or pan.*

The 1 in 100 year floodline in the vicinity of the study area and is shown in Figure 7.

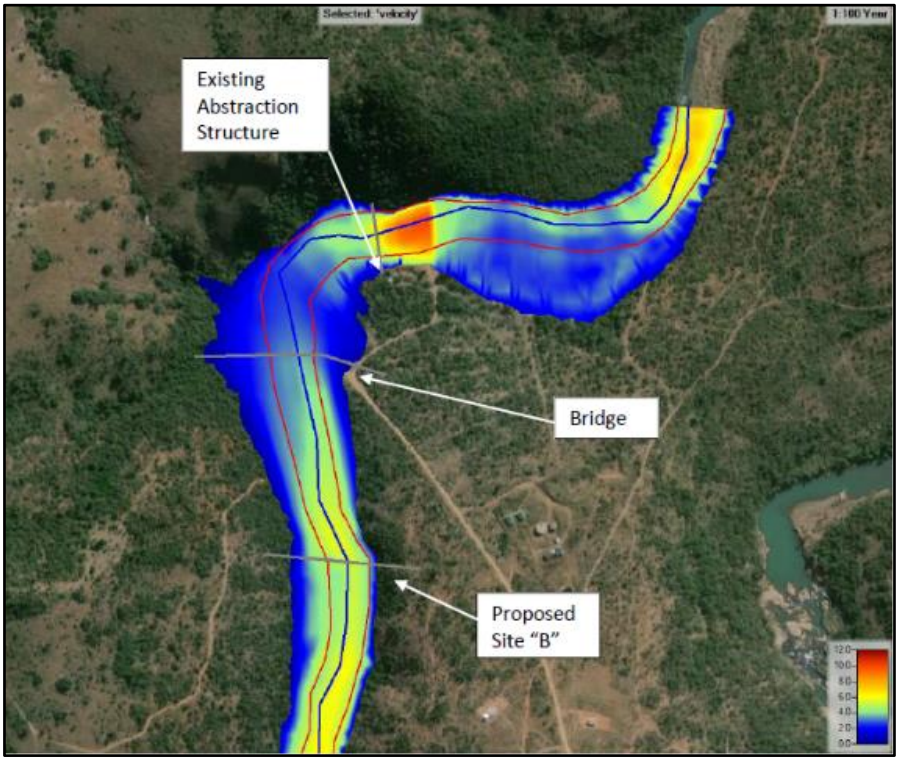

Figure 7: 1 in 100 year floodline in the study area (Source: GIBB, 2021)

In regard to wetlands, the Ezemvelo KZN Wildlife wetlands map, the NFEPA Map 4, and the South African Inventory of Inland Aquatic Ecosystems (SAIIAE) Map 5 were interrogated for any wetlands within 500 m of the study site. Of the three datasets, only the Map 5 and NFEPA indicate any features in that area. The wetlands indicated are all riverine and comprise of the Ibisi River macro-channel. Thus they are covered by the 1 in 100 year boundaries as shown in **Error! Reference source not found.** and **Error! Reference source not found.**.

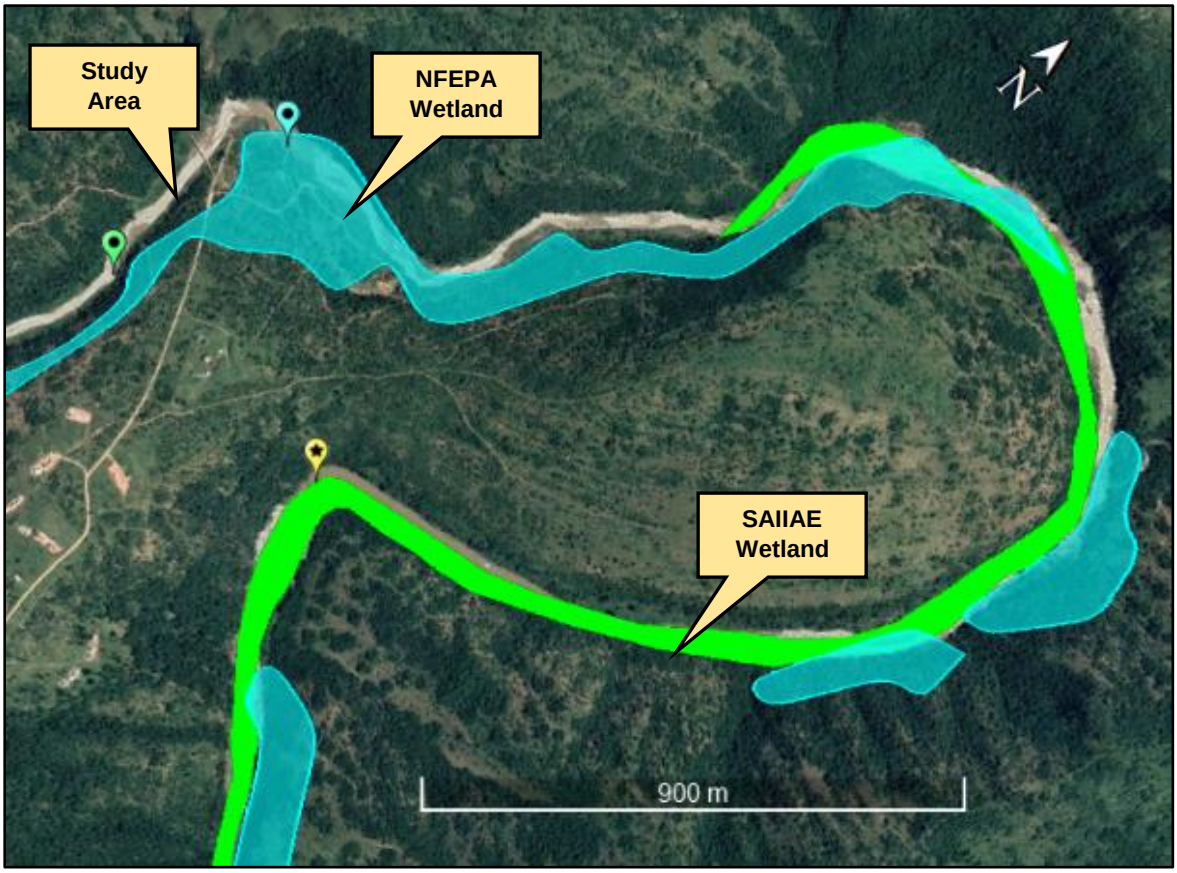

Figure 8: NFEPA and SAIIAE wetlands around the three candidate abstraction sites

The identified impacts have been assessed by means of the Department of Water and Sanitation (DWS) Risk-based Assessment Matrix (DWS, 2014). All of the risks were assessed for conditions during the Construction Phase and with pre- and post-mitigation conditions. The outputs of the Matrix are shown in Table 10. The risk to the aquatic fauna associated with shock waves from blasting to slightly deepen the rock channel cannot be mitigated against. However, the action should be a one-off event and experience from similar blasting at other sites in rivers suggests that the effect will be very localised. Therefore, the rating of "Low Risk" remains.

Consideration of the operational phase risks to the regulated area of the watercourse found that the risks, including flow levels, were so low that the Matrix could not properly assess them. They are therefore considered to be "No Risk".

Table 10: Assessment of risks associated with the new water abstraction facility on the Ibisi River

With/Without Mitigation	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Confidence Level
Without Mitigation	Contamination of the watercourse and wetland areas by vehicles, plant and equipment leaking fuel, oils and other substances	Spillage of hydrocarbons into the river	Hydrocarbons are toxic to aquatic fauna and may be persistent in the aquatic system.	2	6	9	54	**LOW RISK**	90
With Mitigation				2	3	9	27	**LOW RISK**	80
Without Mitigation	Construction of the pumping chamber	Dispersal of uncured cement-based products into the river water	Dispersal of uncured cement-based products into the river water	1.25	3.25	8	26	**LOW RISK**	75
With Mitigation				1	3	8	24	**LOW RISK**	80
Without Mitigation	Rock blasting to deepen the channel	Deepening of the channel to improve water flows	Creation of shock waves from the blast	1.25	3.25	8	26	**LOW RISK**	90
With Mitigation				No mitigation is possible					
Without Mitigation	The construction process will result in	Disposal of litter or building wastes into the river	Such wastes include paper, plastics, food containers, cement	1.25	5.25	10	52.5	**LOW RISK**	85

With/Without Mitigation	Activity	Aspect	Impact	Severity	Consequence	Likelihood	Significance	Risk Rating	Confidence Level
With Mitigation	production of some solid wastes		bags, rubble, scrap materials, etc.	1	3	4	12	**LOW RISK**	90
Without Mitigation	Construction of the new access road and the adjacent rising main water pipeline	The road and pipeline pass across a steep slope and so rock and soil could fall or be washed into the river below	Sediment can cover the substrate and fill animal habitat, and smother plants	1.25	5.25	8	42	**LOW RISK**	80
With Mitigation				1	4	8	32	**LOW RISK**	80
Without Mitigation	Provision of toilets and ablution facilities for construction workers	Toilets could leak or have spillage allowing wastes to be washed into the river	Contaminated water could percolate to the watercourse and result in contamination of the system	1.25	5.25	8	42	**LOW RISK**	80
With Mitigation				1	3	8	24	**LOW RISK**	90

9. CONSIDERATION OF MITIGATORY MEASURES

In accordance with the policy of best practice it will be necessary for some mitigatory measures to be implemented in order to reduce the impacts and risk levels which might arise in the construction phase of the project. Since virtually all of the potential impacts would be associated with the construction phase, the primary focus of mitigation will be to prevent contamination of the river in that time. However, attention must also be given to the operation phase as well as to any future upgrades and to possible decommissioning of the infrastructure. The management and mitigatory measures are listed in Table 11 and should be included into the Environmental Management Plan (EMP) for the project.

Table 11: Mitigatory measures to be used to reduce construction impacts and risks

Impact	Description	Management and Mitigation
Construction Phase		
Spillage of hydrocarbons into the river	Contamination of the watercourse and wetland areas by vehicles, plant and equipment leaking fuel, oils and other substances. Hydrocarbons are toxic to aquatic fauna and may be persistent in the aquatic system.	**1.** The works period within the river channel must be limited to as short a period as possible. **2.** No fuelling of machines or plant may be done within 20 m of the river channel or wetland. **3.** Drip trays must be used during refuelling. **4.** Any spillages, if they occur, in these areas must be contained and cleared up immediately. Contaminated soil must be stored in appropriate containers and then be removed to an approved disposal facility. **5.** An emergency clean up kit of suitable capacity and sealable soil storage drums must be on site at all times. **6.** No plant or equipment will be stored/parked within 40m of the bank of any watercourse or wetland areas when not in operation. Plant and equipment will be parked at designated parking areas. **7.** All plant and equipment must be checked on a daily basis for leaks, any plant that is found to be leaking will be removed off site for maintenance.
Dispersal of uncured cement-based products into the river water	Uncured cement can be toxic to certain aquatic species	**1.** Areas where uncured cement or concrete is being used should be bunded by means of sandbags or boards until such time as the product has fully cured. **2.** No cement or concrete may be mixed (batched) within 40 m of any watercourse or wetland area. All surplus mix must be removed from the construction site, and be stored prior to disposal at a municipal or other approved disposal area. **3.** Mixing may not be done on bare ground but must be on a board or other hard surface which can be properly cleaned. **4.** Cement bags may not be burned but must be taken to a municipal or other approved disposal area. **5.** Ideally the work will be scheduled for the dry season.

Impact	Description	Management and Mitigation
Construction Phase		
Blasting of the rock channel in order to deepen it	The shock wave will kill some animals	1. This impact cannot be fully mitigated against but it is recommended that the number of blast events be kept as low as possible. **2.** Ideally the work will be scheduled for the dry season.
Disposal of litter or building wastes into the river	Such wastes include paper, plastics, food containers, cement bags, rubble, scrap materials, etc.	**1.** During the construction phase, construction and domestic wastes must be collected in waste bins or skips that are located on site. The content of these must be removed on a daily basis to a collection point in the site camp from where the waste can be cleared on a weekly basis. The collected waste must be disposed of at a municipal landfill facility. **2.** A designated eating area must be identified no less than 40m from the bank of the river or the delineated edge of any wetland area. This eating area must be used by the employees during their eating breaks. **3.** Appropriate skips and waste bins must be placed at a number of points around the working areas and construction camp. **4.** No waste may be disposed of on-site by any means including burying or burning. **5. H**azardous waste must be collected and stored in bins in the construction camp prior to being removed from the site by a registered service provider for disposal. The bins must have lids and must be marked as being hazardous. They must be stored in a designated and enclosed area, and may not be used for any other purpose.
Sediment from the new road and the rising main pipeline trench entering the river	Sediment can cover the substrate and fill animal habitat, and smother plants	**1.** Ideally the road construction will be done in the dry season when rainfall is at its lowest. **2.** Prior to the start of any clearing operations the responsible contractor must produce a method statement detailing the planned operating procedures and the statement must be approved by both the ECO and the project engineer.

Impact	Description	Management and Mitigation
Construction Phase		
		4. During the site preparation process all material which is to be removed from the working area must be removed from that area. No material may be simply pushed out of the working area and into the channel. **5.** The material which has been moved must be stockpiled or spoiled at a site which is at least 30 m away from the edge of the river macro-channel. **6.** The road surface must be hardened to a standard which will prevent erosion and development of rainwater gullies. The use of a concreted surface or, at least, concrete strips, is recommended. **7.** Herringbone drains to remove water from the road must be included at intervals not exceeding 30 m on the steeper slopes. **8.** No road drains may discharge into an area within 20m of a watercourse or the Ibisi River channel. **9.** The verges must be stabilised and be planted over with a grass seed mixture consisting of the following grasses: Love Grass (*Eragrostis curvula*) 60% Paspalum (*Paspalum notatum*) 40% In addition, sods of *Aristida* grass may be obtained locally and be used in rows on steeper banks. NOTE: Kikuyu Grass may not be planted anywhere on the site at any time. **10.** The whole area must be cleared of alien weed species and must be kept weed free for a year after the end of the construction and sign-off phases.
Toilets and ablution facilities could spill or leak human wastes into the river	Human wastes could constitute a health hazard	**1.** The capacity and functionality of the toilets must be monitored on a daily basis. **2.** If, the during the monitoring, it is found that the tanks are at 80% of their capacity, they must be cleared within two days of the monitoring event.

Impact	Description	Management and Mitigation
Construction Phase		
		3. The disposal of the sewage waste must be done by a registered service provider who will dispose of the material at an approved facility.
Operational Phase		
The impacts which may be anticipated during the operational phase of the project will be a continuation of those in the construction phase but at a very much lower degree of intensity. However, the objective of protecting the river and its regulated area remains and so the management and mitigation measures listed above should be referred to as guidelines		
Upgrade or Decommissioning Phases		
When the facility is eventually upgraded or decommissioned the same objective of protecting the river and its regulated area remains and so the management and mitigation measures listed above should be referred to as guidelines.		

10. MONITORING REQUIREMENTS

The key impacts that have been identified during the risk assessment relate to the risks that the construction operations pose to the regulated area of the river and to the water quality within the river. Although the likely impacts and risks have been found to be minor it is still recommended that an implementable monitoring regime is undertaken to determine the occurrence of contamination or other impacts as soon as possible. Most of the monitoring will be done by an Environmental Control Officer (ECO) who must meet the required standards but the project engineer and lead construction contractor will also have some monitoring responsibilities.

10.1 Monitoring actions and locations

The monitoring programme provided for below must be conducted by an independent, suitably qualified ecological specialist or specialists.

The monitoring programme will have two components which are to ensure that the stipulated construction and operational conditions which have been included in the Environmental Management Plan (EMPr) are adhered to, and to monitor the condition of the Ibisi River. Table 12 below provides the approximate locations for the sample sites that must be used.

Table 12: Coordinates for the sampling sites

Actions	Sample site	Position	
		Latitude	Longitude
Control points for project construction and operations at the preferred abstraction site. NB: Two candidate sites are suggested for the downstream site.	Upstream Point	30° 27' 28.94"	30° 0' 38.81"
	Downstream Point	30° 27' 13.86"	30° 0' 38.14"
		30° 27' 8.45"	30° 0' 43.55"
Control points for project construction and operations at the downstream abstraction site. suggested.	Upstream Point	30° 27' 8.45"	30° 0' 43.55"
	Downstream Point	30° 27' 34.22"	30° 1' 10.86"

At the chosen sites, the required actions will be as follows:

- To undertake a SASS survey
- To collect water samples for chemical analysis

In addition, the river bank in the vicinity of the abstraction point must be photographed from at least one fixed photo point and must be checked for signs of erosion or of sediment inputs.

10.2 Monitoring actions and frequency

Table 13 lists the required monitoring actions and schedules

Table 13: Monitoring actions to be carried out

Actions	Frequency	Rationale
Wet and dry season visits to the site prior to the start of any construction. The monitoring sites will be visited and fixed photo points will be selected and documented. SASS and possibly fish sampling must be done.	At least two visits	Acquisition of baseline data, including photographs, which may be used as a benchmark against which the results of future monitoring may be measured.
Initial site visit with the project engineer and construction contractor to peg the route of the new access road and pipeline trench and to consider the drainage and other construction issues.	One month prior to the start of construction	The siting of the construction facilities in is of importance and the issues relating to sediment from the new access road and pipeline trench must be considered.
Visits by the ECO at short intervals to the construction area for the first two months of operation.	10 to 14 days	The high frequency of visits in the early stages of the construction process is called for to ensure that the initial clearing work near the river channel is done according to the required conditions.
Monitoring visits by the ECO to the construction area. To include fixed point photography.	Monthly for the remaining duration of the construction	The ECO will check that all the required environmental stipulations in the EMPr are being adhered to and will report on the findings as required by

Actions	Frequency	Rationale
	and sign-off phases.	Appendix 7 of the NEMA: Environmental Impact Assessment Regulations of 2014.
Collection of water samples by the ECO for analysis.	Quarterly for the duration of the construction and sign-off phases.	The water quality is to be monitored in order to ensure that the river is not being contaminated. The following are to be measured: Coliforms, E. Coli, Turbidity, Suspended Solids, Conductivity, Oils.
Ecological monitoring. To include fixed point photography.	Six monthly for the duration of the construction and sign-off phases and for two years thereafter.	SASS surveys. These surveys are intended to determine any instream consequences on the river.

Each monitoring event must be reported on and the reports be submitted to the Harry Gwala District Municipality, EDTEA, The Department of Water Affairs and Sanitation, and the project engineers.

10.3 Sampling procedures for the monitoring programme

The focus of the sampling aspects is to investigate for any traces of contamination from the dam site during the construction and sign-off phases. The analyses are not intended to be a full spectrum determination of the river water and so is restricted to just a few parameters as listed below:

- Coliforms. (To reveal possible leaks from the toilet facilities);
- *E. coli.* (To reveal possible leaks from the ablution facilities);
- Turbidity. (To reveal sediment entering the river);
- Suspended solids. (To reveal sediment entering the river);
- Conductivity. (To reveal sediment entering the river); and

- Petroleum and oil traces (To expose the impact of spillages of hydrocarbons and other dangerous goods).

The collection points for water sampling are to be situated at the sites listed in Table 12. The samples must be analysed at a SANAS certified laboratory and must be collected in new bottles provided by the laboratory. Of key importance in the results will be not the absolute values but rather the differences between upstream and downstream of the construction site.

The biological surveys (SASS5) must be undertaken at the start and end of the rainy season. Thus probable months will be October and March in each year.

11. CONCLUSION AND RECOMMENDATIONS

The riparian and instream conditions of the Ibisi River at the site of the proposed new abstraction works which will provide water for the Mnqumeni Water Supply Scheme have been studied and the possible risks and impacts posed by the project have been investigated. The approach taken was to address the requirements of both the National Environmental Management Act (Act No. 107 of 1998) and the National Water Act (Act No. 36 of 1998) and so the observations made in the field were interpreted in slightly different ways.

11.1 Background conditions

Examination of the river channel and its surrounds, including a SASS survey and a fish survey showed the river to be in moderately good condition. The results of the SASS survey produced a PES Category of Class B (Near Natural) See Table 3. This is similar to the result of an earlier survey done near the town of Ibisi. See Table 5. The fish survey however, caught no specimens although some were seen. The river is known to have a poor indigenous fish assemblage and is not listed as a fish FEPA or Fish Corridor within the NFEPA system. As the water offtake will be limited and as there is no new construction of a barrier to affect fish migrations, it is not thought that the upgrade will have any noticeable effect on the aquatic fauna. It was also noted that the river banks are remarkably free of invasive alien weed species and that there was very little litter in the area.

11.2 Impact assessment

The impact assessment carried out in terms of NEMA found that all the foreseen impacts at both the preferred and alternative sites have significance scores of Low (Tables 6 to 9) The reason for this is that, because of the natural rock formations on the river banks and in the channel itself, there will actually be very little disturbance to the river provided that construction is done correctly and that the mitigation measures are applied.

11.3 Risk assessment

The DWS Risk-based Matrix was used to determine the risks that the project poses to the regulated area of the river in terms of the National Water Act. It was found that all the construction phase risks that could be scored were rated as being Low. See Table 10. Other risks, linked to the operational phase, were so minor that the matrix cannot provide for them and so are rated as being “No Risk”.

11.4 Mitigation of impacts and risks

Despite the very low ranking of the impacts and risks determined by the assessment processes, a suite of mitigatory measures has been put forward. See Table 11. These measures are designed to safeguard the riverine ecosystem and are to be included into the Environmental Management Plan for the project.

11.5 Summary

It is believed that the site of the proposed Mnqumeni Water Supply Scheme has been investigated and assessed sufficiently thoroughly to allow for a decision to be made in regard to the further progression of the project.

The construction phase will have potential for a number of minor impacts on the riverine system but they will be short term impacts largely restricted to the construction phase, and most can be reduced by careful management of the construction site and process.

In the operational phase the impacts arising from the operation and maintenance of the raw water pump station are very minor and can be totally obviated if care is taken.

Against these impacts is the major positive impact of provision of a reliable source of potable water to several rural communities including schools and clinics. The present water supply infrastructure is dysfunctional and unreliable and so places the communities it supplies into an undesirable situation. It is therefore the opinion of the specialist that the construction of the new abstraction point at the preferred site will have no fatal flaws and may therefore be authorised but only subject to certain conditions.

These conditions are as follows:

i. The mitigatory measures put forward must be adhered to.

ii. The appointed ECO must have authority to motivate for further measures if unforeseen impacts arise.

iii. The proposed monitoring measures must be put in place and be rigorously implemented.

12. REFERENCES

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ANNEXURE 1

Declaration of Specialist Independence

I, Dacre James Alletson as the appointed independent specialist, in terms of the 2014 EIA Regulations, hereby declare that I:

- act as the independent specialist in this application;
- perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the applicant;
- 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, 2014 and any specific environmental management Act;
- declare that there are no circumstances that may compromise my objectivity in performing such work;
- have expertise in conducting the specialist report relevant to this application, including knowledge of the Act, Regulations and any guidelines that have relevance to the proposed activity;
- will comply with the Act, Regulations and all other applicable legislation;
- have no, and will not engage in, conflicting interests in the undertaking of the activity;
- have no vested interest in the proposed activity proceeding;
- undertake to disclose to the applicant and the competent authority all material information in my possession that reasonably has or may have the potential of influencing - any decision to be taken with respect to the application by the competent authority; and - the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority;
- 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;
- all the particulars furnished by me in this specialist input/study are true and correct; and
- realise that a false declaration is an offence in terms of regulation 48 and is punishable in terms of section 24F of the Act.

Signature of specialist:

Name of specialist: Dacre James Alletson

Date: 15th November 2022

ANNEXURE 2

Scoring System Used to Rate Impacts

The Environmental Impact Assessment (EIA) Methodology assists in evaluating the overall effect of a proposed activity on the environment. Determining of the significance of an environmental impact on an environmental parameter is determined through a systematic analysis.

Determination of Significance of Impacts

Significance is determined through a synthesis of impact characteristics which include context and intensity of an impact. Context refers to the geographical scale (i.e. site, local, national or global), whereas intensity is defined by the severity of the impact e.g. the magnitude of deviation from background conditions, the size of the area affected, the duration of the impact and the overall probability of occurrence. Significance is calculated as shown in **Table 1**.

Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. The total number of points scored for each impact indicates the level of significance of the impact.

Impact Rating System

The impact assessment must take account of the nature, scale and duration of effects on the environment and whether such effects are positive (beneficial) or negative (detrimental). Each issue / impact is also assessed according to the various project stages, as follows:

- Planning;
- Construction;
- Operation; and
- Decommissioning.

Where necessary, the proposal for mitigation or optimisation of an impact should be detailed. A brief discussion of the impact and the rationale behind the assessment of its significance has also been included.

The significance of Cumulative Impacts should also be rated (As per the Excel Spreadsheet Template).

Rating System Used to Classify Impacts

The rating system is applied to the potential impact on the receiving environment and includes an objective evaluation of the possible mitigation of the impact. Impacts have been consolidated into one (1) rating. In assessing the significance of each issue the following criteria (including an allocated point system) is used:

Table 1: Rating of impacts criteria

ENVIRONMENTAL PARAMETER		
A brief description of the environmental aspect likely to be affected by the proposed activity (e.g. Surface Water).		
ISSUE / IMPACT / ENVIRONMENTAL EFFECT / NATURE		
Include a brief description of the impact of environmental parameter being assessed in the context of the project. This criterion includes a brief written statement of the environmental aspect being impacted upon by a particular action or activity (e.g. oil spill in surface water).		
EXTENT (E)		
This is defined as the area over which the impact will be expressed. Typically, the severity and significance of an impact have different scales and as such bracketing ranges are often required. This is often useful during the detailed assessment of a project in terms of further defining the determined.		
1	Site	The impact will only affect the site
2	Local/district	Will affect the local area or district
3	Province/region	Will affect the entire province or region
4	International and National	Will affect the entire country
PROBABILITY (P)		
This describes the chance of occurrence of an impact		
1	Unlikely	The chance of the impact occurring is extremely low (Less than a 25% chance of occurrence).
2	Possible	The impact may occur (Between a 25% to 50% chance of occurrence).
3	Probable	The impact will likely occur (Between a 50% to 75% chance of occurrence).
4	Definite	Impact will certainly occur (Greater than a 75% chance of occurrence).
REVERSIBILITY (R)		
This describes the degree to which an impact on an environmental parameter can be successfully reversed upon completion of the proposed activity.		
1	Completely reversible	The impact is reversible with implementation of minor mitigation measures
2	Partly reversible	The impact is partly reversible but more intense mitigation measures are required.
3	Barely reversible	The impact is unlikely to be reversed even with intense mitigation measures.
4	Irreversible	The impact is irreversible and no mitigation measures exist.
IRREPLACEABLE LOSS OF RESOURCES (L)		
This describes the degree to which resources will be irreplaceably lost as a result of a proposed activity.		
1	No loss of resource.	The impact will not result in the loss of any resources.
2	Marginal loss of resource	The impact will result in marginal loss of resources.
3	Significant loss of resources	The impact will result in significant loss of resources.
4	Complete loss of resources	The impact is result in a complete loss of all resources.
DURATION (D)		
This describes the duration of the impacts on the environmental parameter. Duration indicates the lifetime of the impact as a result of the proposed activity.		
1	Short term	The impact and its effects will either disappear with mitigation or will be mitigated through natural process in a span shorter than the construction phase (0 – 1 years), or the impact and its effects will last for the period of a relatively short construction period and a limited recovery time after construction, thereafter it will be entirely negated (0 – 2 years).
2	Medium term	The impact and its effects will continue or last for some time after the construction phase but will be mitigated by direct human action or by natural processes thereafter (2 – 10 years).

3	Long term	The impact and its effects will continue or last for the entire operational life of the development, but will be mitigated by direct human action or by natural processes thereafter (10 – 50 years).
4	Permanent	The only class of impact that will be non-transitory. Mitigation either by man or natural process will not occur in such a way or such a time span that the impact can be considered transient (Indefinite).
INTENSITY / MAGNITUDE (I / M)		
Describes the severity of an impact (i.e. whether the impact has the ability to alter the functionality or quality of a system permanently or temporarily).		
1	Low	Impact affects the quality, use and integrity of the system/component in a way that is barely perceptible.
2	Medium	Impact alters the quality, use and integrity of the system/component but system/ component still continues to function in a moderately modified way and maintains general integrity (some impact on integrity).
3	High	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component is severely impaired and may temporarily cease. High costs of rehabilitation and remediation.
4	Very high	Impact affects the continued viability of the system/component and the quality, use, integrity and functionality of the system or component permanently ceases and is irreversibly impaired (system collapse). Rehabilitation and remediation often impossible. If possible rehabilitation and remediation often unfeasible due to extremely high costs of rehabilitation and remediation.
SIGNIFICANCE (S)		
Significance is determined through a synthesis of impact characteristics. Significance is an indication of the importance of the impact in terms of both physical extent and time scale, and therefore indicates the level of mitigation required. This describes the significance of the impact on the environmental parameter. The calculation of the significance of an impact uses the following formula: Significance = (Extent + probability + reversibility + irreplaceability + duration) x magnitude/intensity. The summation of the different criteria will produce a non-weighted value. By multiplying this value with the magnitude/intensity, the resultant value acquires a weighted characteristic which can be measured and assigned a significance rating.		
Points	Impact Significance Rating	Description
5 to 23	Negative Low impact	The anticipated impact will have negligible negative effects and will require little to no mitigation.
5 to 23	Positive Low impact	The anticipated impact will have minor positive effects.
24 to 42	Negative Medium impact	The anticipated impact will have moderate negative effects and will require moderate mitigation measures.
24 to 42	Positive Medium impact	The anticipated impact will have moderate positive effects.
43 to 61	Negative High impact	The anticipated impact will have significant effects and will require significant mitigation measures to achieve an acceptable level of impact.
43 to 61	Positive High impact	The anticipated impact will have significant positive effects.
62 to 80	Negative Very high impact	The anticipated impact will have highly significant effects and are unlikely to be able to be mitigated adequately. These impacts could be considered "fatal flaws".
62 to 80	Positive Very high impact	The anticipated impact will have highly significant positive effects.

ANNEXURE 3

Compliance with the Protocol for the Specialist Assessment and Minimum Report Content Requirements for Environmental Impacts on Aquatic Biodiversity

Protocol Requirement	Compliance
The assessment must be prepared by a specialist registered with the South African Council for Natural Scientific Professionals (SACNASP), with expertise in the field of aquatic sciences.	J. Alletson. SACNASP Registration No 125697
The assessment must be undertaken on the preferred site and within the proposed development footprint.	Section 3
The assessment must provide a baseline description of the site which includes, as a minimum, the following aspects: • a description of the aquatic biodiversity and ecosystems on the site; • aquatic ecosystem types; • presence of aquatic species, and composition of aquatic species communities; • the threat status of the ecosystem and species as identified by the screening tool; • an indication of the national and provincial priority status of the aquatic ecosystem, including a description of the criteria for the given status; and • a description of the ecological importance and sensitivity of the aquatic ecosystem.	Section 3 Section 5 Section 6
The assessment must identify alternative development footprints within the preferred site which would be of a "low" sensitivity as identified by the screening tool and verified through the site sensitivity verification and which were not considered appropriate	Section 2 Note: The project is an upgrade of an existing facility and cannot be moved from the area.
Related to impacts, a detailed assessment of the potential impacts of the proposed development.	Section 7 Section 10
How will the proposed development impact on the functioning of the aquatic feature?	Section 7
How will the proposed development impact community composition (numbers and density of species) and integrity (condition, viability, predator-prey ratios, dispersal rates, etc.) of the faunal and vegetation communities inhabiting the site?	Section 10
The findings of the specialist assessment must be written up in an Aquatic Biodiversity Specialist Assessment Report that contains, as a minimum, the following information: • contact details of the specialist, their SACNASP registration number, their field of expertise and a curriculum vitae;	Header Page Section 4 Section 7 Section 8 Section 10

Protocol Requirement	Compliance
• a signed statement of independence by the specialist; • a statement on the duration, date and season of the site inspection and the relevance of the season to the outcome of the assessment; • the methodology used to undertake the site inspection and the specialist assessment, including equipment and modelling used, where relevant; • a description of the assumptions made, any uncertainties or gaps in knowledge or data; • additional environmental impacts expected from the proposed development; • any direct, indirect and cumulative impacts of the proposed development on site; • the degree to which impacts and risks can be mitigated; • the degree to which the impacts and risks can be reversed; • the degree to which the impacts and risks can cause loss of irreplaceable resources; • proposed impact management actions and impact management outcomes for inclusion in the Environmental Management Programme (EMPr); • a substantiated statement, based on the findings of the specialist assessment, regarding the acceptability or not of the proposed development and if the proposed development should receive approval or not; and • any conditions to which this statement is subjected.	